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Corn

Background for 1990 Farm Legislation

Stephanie Mercier

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Abstract

Corn is the leading U.S. crop, both in volume and in value. In 1987, farmers planted about 65 million acres and harvested 7.1 billion bushels. The farm value of production totaled about $13 billion, about 36 percent of farm receipts from crops. Rising corn yields and market prices strengthened corn farmers' cash flow positions in the late 1970's; however, per bushel real returns above cash expenses declined in recent years. Lower loan rates, the issuance and exchange of generic certificates, and devaluation of the U.S. dollar relative to the mid-1980's all contributed to the growth of U.S. corn exports in recent years. Government program costs for corn averaged more than $4.6 billion a year during the 1984-88 crop years, or 30 percent of the $15.7 billion corn crop value. Higher feed grain prices stemming from the programs comprise an additional cost to the livestock sector and consumers.

Keywords: corn, domestic use, farm programs, farm returns, prices, program effects, world markets

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 preceding legislation to see what lessons can be learned that are applicable to the 1990's. This report updates **Corn: Background for 1985 Farm Legislation** (AIB-471) by William Lin, Mack Leath, and Philip Paarlberg. It is one of a series of updated and new Economic Research Service background papers 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

Although corn yields have fluctuated, there is a definite upward trend of about 2 bushels per acre per year. Corn use trended upward during the past two decades, reaching a record 7.7 billion bushels in 1987/88. Livestock and poultry feeding is the predominant domestic use. Food and industrial use of corn, although a relatively small proportion of total domestic use, has been steadily increasing, mainly due to expanding markets for corn sweeteners. Production of ethanol made from corn has been expanding and its growth may continue if Federal and State tax incentives continue.

Corn imports by Japan, non-EC Western Europe, developing countries, and centrally planned nations will likely be increasingly important. The growth in world corn trade in the 1970's and 1980's came largely from expanded imports by developing and centrally planned countries. However, their import growth in the 1990's is in question.

High corn yields and substantial deficiency payments in recent years have strengthened corn farmers' cash income positions. Their returns above cash expenses increased from $0.37 per bushel in 1977/78 to $1.21 in 1979/80 in nominal terms, but fell to $0.54 per bushel in 1986/87. Most of that was due to program payments. Large commercial farms growing corn are probably more cost-efficient than are small farms, although additional gains in efficiency are minimal once a farm reaches 500-1,000 acres of cropland.

Government corn programs to support prices, enhance farm income, and periodically reduce surplus stocks have a 50-year history. Prior to 1961, the response to low prices and surplus stocks centered on allotments and price supports based on parity. Then the approach shifted to voluntary programs that featured direct payments and acreage diversion. Programs in the 1970's switched to market orientation with emphasis on farmer control over the production mix. Price and income supports were moved toward a safety net concept, and authority was maintained for voluntary production control through acreage reduction.

Corn farmers benefit from participating in corn programs directly through supported prices and direct payments and indirectly through higher market prices and land value capitalization induced by the higher prices. U.S. corn farmers have received program payments since 1961. In recent years, the payments have fluctuated from about $210 million in 1980/81 to $7,737 million in deficiency, diversion, and storage payments in 1987/88. Program payments averaged more than 91 percent of farm returns above cash expenses during 1983-88.

Higher corn prices resulting from the programs, however, are an indirect cost to livestock and poultry producers and consumers. For example, the 1978 corn program was found to have increased retail prices of beef and pork by nearly 1 percent each. The program also affected retail prices of poultry, milk, and eggs.

However, the relatively narrow farm-to-retail price spreads for beef, pork, and other livestock products suggest that more stable corn prices mean more stable retail prices for meat, poultry, milk, and eggs.

The $5.7 billion net Commodity Credit Corporation (CCC) expenditures (including payments and loan operation outlays) for corn alone in crop year 1983 accounted for 30 percent of total CCC outlays for all crops. At this level, net program expenditures amounted to about $26,000 per program participant, or nearly 70 cents per bushel of corn produced. During the 1983-88 crop years, program costs averaged more than $4.6 billion a year or 30 percent of the average $15.6 billion corn crop value.

Corn

Background for 1990 Farm Legislation

Stephanie Mercier

Introduction

Corn is the leading U.S. crop, both in volume and in value. In 1987, farmers planted about 65 million acres in corn, accounting for about 22 percent of the 304 million acres planted to principal crops. About 90 percent of the acreage was harvested for grain and the balance for silage and forage, or abandoned. With an average yield of 119.4 bushels per acre, U.S. corn production for grain reached 7.1 billion bushels in 1987. The value at the farm gate totaled just over $13 billion, down about 36 percent from its record level of $21 billion in 1982.

Corn, soybeans, and cotton compete for the same land in various areas of the country. The primary demand for corn and soybeans is derived from the market for livestock products here and abroad. Corn is the most important grain used in feed rations. Soybean meal is the predominant oilseed meal used in concentrate feeds. In the 1987 crop year, corn accounted for 77 percent of all grains fed to livestock, while soybean meal accounted for around 90 percent of oilseed meals used. Corn programs have indirect but substantial effects on the soybean and livestock sectors.

Farm programs have been used for many decades to address periodic problems for corn producers, such as low prices and incomes. However, the environment is now complicated by the growing dependence of U.S. agriculture on export markets and mounting farm program costs.

As debate on the 1990 omnibus farm legislation begins, accurate information on the industries and current farm programs will be critical to formulating decisions regarding changes in agricultural programs and policies. This report provides detailed background on the corn industry, including trends in U.S. and world production and trade. It also describes the 50-year history of Federal programs for corn and discusses the effects of these programs on crop and livestock producers, consumers, and taxpayers. The report also highlights the issues likely to be discussed in the current policy debate.

Structure of the Corn Industry

Production

Total U.S. corn production has trended upward since the 1930's. Production has more than doubled since 1965, peaking at 8.9 billion bushels in 1985 (app. table 1). Year-to-year fluctuations in production occur, however, because of such

factors as the weather and Federal policies. Drought in 1988, for example, reduced production by more than 30 percent from the previous year. In 1983, drought and a payment-in-kind (PIK) program reduced corn production to 4.2 billion bushels, half the level in 1982 and the smallest corn harvest since 1970.

Harvested acreage has remained fairly constant (app. table 1), indicating that increased yields are responsible for most of the gains in corn production. Corn yields rose from 74.1 bushels per acre in 1965 to over 91 bushels in 1973. Yield gains slowed during the mid-1970's as more marginal, less productive land was brought into production. However, corn yields rose over 18 percent between 1978 and 1987 to 119.4 bushels per acre.

The general increase in yields over time is due mainly to changes in technology and production practices, including development of improved high yielding hybrid varieties, increased rates of fertilization, increased irrigation, higher seeding rates, improved control of weeds, insects, and disease, and diversion of less productive acreage. Total use of agricultural chemicals rose more than 150 percent between 1965 and 1981, then declined somewhat in recent years due to the increased amount of retired acreage. Barring weather fluctuations, such as occurred in 1983 and 1988, corn yields have been increasing about 2 bushels per acre per year.

In 1982, about 9.5 million acres of corn (nearly 12 percent of planted acres) were irrigated. Irrigation, not common in the Corn Belt, has increased in other areas, particularly in the Plains region. Leading States for irrigated corn are Nebraska, Kansas, Colorado, and Texas. Corn yields on irrigated land were 58 percent higher than on nonirrigated land in Nebraska, Kansas, and Texas, but at a higher cost of production.

Almost half the corn acreage is grown in rotation with soybeans. A corn-soybean rotation can result in a 15-percent corn yield increase and some increase in soybean yields because of better control of plant insects and diseases.

In 1980, approximately one-third of the total corn acreage was under some form of conservation tillage, up from 18 percent in 1972. Minimum tillage is gaining in popularity in corn production, although much of the growth in minimum tillage is in historically smaller corn growing areas such as the East and Southeast. Many farmers substitute the chisel plow for the moldboard plow as the primary tillage implement to help control erosion and to reduce production costs. Conservation tillage acreage is expected to continue increasing. This increase in conservation tillage would tend to depress yields slightly, but reduce production costs more.

Location and Size of Farms

The number of farms growing corn declined from 1.5 million in 1964 to 713,700 in 1982, while the average acreage harvested rose from 39 to 100 acres per farm. The 21 largest corn-producing

States accounted for nearly 84 percent of the farms growing corn in that year. Acreage planted to corn in the 21 States accounted for nearly 90 percent of the national total. A special tabulation of 1982 Census data in the 21 States showed total cropland in farms growing corn to be almost 200 million acres. The farms averaged more than 240 acres of cropland and had greater than $70,000 worth of sales per farm from all production. Farms with 500 acres of cropland or more accounted for 15.6 percent of farms growing corn but 45 percent of corn production (table 1). Farms with less than 100 acres of cropland accounted for around one-third of farms growing corn, but produced only 5 percent of the corn. Fifty-one percent of farms harvesting corn

Table 1--Number of farms harvesting corn in 21 largest corn-producing States, by acreage and sales classes, 1982

Cropland and sales class	Farms	Percentage of total
	Number	Percent
Cropland (acres):		
1-99	186,562	31.2
100-249	185,417	31.0
250-499	132,598	22.2
500-999	68,818	11.5
1,000 and over	24,225	4.1
Total	597,620	100.0
Sales class:		
Less than $2,500	55,784	7.8
$2,500-$9,999	112,081	15.7
$10,000-$39,999	198,413	27.8
$40,000-$99,999	183,485	25.7
$100,000-$249,999	124,486	17.5
$250,00-$499,999	29,465	4.1
$500,000-$999,999	7,532	1.1
Greater than $1,000,000	2,414	.3
Total	713,660	100.0

Note: The 21 States tabulated are: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas, North Carolina, Georgia, Kentucky, Mississippi, Texas, Idaho, Colorado, Washington, and California. Sales class dates are based on farms that grew corn in 48 States in 1982.

Source: 1982 Census of Agriculture.

Table 2--Types of farms and crop mixes by size of farm growing corn for selected States, 1982[1]

Commodity	Size of farm (cropland acres)					All farms
	1-99	100-249	250-499	500-999	Over 1,000	
			Percent			
Type of farm:						
Cash grain	45.5	46.4	54.8	64.3	69.9	51.0
Other crops	15.9	7.5	5.0	4.8	6.7	9.2
Livestock	29.0	22.9	23.9	22.8	19.6	24.9
Dairy	6.9	21.0	13.7	6.0	2.1	12.5
Poultry	1.1	.5	.4	.3	.3	.6
Other livestock	1.7	1.7	2.2	1.9	1.4	1.8
			Acres per farm			
Harvested acres for principal crops:						
Corn	19.3	62.3	139.9	261.3	526.1	107.8
Sorghum	.2	1.1	4.2	13.5	56.8	5.2
Wheat	2.1	7.3	19.2	54.4	244.9	23.4
Oats	2.0	7.9	12.3	16.8	24.7	8.8
Barley	.1	.4	1.3	4.4	23.7	1.9
Soybeans	7.6	33.9	89.3	174.6	301.9	65.1
Hay	8.1	26.5	36.1	47.4	90.4	27.9

[1] States as shown in table 1 footnote.

in 1982 were classified as cash grain farms. The next most important type of farm was livestock, accounting for just under 25 percent. More of the large farms tended to be cash grain farms, while the proportion of livestock farms appeared to be fairly uniform across the various sizes (table 2).

Corn was the primary crop grown by all farms growing corn, accounting for about 44 percent of the total cropland allocated to specific crops. The next most important uses of cropland were for soybeans (27 percent) and hay crops (11.6 percent) for livestock feeding. The remaining cropland was used for growing wheat, oats, sorghum, and barley. The enterprise mix also varied by region. For example, farms growing corn in the eastern Corn Belt tended to be cash grain farms while those in the western Corn Belt were corn/livestock farms. Corn production is concentrated in the Corn Belt, Lake States, and Northern Plains.[1]

[1] Corn Belt States -- Iowa, Illinois, Ohio, Indiana, Missouri. Lake States -- Michigan, Wisconsin, Minnesota. Northern Plains -- North Dakota, South Dakota, Nebraska, Kansas. Southeast -- Alabama, Georgia, South Carolina, Florida. Delta States -- Arkansas, Missisippi, Louisiana.

The Corn Belt has accounted for around half of U.S. corn acreage since the 1950's. The Lake States' share has continued to increase and in 1987 was nearly double the 9-percent share of 1950. The Northern Plains has maintained a 15- to 18-percent share of corn acreage since 1960. The expansion in the Lake States came at the expense of the Southeast and Delta regions where the shares trended downward to 2.3 and 0.1 percent in 1987. This occurred because of competition from more profitable crops, such as soybeans and double-cropped wheat and soybeans.

Trends in Domestic Use and Stocks

In the 1980's, Federal policies and the weather meant large fluctuations in corn production and stocks. The combination of the PIK program and summer drought reduced U.S. corn production in 1983 to 4.2 billion bushels, half the level in 1982 and the smallest corn harvest since 1970. At the same time, however, beginning stocks were at record levels because of bumper 1981 and 1982 crops.

Total disappearance of corn, both domestic use and exports, has trended upward during the past 20 years, reaching a record 7.7 billion bushels in the 1987 crop year: 6.0 billion bushels for domestic use and 1.7 billion bushels for exports. During the

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Crop Acreage Base

The crop acreage base (CAB) was expanded in 1978 and 1979. Any corn grower, under the basic rule established first in the 1981 Act, could ask the Agricultural Stabilization and Conservation Service (ASCS) for certification of base acreage if there was a 2-year corn production record. Under the Food Security Act of 1985, the individual corn and sorghum bases were combined into one base for program participation purposes. The corn-sorghum acreage base is the average of acres planted and considered planted (primarily acres put into conserving uses under the acreage reduction program and the paid land diversion) to corn or sorghum in the last 5 years. During 1974-77, the base remained stable at nearly 61 million acres, but expanded to 76 million acres in response to rapidly growing export demand in 1978. By 1987, it reached 83 million acres (table 3).

With program participation at extremely high levels, the amount of base acreage tends to restrict additional acreage planted, and tends to control the corn crop size. The existence of base acreage also has the effect of limiting the growth of soybean acreage, because as a nonprogram crop, planting soybeans on base acreage causes the farmer to lose base acreage certification on that land.

Table 3--Corn base acreage, planted acreage, yield, and production, 1980-88

Item	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
Base acres	Mil. ac.	84.1	80.5	81.2	81.2	80.8	84.2	82.4	83.3	83.4
Planted acres	Do.	84.0	84.1	81.9	60.2	80.5	83.4	76.7	65.7	67.5
Program yield	Bu./ac.	96.2	102.5	102.0	104.0	112.0	106.0	104.2	104.2	104.2
Yield	Do.	91.0	108.9	113.2	81.0	106.7	118.0	119.3	119.4	84.6
Production	Mil. bu.	6,639	8,119	8,235	4,166	7,674	8,876	8,249	7,072	4,921

1970's, corn exports grew faster (53 percent) than domestic use (5 percent). But, between 1980 and 1987, exports dropped from 2.4 billion bushels to 1.7 billion bushels (with a low of 1.2 billion bushels in 1985) as domestic use increased. Feed and residual use dropped in 1988 due to the drought. Corn exports, however, have been rising since 1985/86 and are projected to be 2.1 billion bushels in 1988/89.

Livestock and Poultry Feed

Livestock and poultry feeding accounted for 76 percent of the domestic use of corn in 1988/89. Corn accounted for 79 percent of all grains fed to livestock. Feed use ranged from a low of 3 billion bushels in 1964/65 to a record 4.7 billion bushels in 1987/88 as cattle on feed stood at 9.2 million head and grain-consuming animal units (GCAU's) totaled 77.3 million head (tables 4 and 5). Feed use of corn, being a derived demand, is positively related to cattle on feed or more generally to the number of animal units (includes pork and poultry as well). For example, feed use of corn dropped sharply in 1983/84 as cattle on feed fell from 10.3 million head to 9.9 million. A 10-percent rise in GCAU's has been associated with a 5-percent rise in corn feed use, and vice versa.

In addition to the change in number of animals fed, the variation in feed use reflects adjustments made by livestock and poultry producers in response to relative prices and availability of corn and competing feed grains or feed ingredients (see box). Factors such as variations in crop quality, the volume of feed required to achieve a particular protein content, can affect feed value and thus maintain a particular level of animal weight gain. For example, the increase of corn feed use between 1983-87 reflected the steady level of grain consuming animal units and also the decline in corn prices from $3.25 a bushel in 1983/84 to $1.94 in 1987/88. Higher corn prices because of drought and increased corn exports decreased corn feed use from 114.5 million tons in 1979 to 105 million the following year, because of drought and the PIK program in 1983, and the drought in the spring and summer of 1988. Estimates indicate feed use of corn increases (decreases) by 0.4 to 0.6 percent for a 1-percent decrease (increase) in the price of corn.

Table 4--U.S. corn supply and disappearance, 1978-88

Year beginning October 1	Supply			Disappearance				Ending stocks (Sept. 30)		
	Beginning stocks	Production	Total (including imports)	Food, seed, and industrial	Feed and residual	Exports	Total	Government owned	Privately owned[1]	Total
				Million bushels						
1978/79	1,111.4	7,267.8	8,380.5	620.7	4,322.8	2,133.1	7,076.6	99.7	1,204.2	1,303.9
1979/80	1,303.9	7,928.1	9,233.1	674.8	4,508.3	2,432.6	7,616.0	256.3	1,360.8	1,617.1
1980/81	1,617.1	6,639.4	8,257.7	735.3	4,132.9	2,355.2	7,223.4	237.8	796.5	1,034.3
1981/82	1,034.3	8,118.7	9,154.2	811.5	4,201.8	1,966.9	6,980.2	302.4	1,871.6	2,174.0
1982/83	2,174.0	8,235.1	10,410.0	897.8	4,522.3	1,870.0	7,290.1	1,166.3	1,953.6	3,119.9
1983/84	3,523.1	4,174.7	7,700.5	975.1	3,817.6	1,901.5	6,694.2	201.5	804.8	1,006.3
1984/85	1,006.3	7,674.0	8,683.8	1,091.0	4,079.0	1,865.0	7,035.6	224.9	1,423.3	1,648.2
1985/86	1,648.2	8,876.7	10,535.5	1,159.8	4,095.3	1,241.2	6,496.0	545.7	3,493.8	4,039.5
1986/87	4,039.5	8,249.9	12,291.5	1,190.6	4,717.3	1,504.4	7,412.3	1,443.2	3,438.5	4,881.7
1987/88	4,881.7	7,072.1	11,958.1	1,229.0	4,738.0	1,732.0	7,699.0	835.0	3,424.8	4,259.6
1988/89[2]	4,259.1	4,921.2	9,185.3	1,255.0	4,000.0	2,100.0	7,355.0	400.0	1,430.0	1,830.0

NA = Not available.

[1] Includes free stocks and farmer-owned reserve.
[2] Estimate as of Aug. 12, 1989.

Source: Feed Situation and Outlook. Econ. Res. Serv., U.S. Dept. Agr., 1984, 1988.

Table 5--Feed use and animal numbers, marketing years, 1979-88

Item	1979/80	1980/81	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89
					Million metric tons					
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[1]	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[2]	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
					Million units					
Animals:										
GCAU[3]	82.3	80.6	77.5	78.5	78.3	76.5	75.4	75.0	77.3	76.4
					Million head					
Cattle[4]	10.4	9.8	9.0	10.3	9.9	10.3	10.6	9.7	9.2	9.7
					Dollars per bushel					
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
					Metric tons per GCAU					
Feed rate[5]	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.

Substitution in Feed Rations

The livestock feed ration (on a weight basis) contains two-thirds roughage and pasture and one-third concentrates (although poultry feeding relies primarily on concentrates). Feed concentrates include feed grains, wheat, rye, oilseed meals, animal protein feeds, grain protein, mill byproducts, and mineral supplements.

Competition among feed ingredients depends on relative prices and relative feed values. Average feed values on a bushel-for-bushel basis differ from a pound-for-pound basis because bushel weights generally are different, although corn and sorghum bushels each weigh 56 pounds. Feed values for major grains averaged across all livestock classes and shown as a percentage of corn's value are presented below:

	Pound for pound	Bushel for bushel
	Percent of corn's feed value	
Corn	100	100
Sorghum	95	95
Barley	90	77
Oats	90	51
Wheat	105	113

Prices of competing feed grains, feed wheat, and to a lesser extent feed ingredients such as soybean meal also are important determinants of feed use of corn. For example, the corn/sorghum feed use ratio increased in the feed ration from 6 to 1 in 1973/74 to 8.9 to 1 in 1986/87, partly because corn became cheaper relative to sorghum. Wheat feeding similarly increased from 7.8 million tons in 1982/83 to 10.5 million tons in 1986/87 because wheat became less expensive relative to corn. Substitution between corn and wheat has been moderated by wheat programs that set wheat loan rates relative to corn loan rates at a level exceeding feed value. A 1-percent drop in the wheat/corn price ratio generally boosts wheat feed use by 3.5 percent.

About a third of U.S. corn production is fed to livestock and poultry on the farms where it is raised; the rest enters the marketing system. Country elevators are the primary assemblers of corn sold from farms, accounting for about 80 percent of the volume, although some corn moves directly from farms to subterminal and terminal elevators.

The feed manufacturing industry is the most important user of corn in terms of sales volume, accounting for about a fourth of

the total feed use. In 1984, 6,411 feed manufacturers with potential annual capacity to produce 1,000 tons or more of feed produced 109.5 million tons of formula feed. The industry processes and mixes feed to specifications. Ingredients include corn and other feed grains, oilseed meals, grain byproducts, animal protein, minerals, and miscellaneous ingredients.

Food, Seed, and Industrial Use

Food, seed, and industrial uses of corn totaled over 1.2 billion bushels in 1987/88, about 20 percent of domestic use. The amount of corn used for food, seed, and industrial purposes doubled in the 1970's and again in the 1980's due to expanding markets for high-fructose corn syrup (HFCS) and other sweetener products produced by the wet-milling industry.

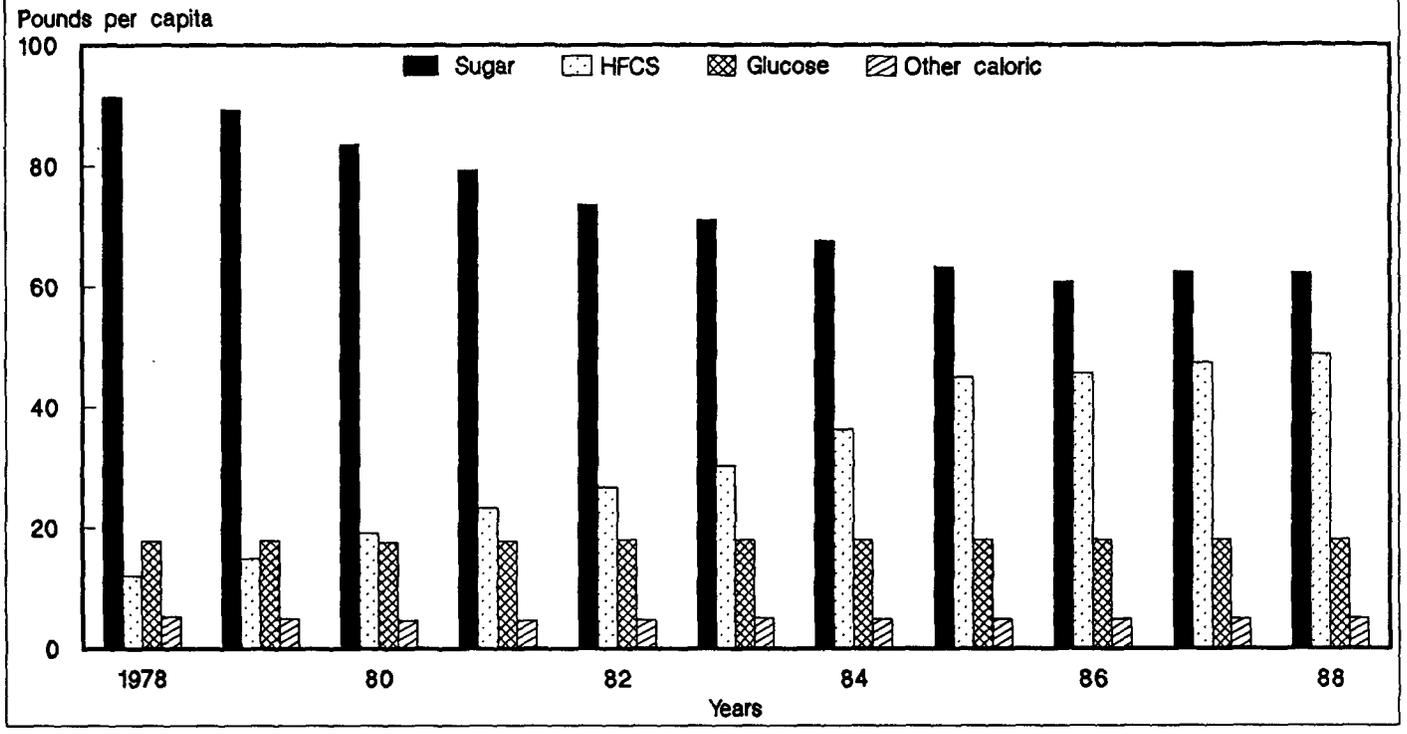
In 1987/88, about 713 million bushels of corn were used to produce HFCS, glucose, dextrose, and starch. Another 207 million bushels were used for ethanol production, up from 15 million bushels of corn in 1970. HFCS accounted for 12 percent of domestic corn use and ethanol, 3 percent.

The U.S. sugar programs and Federal and State tax incentives designed to expand capacity for ethanol production have stimulated the growth in corn wet-milling. Import fees, duties, and restrictive import quotas used to administer the current sugar program kept the domestic refined sugar price at an artificially high level, despite a declining world price. The U.S. sugar price has been about twice what it would have been without the program since 1982. On a per pound basis, wholesale HFCS prices have been able to undercut sugar prices by 20-30 percent in the 1980's. This helps to explain the growth of HFCS in the U.S. sweeteners market from 3 pounds per capita in 1974 to 48.7 pounds in 1988 (fig. 1). In contrast, per capita sugar consumption fell from 95.6 pounds in 1974 to 62 pounds in 1988 (table 6). Thus, the sugar program has stimulated additional substitution of HFCS for sugar in many food and beverage products, even though per capita consumption of HFCS probably would have grown anyway because of its low cost of production.

HFCS, glucose, and other caloric sweeteners now account for more than 53 percent of total domestic sweetener use, as opposed to 24 percent in 1975. Analysts expect the share to continue to grow if the current sugar program is maintained, thereby benefiting corn growers. Per capita consumption of HFCS, however, is projected to rise at a much slower rate than in earlier years as the HFCS industry has matured. Corn use for HFCS is projected to rise from 370 million bushels in 1988/89 to nearly 460 million bushels by 1995, an annual growth rate of about 3 percent. This compares to an annual growth rate of corn use for HFCS in the 1980's of 26 percent.

Fuel, industrial, and beverage alcohol sales grew from 75 million bushels in 1980/81 to an estimated 352 million bushels in 1987/88. Corn prices, government policy to deregulate natural gas, tax incentives, and petroleum prices all affect the

Figure 1
U.S. per capita sweetener consumption



competitive position of ethanol. The increase in the Federal excise tax break on ethanol blends from 5 cents to 6 cents a gallon, which took effect on January 1, 1985, substantially expanded ethanol sales. An additional factor is the Environmental Protection Agency's (EPA) determination to reduce automobile emissions by mandating sale of ethanol blend gasoline in certain high-pollution regions, such as Denver, Colorado.

Trends in the World Corn Market

World corn production trended upward from 1960 to the early 1980's, then fell to about 347 million tons in 1983/84. It climbed to near 480 million tons by 1986/87. The United States is the largest producer, accounting for more than 40 percent of world corn production in 1987/88 (table 7). China ranks second with 18 percent. East Europe and Brazil both produce 5-8 percent of world corn output.

The United States also is the largest corn consumer, typically accounting for around a third of world corn consumption. China ranks second with 16 percent. The EC-12, the Soviet Union, and Japan together account for about a sixth (table 7).

World Exports and Major Competing Exporters

World exports of coarse grains increased from about 25 million tons in 1960/61 to a record 90 million tons in 1982/83, dropping to about 83 million tons in 1987. Corn dominates the world trade in feed grains, accounting for about 70 percent (excluding intra-EC trade) in 1988/89.

Table 6--Per capita consumption of sweeteners, world sugar prices, refined sugar prices, and delivered prices for HFCS, 1979-88

Item	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
					Pounds					
Per capita consumption:										
Sugar	89.3	83.6	79.4	73.7	71.1	67.6	63.3	60.8	62.4	62.2
HFCS	14.9	19.2	23.3	26.7	30.3	36.3	45.0	45.6	47.3	48.7
Glucose	17.9	17.6	17.8	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Other caloric	5.0	4.7	4.7	4.8	5.1	4.9	4.9	4.9	4.9	5.0
Total	127.1	125.1	125.4	123.2	124.5	126.5	131.2	129.3	132.6	133.1
					Cents per pound					
World raw price	9.74	29.02	16.93	8.42	8.49	5.18	4.04	6.05	6.71	10.07
Refined sugar price (f.o.b.)[1]	19.68	38.29	28.26	27.62	26.09	25.66	23.18	23.42	23.60	25.27
Delivered price for HFCS-42	13.54	24.27	21.94	16.82	18.47	20.41	19.38	19.30	17.72	16.46

[1] Wholesale prices of cane sugar, 100-lb. paper bags, Chicago market.

Table 7--World corn production, utilization, and trade for leading countries and the United States, 1984-88

Item	1984/85	1985/86	1986/87	1987/88	1988/89[1]
			Million metric tons		
Corn production:					
United States	194.9	225.5	209.6	179.6	125.0
China	73.4	63.8	70.9	79.8	75.0
East Europe	35.4	30.6	38.9	29.9	28.4
Brazil	22.0	21.0	26.5	24.5	23.0
World	458.8	479.8	477.7	447.0	397.8
Corn utilization:					
United States	131.3	133.5	150.0	151.6	140.3
China	65.7	73.2	74.4	77.0	74.0
USSR	32.9	24.8	19.6	22.1	33.3
West Europe	30.7	30.1	28.9	27.9	27.9
Japan	14.2	14.4	15.5	17.1	16.8
World	435.0	425.2	460.3	462.2	460.2
Corn exports:					
United States	46.7	31.5	39.4	44.5	53.4
Argentina	7.1	7.4	4.0	3.6	2.7
China	5.1	6.0	2.2	4.1	3.8
Thailand	3.2	3.8	2.6	.7	2.4
South Africa	.2	1.5	2.6	.6	2.0
World	66.6	54.5	56.4	56.8	66.8
Corn imports:					
USSR	20.3	10.3	7.6	8.1	17.3
Japan	14.0	14.6	16.1	16.7	16.7
EC-12[2]	9.0	4.8	2.8	3.3	3.0
Mexico	1.7	1.7	2.8	3.0	3.3

[1] Estimate as of Aug. 12, 1989.
[2] Excludes intra-European Community (EC) trade.

The United States, Argentina, South Africa, China, and Thailand are the leading corn exporters, accounting for more than 90 percent of total world corn exports (table 7). The United States ranks first, accounting for more than 70 percent of corn exports. In 1988/89, U.S. corn exports totaled an estimated 53.4 million metric tons.

Argentina has retained its distant second place share of world corn exports despite a decline since the 1985 peak of 13.6 percent. In 1988/89, Argentina accounted for slightly more than 4 percent of world corn exports. Exports declined over that period due to switching to other crops due to relative price

advantages, the chaotic state of the economy (particularly the massive inflation), and sporadic bad weather.

Thai exports of corn in general increased between 1965-85, although they have also been subject to variation due to poor quality and bad weather. Thailand now accounts for 3.6 percent of the world corn exports and its coarse grain (mostly corn) exports average about 3 million tons, with the exception of 1987/88, when the monsoon failed to produce adequate rain. In the past, export taxes were used by Thailand to generate customs revenue and control supplies to the domestic market. But these policies are being relaxed, making Thailand more price-competitive.

Thailand has an open market for corn with relatively few restrictions or incentives for corn production or exports. The government, however, has had a long-term bilateral supply accord with Taiwan and actively negotiates annual bilateral trade agreements for corn exports. The recent expansion in Thai corn production resulted from an increase in acreage planted. Expansion will depend on the allocation of foreign exchange to purchase fertilizer from abroad or produce it domestically, and on the availability of improved hybrids to boost yields. Prospects for further land expansion are limited. One factor which has limited Thai export capability, especially over the last few years, is the expansion in domestic use of corn, particularly in poultry feeding.

Exports from South Africa, while relatively small, have fluctuated greatly over the last decade. South African corn exports have ranged from almost 5 million metric tons in 1980 to a negligible amount in 1983 and 1984. These variations arise primarily from weather considerations. South Africa markets corn through its Maize Board which protects producers via a stabilization fund, and sets minimum selling prices below producer prices. Thus, world market price changes are not fully transmitted to producers and consumers.

China has been increasing its exports of corn since the beginning of agricultural reform in 1978, but has been a net exporter of corn only since 1985. Poor internal infrastructure, particularly transportation, has caused China to export corn from grain-surplus regions in northern China but import corn and other coarse grains into southern China. China's share of world corn exports since that time has ranged from 6-11 percent.

U.S. Exports of Corn

U.S. corn exports climbed steadily during the boom of the 1970's, peaking at 2.4 billion bushels in 1979. The U.S. market share declined in the early 1980's, but its share began to rebound in 1985 (table 8). High U.S. loan rates and a continued strong U.S. dollar contributed to the decline in U.S. corn and coarse grain exports in the early 1980's. U.S. corn loan rates above world market-clearing prices encouraged importers to buy less U.S. coarse grain. Such loan rate levels stimulated competing

Table 8--U.S. corn exports to selected countries, October-September year, 1983-87

Destination	1983/84	1984/85	1985/86	1986/87	1987/88
			1,000 metric tons		
Mexico	2,805	1,400	1,639	3,251	3,172
EC	7,982	5,954	3,046	1,948	2,663
USSR	6,282	14,399	6,376	3,884	5,119
Japan	13,775	11,165	9,313	12,450	14,879
South Korea	2,971	1,453	1,330	4,079	4,798
China	200	--	--	1,027	281
Taiwan	2,694	3,079	2,583	3,183	3,845
Egypt	1,302	1,398	1,496	2,036	873
Subtotal	38,011	38,848	25,783	29,910	35,630
Total	46,985	46,276	31,136	39,349	43,724

Note: Total U.S. exports may differ from table 7 due to different marketing year shown.
-- = Not Applicable.

exporters to expand their production and sell more in world markets at a price just under the loan rate, thereby reducing U.S. corn and coarse grain exports. U.S. corn exports change less than proportionally in the short run as U.S. corn prices change. However, in the longer run, a given percentage change in price leads to a larger percentage change in exports in the opposite direction. A higher price cuts exports and a lower price increases them.

The Food Security Act of 1985 lowered loan rates from their previous levels. This fact together with the issuance and exchange of generic certificates enhanced U.S. competitiveness on the world coarse grain market.

Increases in the value of the dollar also hurt the competitive position in the early 1980's. For example, as the U.S. dollar strengthened from 219 yen per dollar in 1979 to nearly 250 in 1985, U.S. corn exports declined from 61 million tons to 31.1 million tons. Similarly, as the yen/dollar rate declined to 135.8 by the end of 1986, U.S. corn exports increased to 39.3 million tons. During 1980-85, it is estimated that a 1-percent increase in the value of the U.S. dollar reduced U.S. corn exports by 3.1 percent. Subsequent to 1985, however, the value of the dollar decreased, enhancing the U.S. competitive position in the export market.

Table 9--Distribution of world corn exports and stocks, October-September years, 1984-88

Country	1984/85	1985/86	1986/87	1987/88	1988/89
			Percent		
Share of exports:					
United States	70.0	57.8	69.8	78.3	77.5
Argentina	10.7	13.6	7.1	6.3	4.1
South Africa	.3	2.7	4.6	1.0	3.0
Thailand	4.8	7.0	4.6	1.2	3.6
China	8.2	11.7	6.7	7.2	6.0
Other	6.0	7.2	7.2	6.0	5.8
			Million metric tons		
Total world corn exports	66.6	54.5	56.4	56.8	65.8
			Percent		
Share of ending stocks:					
United States	53.2	71.3	76.9	74.2	56.7
Total foreign	46.8	28.7	23.1	25.8	43.3
			Million metric tons		
Total world ending stocks	89.2	143.8	161.7	145.8	74.4

Note: Intra-EC trade is excluded.

Sales to the Soviet Union helped increase the U.S. share of world corn exports from 56 percent in 1972 to 78 percent in 1987/88 (table 9). During that period, however, the U.S. share fluctuated largely due to the January 1980 U.S. embargo on grain sales to the USSR. Following the embargo, the U.S. share of the world market for coarse grain declined by 6 percentage points from 1978/79 to 1982/83. Major countries that compete with the United States in the world grain market expanded their grain production and exports. For example, the Canadian share of the world wheat and coarse grains market rose from 11 to 15 percent, which it has maintained, while the Argentine share increased from 6 to 10 percent between 1982-85, but fell to around 4 percent in 1988/89. After the embargo, the USSR, the EC, Japan, Eastern Europe, and China increased their imports from major U.S. competing exporters. Meanwhile, the USSR cut its purchases of U.S. wheat, coarse grains, soybeans, and sorghum. In 1982/83, the USSR imported only 20 percent of its wheat and coarse grains from the United States, down from 72 percent in 1978/79. However, the U.S. share of Soviet imports now has risen to about a third due, in part, to a new long-term agreement and the export enhancement program (EEP).

The United States absorbs a disproportionate volume of coarse grain stocks when world supplies are large and releases coarse grain supplies when supplies are tight. The U.S. farmer-owned reserve and price support programs have helped the United States maintain its image as a reliable supplier of corn and coarse grain. The large stocks and competitive position of the dollar caused U.S. exports to rebound since 1985. Additional factors have been the unreliability of rival suppliers and various credit guarantee and food aid programs in use, although EEP has not been used for corn exports. The United States had 74 percent of world corn ending stocks in 1987/88 when corn supplies were large (see table 9). U.S. stocks served a cushioning role when the drought of 1988 depleted world corn stocks by 50 percent, yet world trade and consumption remained virtually unchanged.

Major Exporters and Competition from Other Feed Grains

Export competition for corn cannot be assessed in isolation from other feed grains because of the ease of substitution among alternative feed grains and carbohydrate sources in livestock and poultry feeding. Corn faces a large number of substitutes including other feed grains as well as feed wheat, grain byproducts, cassava, and citrus pulp. In this context, the United States faces competition not only from Argentina, South Africa, Thailand, and China for corn, but from Argentina and Thailand for other feed grains and nongrain feeds, as well as Canada and Australia for wheat and other feed grains (table 10).

Argentina world coarse grain export share (corn, sorghum, and barley) trended upward in the 1960's and 1970's but has fallen from a peak reached in the early 1980's. In some ways, soft wheat exports (that are feed quality) will be even greater competition to U.S. corn exports. There are several reasons why Argentine coarse grain exports grew during the 1970's. First, Argentina eliminated its export taxes for wheat, corn, and sorghum temporarily in 1977, restored them to 25 percent in 1982, eliminated them again in 1988, and reinstituted them in 1989. Floor prices for corn are based on the world price. Export taxes on those commodities were as high as 50 percent before 1977.

Second, Argentina sought to reduce the degree of overvaluation of its currency in the early 1980's by allowing the austral to depreciate against the U.S. dollar. This means that Argentina has the potential to undercut the U.S. export price as the value of the austral falls relative to the dollar. Finally, Argentina benefited from the sales suspension of sales to the Soviet Union, providing an opportunity for Argentina to negotiate a new long-term agreement, one of the few sources of corn and sorghum available to the Soviets. The Soviet Union purchased large quantities of corn and sorghum from Argentina at a premium price. In addition to the USSR agreement, Argentina has bilateral pacts with China, Iraq, Mexico, Algeria, Cuba, and a few other countries.

Canada and Australia, not major corn producers, are important exporters of other feed grains and feed wheat. Given the

Table 10--World coarse grain exports, crop years, 1984-88

Country or region	1984/85	1985/86	1986/87	1987/88	1988/89
			Million metric tons		
United States	55.4	36.4	47.5	53.5	59.0
Canada	3.3	5.8	6.6	4.2	3.9
Australia	6.4	5.0	3.1	2.5	2.6
Argentina	10.6	9.7	5.0	5.2	4.2
South Africa	.2	1.5	2.6	.6	2.0
Thailand	3.5	4.0	2.8	.7	2.6
China	5.6	6.3	2.0	3.6	3.8
World total	100.4	83.2	84.1	83.0	94.7

substitutability of feed grains in world markets, policies and trade practices in these countries can significantly affect U.S. corn exports.

Both Canada and Australia export feed grains through marketing boards and use price pooling to stabilize grower returns. These marketing boards also can influence domestic prices, although the degree of control varies by country, commodity, and use. Domestic wheat prices in Australia have been administered at levels above and below export prices. In the case of coarse grains (primarily barley and sorghum), however, sales are handled by state marketing boards, and no administrative price has been set for the domestic market. With U.S. dominance in world feed grain markets and the wide range of substitutability, the boards are not able to significantly affect world prices of feed grains.

Argentina and Australia primarily rely on the world market to absorb most of their production variability. These countries, along with Canada, have little economic incentive to expand their grain storage capacity, likely due to the U.S. willingness to carry the bulk of the world's stocks at no cost to taxpayers in competitors' countries. As a result, only pipeline supplies are usually held at the end of the marketing year in Argentina and Australia. In recent years, Canada has held coarse grain stocks (mostly barley) that are between 20-30 percent of annual production. This stocks size has not been the result of deliberate government policy but evidently the combination of bumper harvests and reduced exports due to export subsidization by major competitors. Until the EC began its voluntary set-aside program in 1988, the United States had been the only country spending money to cut back grain production.

Australia has long-term trade agreements with Egypt, China, Japan, and the USSR for wheat. Canada has long-term agreements with Brazil, China, the USSR, and East Germany for wheat and feed

grain sales. In addition, credit sales programs (subsidized interest rates) have been administered by the Australian Wheat Board to promote Australia's wheat exports.

France, a member of the EC which as a whole is a large net importer of corn, has expanded feed grain production more than enough to meet domestic needs. It now actively exports corn and barley. France is now the leading corn-producing country in the EC. Exports of corn and especially barley outside the EC are heavily subsidized. These exports have reduced U.S. corn exports and lowered world prices.

Major Importers

As can be seen from the discussion on corn exports, corn imports have greatly expanded over the last few decades. Since 1960, world trade in corn rose from 14 million metric tons to a high of 85.3 million metric tons in 1980, a more than 500-percent increase. Current trade levels are 10-25 percent below that peak. Japan is the leading importer, accounting for over 20 percent of world corn imports. A number of others, including the USSR, the EC, Mexico, and high-income East Asian countries, such as South Korea and Taiwan, are also substantial markets (see table 7). During the last two decades, especially during the 1970's, developing and centrally planned countries accounted for much of the increase in world corn imports in response to rapidly growing meat demand.

Corn imports by developing nations rose from an average of 7 percent of world corn trade in 1960-64 to about 30 percent in 1987-88. Corn imports by North Africa, the Middle East, Latin America (including Mexico), and high-income East Asian countries all increased rapidly in the early 1980's as income growth, such as in the OPEC countries and in East Asia, increased the demand for meat and for U.S. corn exports. Population growth contributed to the increase in the demand for corn as both feed and food. Finally, several countries, such as South Korea and Taiwan, adopted policies to protect domestic livestock industries. Their lack of ability to efficiently produce feed grains and protein meal encouraged imports of feedstuffs. The policies directly contributed to the increase in corn imports by South Korea and Taiwan from 5.6 million tons in 1983/84 to 8.6 million tons in 1987/88.

A worldwide recession in the early 1980's slowed the growth in corn imports by developing nations. After peaking at 18.5 million metric tons in 1986/87, imports by these countries declined to 15.5 million metric tons in 1988/89. This decline is largely due to the tremendous debt burden of many of these countries, limiting hard currency availability for food imports.

The import share of centrally planned countries increased from 7 percent in the early 1960's to more than 30 percent in the late 1980's. This growth was due largely to the decision by the Soviet Union to import supplies from the world market while

continuing to build livestock herds and to increase the ratio of feed concentrates in livestock feeds at the expense of feedstuffs of lower feed value.

The easy credit terms from the West which allowed Eastern Europe to purchase grain were ended as these countries began to experience debt-servicing difficulties in the mid-1980's. Consequently, its corn imports have fallen. As Chinese domestic corn production has expanded, corn imports by China (primarily from Thailand and the United States) have either drastically declined or disappeared since 1983/84 (with an exception in 1986/87 when Chinese imports totaled 1.0 million tons, because of a weather-related poor crop).

The EC has reduced corn imports over the last two decades. In 1960-64, the EC accounted for an average of 55.5 percent of world corn imports. That share fell to 4 percent by 1987-88. This share would have fallen still further except for the addition of Spain and Portugal to the EC in January 1986. Both of these countries still import substantial amounts of non-EC corn.

The drastic decline in EC corn imports reflects increased imports of cereal substitutes (nongrain feeds, excluding oilseed meal). At the same time, the EC's policy of high price support for cereals stimulated production of soft wheat, barley, and corn through expanded farm investments and productivity gains. The EC's Common Agricultural Policy (CAP) supports prices through purchases when the market price falls below a pre-set level. The CAP also establishes variable levies to support internal grain prices at levels well above world prices. Because the EC policy encourages use of domestically produced grains for livestock feeding, exports to the EC are now primarily used for industrial products, not for feed.

High grain prices have meant cassava, citrus pulp, and other substitute products not subject to restrictive import barriers have to some extent replaced corn as feed. Imports of the nongrain feeds by the EC surged from about 4.2 million tons in 1972 to a high of 16.2 million tons in 1982, and still greatly exceed EC grain imports.

Unlike the EC, the Japanese market share has risen, from 13 percent in the early 1960's to 34 percent in 1987/88, due to increased incomes and the demand for meat, and protection of domestic meat-livestock industries. U.S. corn exports to Japan rose from 11.2 million tons in 1979/80 to 14.9 million tons in 1987/88. The market share of non-EC Western European nations also has risen slightly as demand for meat has increased.

Implications of World Corn Market Trends for U.S. Exports

Recent trends in the world corn market suggest that imports by Japan, non-EC Western Europe, and developing and centrally planned nations have been increasingly important, while purchases by the EC have declined. The growth in world corn trade was largely due to expanded imports by developing and centrally

planned countries. Since imports by these countries depend heavily upon income growth, economic conditions in these countries are crucial in determining U.S. corn exports.

Access to financing by the developing countries, whether they choose to use the available credit for consumption or productive investment, and terms of credit available to these nations have also been important determinants of U.S. corn exports. The mounting debt situation facing a number of developing countries, such as Mexico, has added another uncertainty to U.S. corn exports to those countries, depending on their ability to export more goods abroad so as to earn foreign exchange to pay their debts and buy U.S. corn. Any increase in U.S. interest rates will likely worsen the situation since a 1-percentage-point increase in the U.S. interest rate translates into substantial additional annual debt service in Mexico.

The increased share of world corn imports by centrally planned countries holds potential to disrupt U.S. corn exports to that part of the world. The Soviet Union and China have struggled to meet their domestic needs; their imports have been variable. For example, China greatly reduced its imports in 1983/84, and was actually a net corn exporter by 1985. The Soviet Union has been the single largest source of instability for world grain markets.

The EC's price support and trade-restricting policies in large part explain the dramatic decline in EC corn imports from the United States. If the EC countries had lowered grain price supports and aligned them more closely with world prices, the EC would likely have increased use of feed grains in the feed rations and thereby have increased corn imports and reduced use of cereal substitutes. However, analysts believe the EC would assure that its grain, not imports, be used for animal rations. Thus, the EC may offer a larger market under this circumstance than presently for corn, but it is very unlikely that EC demand will return to its earlier level, in the absence of successful multilateral trade negotiations.

Major U.S. competing exporters have taken steps to protect their market shares. Argentina, for example, has reduced its export taxes and the degree of overvaluation of its currency. It has also undertaken a fertilization program to increase grain production 30 percent. Bilateral agreements signed by Thailand, Australia, and Canada made the United States even more a residual supplier in the world grain market. Canada has taken major steps to expand its export capacity, including major port and rail investments. Australia, with its competitive wheat export prices, has aggressively marketed its wheat to East Asia and the Middle East, further encouraging substitution of feed wheat for U.S. corn and other feed grains by these countries. The United States responded by introducing its export enhancement program that subsidizes selected agricultural exports such as wheat and barley to targeted countries.

Trends in Prices and Farm Returns

In the early 1950's, U.S. corn prices were high historically because of high price support rates. Prices received by farmers trended downward in real terms, but remained close to the loan rate until 1972-74 when market prices began to respond to the increasing world demand for corn due to a worldwide grain production shortfall and devaluation of the dollar. After 1974, prices again trended downward through 1977 and then rebounded in response to an increase in demand and drought problems through 1980 (see fig. 2).

Stagnant domestic demand, sagging exports, bumper crops in 1981 and 1982, and mounting carryover stocks resulted in low corn prices in 1981 and 1982. In 1983, the combination of the payment-in-kind program and drought significantly reduced production. As a result, corn prices jumped 26 percent, and corn stocks fell to their lowest level since 1975/76. Corn ending stocks since have been building, reaching 4.9 billion bushels by 1987. Corn prices, which jumped 31 percent due to the severe drought in 1988, are expected to drop to normal levels for the 1989/90 crop year. Corn ending stocks are projected to decline to 1.8 billion bushels for 1988/89.

There are many ways to indicate the financial health of corn producers. One measure, farmers' returns above cash expenses, shows their changing average cash flow position (table 11). These net returns are determined by subtracting total cash expenses from gross receipts. The gross receipts include corn

Figure 2
Corn prices and loan rates, by quarter, 1979-88

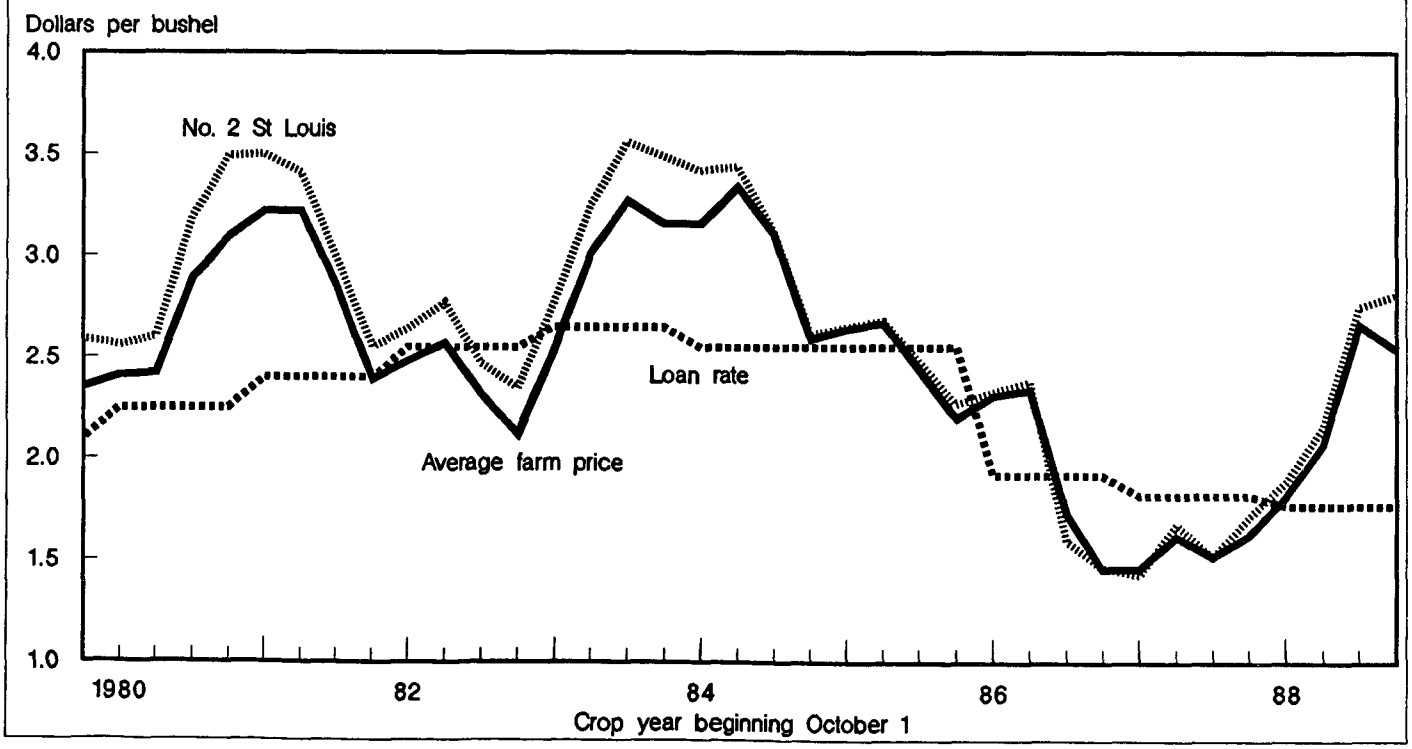


Table 11--Returns above cash expenses in U.S. corn production, 1975-88

Crop year	Value of output[1]	Direct payments[2]	Gross income	Total cash expenses[3]	Returns over cash expenses[4] Total	Per bushel Nominal	Per bushel Current[5]
	Billion dollars					Dollars	
1975	14.83	0.005	14.84	8.72	6.12	1.05	1.77
1976	13.52	.010	13.53	10.13	3.40	.54	.86
1977	13.14	.300	13.44	11.04	2.40	.37	.55
1978	16.35	.840	17.19	12.53	4.66	.64	.89
1979	20.01	.350	20.36	10.79	9.57	1.21	1.54
1980	20.71	.210	20.92	13.28	7.64	1.15	1.34
1981	20.05	.460	20.51	15.29	5.22	.64	.68
1982	20.99	.920	21.91	15.27	6.64	.81	.81
1983	13.40	6.656	10.96	11.66	8.30	1.98	1.91
1984	20.18	1.753	21.93	17.35	4.58	.59	.55
1985	19.79	2.644	22.43	17.52	4.91	.55	.49
1986	12.79	6.669	19.46	15.05	4.41	.54	.47
1987	13.22	7.737	20.95	13.09	7.86	1.11	.94
1988	12.64	4.076	16.71	13.51	3.20	.65	.53

[1] Corn production times season-average price received by farmers.

[2] The sum of deficiency, diversion, disaster, and storage payments; for 1983, PIK entitlements are included as part of direct payments.

[3] Costs per planted acre times acreage planted for grain; cost of maintaining conserving-use acreage is 20 percent of variable expenses times the acreage. Cash expenses prior to 1981 are computed from percentage changes between 2 succeeding years and based on cash expenses reported in Economic Indicators of the Farm Sector: Costs of Production, U.S. Dept. Agr., Econ. Res. Serv., various years. Cash expenses for 1988 estimated based on 1987 costs of production; not yet available for 1988 costs.

[4] The difference between gross income and total cash expenses; this difference was divided by quantity produced and was then deflated for per-bushel returns.

[5] Current dollars based on 1982=100.

sales receipts and direct Government payments. Returns above cash expenses are available for paying expenses associated with land, capital replacement, family debt, and living expenses.

The cash flow position of corn producers heavily depends on market prices, crop yields and the level of Government payments on the revenue side, and size of interest payments on the expense side. The high interest rates imposed on capital for farm expansion during the inflationary period of the late 1970's followed by the slide in the export market in the mid-1980's left many farmers in precarious positions. Gross income was fairly constant in that period ($20-22 billion), but cash expenses, primarily in the form of interest payments, increased by nearly 50 percent between 1983 and 1984, and per bushel returns fell precipitously as a result.

High corn yields and loan rates tend to strengthen corn farmers' cash flow positions. In 1977/78, for example, U.S. corn yields averaged 90.8 bushels an acre and the loan rate was $2.00 per bushel. In 1979/80, yields increased to 109.5 bushels an acre and the loan rate rose to $2.10 per bushel for the regular CCC loan and $2.60 for the farmer-owned reserve loan. As a result of these higher rates, corn farmers' returns above cash expenses increased from $0.37 a bushel to $1.21 in nominal terms, or from $0.55 to $1.54 in 1982 dollars (table 11). In real terms, the returns above cash expenses per bushel since 1975 were the lowest in 1977. In the early 1980's, cash receipts remained fairly strong but Government payments were low as practically no deficiency payments were made. Returns strengthened in 1983, as a result of the payment-in-kind program and drought, to $1.98 per bushel, or $1.91 per bushel in real terms. In that year, production fell, so cash receipts were low despite high prices, but huge PIK payments supplemented corn gross income. The Food Security Act of 1985 mandated lower loan rates for all crops to reduce Federal outlays and excessive stocks. In addition, corn market prices were significantly below the loan rates in the latter part of the 1986 crop year and use of generic certificates tended to reduce the price support impact of the loan program by returning forfeited grain to the marketplace. Per bushel real returns above cash expenses were down to $0.47 in 1986/87.

Government payments as a component of gross income have varied over the last few decades. These payments have fluctuated from less than $200 million a year in the mid-1970's to more than $6 billion a year for the first 3 years of the 1985 farm act. The share of Government payments in total revenue has ranged from 0.6 percent in 1975 to nearly 37 percent in 1987. In fact, in 1986-88, total Government payments constituted more than 125 percent of total returns above cash expenses.

Returns for producing corn, while subject to changing economic conditions (including the growth in productivity, market prices, and cost of output), also depend on the size of the operation. The special tabulation of the 1982 Census of Agriculture data for the 21 corn-producing States show that cost per dollar of receipts declines as farm size increases up to the 500-999 acre

interval for cropland before appearing to level off. Large commercial farms growing corn are probably more cost-efficient than small farms, although additional gains in efficiency (decreases in unit cost) are minimal once a farm reaches a commercial size.

History of Corn Programs

Federal farm policies and programs are designed to address the problems of low farm income, price instability, and periodic surplus stocks. Efforts by Congress to become involved in the corn market trace back to early this century, when increased production led to high corn prices. Following the war, commodity prices dropped abruptly, leading to unrest in the sector. Legislative attempts to strengthen prices by selling farm products for domestic consumption at a "fair exchange value" and surplus products abroad at the world price were periodically proposed in Congress but not passed until 1927 and 1928. President Coolidge vetoed the legislation both times.

Legislation of the Late 1920's

A Federal farm program was implemented when President Hoover signed the Agricultural Marketing Act of 1929. The objectives were to stabilize prices and control surpluses. A federally funded corporation, the Federal Farm Board, with a revolving fund of $500 million, was set up to make loans to marketing cooperatives that would purchase grain, including wheat and corn, from farmers. However, a steep decline in prices that started in 1930 exhausted the resources of the corporation and it ceased to function.

While the Federal Farm Board failed, the idea that Federal farm programs could and should be used to alleviate price and income problems for grain and cotton farmers gained political acceptance. The role of the Government in dealing with such problems was consistent with the concepts of the New Deal.

Farm Programs of the 1930's

The severe economic problems of the farm sector during the depression caused Congress to pass the Agricultural Adjustment Act in 1933. Under the 1933 Act, farmers could enter into contracts with the Secretary of Agriculture to adjust production of surplus commodities such as corn in return for parity payments that were financed by processing taxes on the commodities concerned. The Commodity Credit Corporation (CCC), incorporated under the laws of Delaware later that year, was required to make mandatory price support loans on "basic" (storable) commodities such as corn.

In January 1936, the Supreme Court ruled against the processing taxes and declared the production control program unconstitutional. In the subsequent Soil Conservation and Domestic Allotment Act, passed the following month, the emphasis was shifted from acreage control toward soil conservation by

authorizing payments for conserving activities, and direct appropriations replaced the processing tax. This act set up the various soil conservation programs and authorized Federal payments to cover part of the costs of soil-conserving practices on farms.

After a prolonged drought in 1936 followed by a return of normal growing conditions, the Agricultural Adjustment Act of 1938 was passed to assist producers of cotton, wheat, corn, tobacco, and rice to obtain nonrecourse loans based on parity prices and parity payments. Farmers could secure loans from the Government by pledging the commodity as collateral. The Government would take title to the commodity if the loan was not repaid, with no further recourse to the borrower.

New features of the legislation included mandatory nonrecourse loans, authority for marketing quotas if supplies reached certain levels provided that two-thirds of the producers voting in a special referendum approved, and parity payments if funds were appropriated. Marketing quotas were not in effect for corn in 1938, since supplies of corn were under the level which called for marketing quotas. However, parity payments were made to corn producers in amounts which would provide a return as nearly equal to parity as the available funds would permit. The act also provided adjustment payments for shifting land from "soil depleting" to "soil conserving" crops and conservation payments for instituting specific conservation practices.

Farm Acts of Postwar Period

Agricultural policy during the early 1940's shifted to encouraging production of farm commodities required to meet wartime and postwar needs. The Agricultural Act of 1948 provided support for basic commodities at 90 percent of parity for 1949 but provided for lowering support levels in 1950 should supplies become excessive. The Commodity Credit Corporation Charter Act, also enacted in 1948, provided a Federal charter for CCC and established it as an agency of USDA. Dissatisfaction with the price support provisions in the 1948 Act led to the Agricultural Act of 1949, which set support prices for basic commodities at 90 percent of parity for 1950. Price supports for basic commodities continued at 90 percent of parity through the 1954 crop year because of the Korean War.

Prices were supported entirely through nonrecourse loans and direct purchases by CCC prior to 1961. From a high of $1.62 per bushel in 1954, the loan or purchase rate was reduced each year to $1.06 per bushel in 1960 as hybrid corn boosted productivity growth rapidly, more than offsetting the cuts in price supports. Average farm prices for corn were below the loan rate for a decade. By the fall of 1961, corn stocks exceeded 2 billion bushels, resulting from price supports which prevented corn prices from falling enough to clear the market. In 1950, corn acreage allotments were in effect in "commercial corn areas." Acreage allotments were also in place during 1954-58. Planting within allotments was not mandatory, but the high price supports

were available only to farmers who planted within their allotments or were not in a commercial corn area when the allotments were in effect.

Commodity Programs of the 1950's

The increase in stocks during the 1950's led to several new policy initiatives. First, the Agricultural Trade Development and Assistance Act of 1954 (PL 480) channeled surplus farm commodities into foreign aid, selling them for foreign currency, for emergency relief, and for strategic materials. Second, the Agricultural Act of 1954 introduced flexible support prices that could be set within a range based on percent of parity. Finally, the Agricultural Act of 1956 provided for a two-part soil bank program to encourage farmers to divert cropland from production to conserving uses. The conservation reserve program authorized 3- to 10-year contracts with payments for shifting cropland into grass or other conservation uses. The annual acreage reserve program diverted specific crop allotment acres in return for a direct payment. This was the first major attempt since 1936 to control production by withholding land. This program reduced the acreage of corn harvested for grain in 1957 by 10 percent below the early 1950's. But, since the less productive land was taken out of production, the acreage reduction was more than offset by increased yields due to higher input application, and carryover stocks continued to increase. The acreage reserve part of the Soil Bank program was discontinued after 1958. The conservation reserve ended in 1961, although conservation reserve land remained idle through the 1960's because of the long-term contracts.

Corn producers received an opportunity in the Agricultural Act of 1958 to choose between (1) no allotments in 1959 and subsequent years with prices supported at 90 percent of the previous 3-year-average market price but not less than 65 percent of parity, or (2) allotments with prices supported at 74 to 90 percent of parity. Corn growers voted in a 1958 referendum to end corn allotments.

U.S. Government Intervention in the 1960's

At the beginning of the 1960's, surplus stocks continued to grow despite falling support rates and prices (table 12). Farmers had no better alternatives on land suitable for corn and yields continued to increase, given the then existing support prices and acreage restrictions on alternative crops (table 13). Among the major crops, only feed grains and soybeans had no production control provisions.

Emerging conditions led to considerable pressure to end the stocks buildup. The Agricultural Act of 1961 established specific acreage diversion programs for the 1961 crops of feed grains (corn and sorghum). The aim was to divert acreage from these crops to conserving uses. Barley was added to the program in 1962.

Table 12--Government and privately owned stocks of corn, 1962-88

Year beginning Oct. 1[1]	CCC-owned stocks	Under loan	Farmer-owned reserve	Free stocks	Total stocks
		Million bushels			
1962	888	647	--	118	1,653
1963	810	465	--	90	1,365
1964	828	472	--	237	1,537
1965	540	384	--	233	1,157
1966	249	301	--	292	841
1967	139	234	--	453	826
1968	182	532	--	455	1,169
1969	295	441	--	382	1,118
1970	255	345	--	406	1,005
1971	105	234	--	328	667
1972	160	562	--	405	1,127
1973	79	88	--	541	708
1974	7	4	--	472	483
1975	0	3	--	359	361
1976	0	32	--	601	633
1977	0	143	--	999	1,135
1978[2]	3.5	480	212	740	1,435
1979	100	158	585	866	1,709
1980	260	116	670	988	2,043
1981	242	126	0	800	1,392
1982	280	365	1,276	539	2,536
1983	1,143	113	1,890	361	3,523
1984	201	44	447	313	1,006
1985	225	657	383	377	1,648
1986	546	2,589	564	193	4,039
1987	1,443	2,102	1,320	-161	4,881
1988	835	929	1,127	1,369	4,259
1989[3]	400	400	750	280	1,830

-- = Not authorized.
[1] Crop year changed to September 1-August 30 in 1985.
[2] Farmer-owned reserve program authorized in 1977 Food and Agriculture Act.
[3] Preliminary.
Source: Agr. Stab. and Conserv. Serv., U.S. Dept. Agr.

The 1961 legislation marked a major shift from total support through commodity loans to a loan rate combined with payments for acreage diversion. Further, the program was voluntary and only participants were provided support. With 19 million acres of corn base (22 percent) diverted from production in 1961, the buildup of CCC stocks was halted. The program continued in 1962. A direct price support payment was introduced in 1963 as an addition to the diversion payment. It was paid on acreage planted in compliance with program provisions and was not affected by actual price or the price the individual farmer received. The loan rate was lowered by the amount of the price support payment. As a result, CCC acquisitions dropped from 460 million bushels in 1962/63 to 16 million bushels in 1963/64 and remained low during the rest of the 1960's and 1970's, except 1967/68. The basic elements of the program in effect for 1963 continued for 11 years: price support loans at or below world prices, direct price support payments, and diversion payments. An optional acreage diversion program offering payments for idling additional land was also available between 1961-70 (except 1967). Thus, corn acreage was diverted every year to keep carryover stocks from growing into surpluses which developed when prices, because of price support, were not permitted to fall enough to clear the market.

The first omnibus farm act which started the trend of bringing additional crops under voluntary programs was the Food and Agriculture Act of 1965, which made no other major program changes. One of the underlying issues confronting farmers and program administrators at that time was that the historically based acreage allotments and feed grain bases were restricting farmers from making crop mix adjustments on their farms. Total factor productivity, output per acre, and output per labor hour were increasing; farm size was increasing due to economies of size; and farms were moving toward more specialized operations because of the reduction in price risk. This raised a conflict between these economically desirable changes and the rigidities imposed by the program provisions. As a result, farmers with both wheat allotments and feed grain base were allowed to substitute among these crops, a first step to alleviate the restrictions that historically based acreage allotments imposed on farmers.

The 1960's ended with programs in place that had brought surpluses under control. The cost was substantial: $1.5 billion in fiscal 1969, compared with well under $1 billion in previous years. Even though prices had not increased and the parity ratio had continued to drift downward, the rapid productivity growth had sustained farmers' returns.

Agricultural Programs of the 1970's

The Agricultural Act of 1970 addressed two issues of growing concern: payment limitations and flexibility in planting on base acreage.

Table 13--Price support operations for corn, crop years, 1967-88

Year beginning Oct. 1	Price support rates: Loan rate	Price support rates: Support payments	Price support rates: Total support[1]	Put under support: Quantity	Put under support: Percentage of production	Acquired by CCC[2]	Total payments to participants[3]
	-------Dollars/bushel------			Mil. bu.	Percent	Mil. bu.	Mil. dol.
1967/68	1.05	0.30	1.35	497	10.4	193	731
1968/69	1.05	.30	1.35	404	9.2	36	1,166
1969/70	1.05	.30	1.35	398	8.7	5	1,365
1970/71	1.05	.30	1.35	324	7.9	7	1,228
1971/72	1.03	.32	1.35	953	16.9	35	893
1972/73	1.01	.40	1.41	420	7.5	1	1,469
1973/74	1.32	.32	1.64	261	4.6	0	910
1974/75	1.10	.28	1.38	77	1.7	0	244
1975/76	1.10	.28	1.38	147	2.5	0	90
1976/77	1.50	.07	1.57	278	4.4	0	181
1977/78	2.00	0	2.00	1,164	17.7	94	281
1978/79	2.00	.10	2.10	641	8.8	0	683
1979/80	2.10	.10	2.20	557	7.0	0	126
1980/81	2.25	.10	2.35	840	12.6	42	280
1981/82	2.40	0	2.40	1,977	24.1	45	92
1982/83	2.55	.15	2.70	1,585	18.9	NA	290
1983/84	2.65	.21	2.86	NA	NA	NA	904
1984/85	2.55	.43	3.03	3,846	50.0	NA	342
1985/86	2.55	.48	3.03	5,166	58.0	NA	2,479
1986/87	1.92	1.11	3.03	5,549	67.0	NA	6,150
1987/88	1.82	1.09	3.03	5,272	75.0	NA	7,290
1988/89[4]	1.77	.33	2.93	4,921	100.0	NA	4,796

NA = Not available.
[1] Beginning in 1974, and until 1977, total support is the target price on allotment production.
[2] Includes deliveries from original loan program, the reseal loan program, and over-deliveries to CCC.
[3] Payments have been made to feed grain producers under deficiency, disaster, and diversion provisions.
[4] All producers were eligible to receive aid under the 1988 Disaster Relief Act.

Source: Agr. Stab. and Conserv. Serv., U.S. Dept. Agr.

Some of the direct payment checks that went to individual farmers prior to 1970 totaled more than $100,000 and a few were issued for over $1 million. The 1970 Act limited direct payments to $55,000 per crop per person for producers of upland cotton, wheat, and feed grains. Nonrecourse loans were not included. The limit had no significant effect on total outlays because many large farmers were able to divide up operations so as to largely circumvent the limit.

By introducing the concept of set-aside acreage, the act also addressed continued producer complaints about not being able to select crop mixes or make crop adjustments in response to the most economical use of resources. In contrast to diverted acreage that applied to specific crops, under set-aside, participants were required to set aside a portion of their allotment or base acreage to conserving acres, in addition to normal conserving base requirements. Then they could plant any crop on the remaining acreage except those under marketing quotas. This gave producers more flexibility to base production decisions on expectations of economic conditions.

The Agriculture and Consumer Protection Act of 1973 took another step in the shift from strict production controls to market-oriented programs that had price and income safety nets. Support prices based on parity were replaced by target prices, with the target price level related to changes in production costs adjusted for yields. With target prices, a deficiency payment would be made if the average market price during the first 5 months of the marketing year was below the target price. No payment would be made if the market price remained at or above the target price. This made 1974 the first year since voluntary programs started that a participating corn farmer was not assured of a direct payment regardless of the market price level.

The disaster payment feature, another new concept, provided for a direct payment to participants who, because of natural causes, either were unable to plant a crop or suffered low yields. The disaster payment program recognized that farm income is affected by yield as well as by prices. At that time, multi-peril crop insurance was not available in many high-risk areas. The disaster payment program was available to any participating producer and no premium was required. Therefore, the disaster payment program actually induced planting of corn in high-risk areas.

The $55,000 payment limit was reduced to $20,000 and included all program crops associated with the person subject to the limit. Loans and any compensation for resource adjustment were not subject to the payment limit. The 4-year span (1974-77) covered by the 1973 Act was a time of rising exports and dwindling stocks. Corn prices stood at a record $3.45 a bushel in October 1974 because of a drought and an extremely low stock carry-out level; only 359 million bushels were on hand on September 30, 1975. As a result, the loan rate had no real market price impact until mid-1977, and no deficiency payments were made to corn producers under the 1973 Act.

An acreage allotment based on the acreage required to meet domestic and export needs was announced each year under the 1973 Act. The allotment specified the acreage eligible for target price protection and disaster payment protection. A farmer had to plant at least 90 percent of the allotment to be eligible for full target price protection; however, any of a number of crops could substitute for the program crop.

Replacement of the longstanding acreage allotments (derived from production patterns dating back to the 1950's) by a current planting concept represented a major change in the 1977 Food and Agriculture Act. Under the 1973 Act, corn farmers received deficiency payments based on their allotments, regardless of the number of acres they planted. Under the 1977 Act, deficiency payments were to be based on the production from current plantings, adjusted by the program allocation factor. The program allocation factor is the ratio of the national program acreage to the estimate of harvested acreage. In 1978, the allocation factor for corn was 97 percent. During 1974-77, acreage planted to corn, on the average, exceeded allotment by about 20 million acres.

The act adjusted target prices on the basis of changes in corn production costs per bushel, instead of using the aggregate prices paid index which does not take into account the growth in productivity. Therefore, under the 1977 Act, growth in corn yields were taken into account in setting target prices.

Corn stocks were on the rise during the last year of the 1973 Act. The increase in stock levels also raised the possibility that the Government might end up holding stocks again. Nonrecourse loans continued to be the major price support mechanism, so a continued increase in stocks would inevitably result in increasing CCC inventories. Meanwhile, U.S. corn exports were rising and by 1977 they were approaching 2 billion bushels. Recognizing the growing importance of exports, the need to protect grain and livestock producers from price shocks, and increasing corn carryover stocks, Congress established the farmer-owned reserve program (FOR) under the 1977 Act to help reduce price instability and to control the cost of holding CCC inventories.

The FOR permitted farmers who complied with the set-aside requirements to place their grain into the reserve (initially 3 years, but now 3 to 5 years), normally after regular CCC loans matured. Under the program, farmers agreed to hold their grain in storage until maturity of the contract or until a specified release price was reached in the market. In return, farmers received payments for storing their grain (presently 26.5 cents a bushel), and interest was waived on the loans after the first year of the contract. Following the U.S. embargo on grain sales to the Soviet Union, reserve loan rates were set higher than regular loan rates. The farmer-owned reserve became an instrument for price support. At the end of 1981/82, corn stocks under the farmer-owned reserve reached 1.3 billion bushels.

The 1977 Act covered the 1978 through 1981 crops. Set-aside requirements were announced as a condition of eligibility to receive price and income supports in 1978 and 1979, but no restrictions were imposed on crop planted acreage in 1980 and 1981.

Farm Programs of the 1980's

The 1980's have seen a very volatile environment, with shifting world prices and exchange rates and thus varying export demand, and Government stocks and Federal spending have grown rapidly in response to efforts to support farmers.

Corn prices rebounded to $3.11 per bushel in the 1980 crop year due to strong exports. As a result, a set-aside was not in effect until 1982, the first year under the 1981 Agriculture and Food Act. The 1981 Act responded to problems stemming from provisions of the 1977 Act. Use of cost of production data to set and adjust target prices was not working as expected. Rising land values in an inflationary economy brought great resistance to lowering target prices. Changing yields introduced instability into the adjustment formula results.

Acreage controls were not considered satisfactory either. Allowing all planted acreage to qualify for target price protection invited additional acreage. Another concern was that set-aside was not effective in achieving crop-specific acreage reduction.

To address these issues, the 1981 Act mandated specific loan and target price minimums that would override the Secretary's discretion in setting the minimum price and income support levels for each year. Crop-specific acreage reduction programs were introduced which revived the allotment concept. The legislative authorities for the farmer-owned grain reserve gave the Secretary more discretion in managing the conditions of release from the reserve.

When the 1981 Act became law, the yearly increase of nearly 6 percent in target prices for the 1982 through 1985 crops was viewed as very modest. Export markets were expected to continue strong, supporting farm prices. At the same time, rapid inflation, which reached 15 percent in 1980, was forecast to exert strong pressure on farm costs. As the 1981 farm bill was being debated, crop prices were rising. But by the time the 1981 Act was signed, the corn market was weakening. It did not recover until after the 1983 payment-in-kind program was announced. The PIK program, together with the acreage reduction program and paid land diversion, diverted nearly 32 million acres of cropland from corn production.

Participants in the 1984 corn program were protected against down-side price risk by a $2.55 per bushel loan rate, down from $2.65 in 1983. In addition to being eligible for price support, participants in the 1984 corn program were eligible for deficiency payments since the average farm price during the first

5 months of the 1984/85 season was below the target price of $3.03 per bushel.

The Food Security Act of 1985 (FSA) continued many of the programs and provisions of the previous farm act, including the acreage reduction program, deficiency payments, generic certificates, disaster payments, and various export certificate programs. The FSA was also designed to address many of the problems created by the state of the world economy during the early 1980's and the structure of the 1981 Act. Loan rates above world prices pushed commodity stocks to record levels. By 1986, ending stocks of corn totaled over 4.8 billion bushels (see table 12).

The high and rigid price supports established in the 1981 Act were not responsive to market conditions. As a result, U.S. farmers had difficulty selling their products overseas when global markets changed in the 1980's. U.S. exports of corn declined by almost 50 percent from 1980 to 1.2 billion bushels in 1985.

At the same time, corn prices fell from $3.12 a bushel in 1980 to $2.23 in 1985. Depressed commodity prices, coupled with deflated expectations regarded farmland appreciation, and sudden increases in real interest rates led to declining farm asset values. Between 1981 and 1986, farm asset values fell by more than one-quarter.

The high price supports also meant costly Federal farm programs. Commodity Credit Corporation outlays for corn jumped from $2.1 billion in 1980 to $10.1 billion in 1986. Total Federal farm expenditures for farm programs increased more than 700 percent between 1980 and 1986.

Loan rates and target prices were set in order to encourage exports and avoid excessive stocks by better reflecting prevailing supply and demand conditions. Target prices were initially frozen at their 1985 levels then decreased annually to $2.75 a bushel by 1990. The basic corn loan rate (previously the national average loan rate) was set by law at $2.40 for 1986/87. For 1987-90, the basic loan rate is to be announced by the Secretary near the beginning of subsequent crop years, at the same time as other program provisions. The Findley provision of the act provided that the loan rate may be further reduced from the basic level by up to 20 percent if the average market price is 110 percent or less of the announced loan rate or if the reduction is seen as necessary to maintain domestic and export markets. Thus, prevailing market conditions caused the Secretary to announce an effective loan rate of $1.92 a bushel for corn for 1986 (see table 13). By 1988/89, the loan rate had declined to $1.77 per bushel (table 14).

The 1985 Act provided that diversion payments and part of deficiency payments may be paid to farmers in advance and in the form of generic certificates. The conservation reserve program (CRP) was established with the primary aim of removing highly

Table 14--Corn program provisions, crop years, 1987-89

Provision	Unit	1987	1988	1989
Acreage reduction	Percent of base acre	20	20	10
Paid land diversion	Do.	0	2.5	0
Paid land diversion rate	Do.	NA	1.75	NA
Target price	Dollars per bushel	3.03	2.93	2.84
Basic loan rate	Do.	1.82	1.77	1.65
Deficiency payment rate	Do.	1.21	1.09	.33

NA = Not available.

erodible cropland from production. The program idled more than 3 million acres of corn cropland for a 10-year period by 1988. In addition, the 1985 Act permitted using a marketing loan for corn, similar to those now in use in peanuts and cotton. To date, such a program has not been implemented for corn.

The Secretary was authorized to make in-kind payments in the form of transferable certificates that would allow producers to receive the same total return that they would have otherwise received in cash. This so-called generic certificate has been used by the Department of Agriculture as payment to producers who participate in Government programs such as acreage reduction, paid land diversion, conservation reserve, marketing loan, disaster payment, export enhancement, and ethanol fuel subsidy. These certificates constitute a claim on commodities held by the Commodity Credit Corporation with a fixed dollar value valid for 8 months. They can be exchanged for commodities pledged by farmers as collateral for price support loans or for most commodities owned by CCC at the prevailing market price, thus saving storage costs. Between April 1986 and January 31, 1989, almost $22.6 billion in certificates were issued, more than half of which went to corn producers. Over that time, more than two-thirds of the certificates were redeemed for corn owned by the CCC or under loan.

The farmer-owned reserve was maintained in the 1985 Act, though in a somewhat different version. The loan period was reduced from 5 to 3 years, although it can be extended as warranted by market conditions. The release price is set at the higher of 140 percent of the stated loan rate or the corresponding target price, instead of being set by the Secretary as in the 1981 Act.

The following provisions were put into effect for the 1989/90 crop year:

(1) The 0/92 option: producers are permitted to commit all or part of base acreage to the conservation reserve and receive 92 percent of the deficiency payments they would otherwise have received.

(2) Advance deficiency payments will be made equal to 40 percent of anticipated payment rates.

(3) Limited cross-compliance for 1989 wheat, corn, sorghum, barley, upland cotton, and rice. Farmers are allowed to shift 10-25 percent of permitted program plantings to soybeans and sunflowers without suffering penalty to base acreage.

(4) Minor haying and grazing provisions on acreage reduction and conservation reserve land in the event of natural disaster.

A severe early spring and summer drought, combined with high late summer temperatures which affected most areas of the country in 1988, caused a drastic reduction in yields and output of the major grain and soybean crops. This blow to U.S. farmers, many of whom were just beginning to recover from the financial stress of the early 1980's, prompted an emergency drought relief bill in mid-summer. The Disaster Assistance Act of 1988 (PL 100-387) was the largest disaster relief measure in U.S. history. The law contained provisions dealing with almost all aspects of agriculture affected by the natural disasters of 1988. Payments were allocated both to program participants and nonparticipants based on their deviation from established program yields of program crops, including corn.

Producers of annual commercial crops who lost at least 35 percent of their 1988 crop due to drought or other natural disaster received disaster payments. Payment rates differed depending on the commodity, the amount of crop loss, and whether producers participated in the 1988 Federal commodity programs. The disaster payment for feed grains program participants who lost 35 to 75 percent of their crop equaled 65 percent of the 1988 target price. Nonparticipants raising program crops received 65 percent of the county loan rate. Participating producers with losses greater than 75 percent received 90 percent of the target price. Similarly, nonparticipating producers received 90 percent of the county loan rate. Actual yields equal to or below an USDA-established "de minimus yield" received maximum benefits.

Participating producers with losses up to 35 percent were not required to refund their 1988 advance deficiency payments. At the discretion of the Secretary, producers with more extensive losses were not required to repay their advance deficiency payments until July 31, 1989.

The Disaster Assistance Act imposed a number of limitations on the amount of benefits producers could receive. The law also addressed concerns about Federal aid to higher income farmers by instituting the first "means test" for agricultural program payment eligibility. Any person with gross revenues over $2 million annually was not eligible for crop payments. Total payments to producers with Federal crop insurance were limited to combined crop insurance benefits and disaster payments up to an

amount not exceeding the income that would have resulted from a normal crop yield.

Effects of Corn Programs

Crop Producers

Corn producers benefit from participation in corn programs directly through supported prices and direct payments, and indirectly through higher market prices and the land capitalization induced by program benefits. Moreover, soybean producers also benefit somewhat from the corn programs for two reasons: (1) higher loan rates and target prices for corn have encouraged some farmers to switch from soybeans to corn and (2) higher corn prices resulting from the program may have induced substitution of soymeal for corn in the feed ration, further raising soybean prices.

Size of Program Payments

Since 1961, U.S. corn farmers have received program payments ranging from $90 million in 1975 to $917 million in 1982 to $7,737 million in 1987. Reserve storage payments became more significant in recent years, reaching a peak of $625 million in 1982 (table 15 and app. table 4) due to bumper harvests and often low market prices.

During 1983-88, program payments varied from 8.7 percent of sales receipts of the corn industry in 1984 to 58.4 percent in 1987. Program payments averaged 36 percent of corn producers' sales receipts or 90 percent of returns above cash expense. Program payments ranged from $0.23 a bushel in 1984 to $1.08 in 1987. Program payments ranged from 38.2 percent of returns above cash expenses in 1984 to 151 percent in 1986.

Distribution of Program Payments

Analysis of the 1987 corn program reaffirms that benefits are closely related to participating acreage and production and that the regions with larger base acreage in compliance receive a larger share of the program payments. This tendency was true in 1982/83 in which only 30 percent of the corn base was in compliance, and even more evident in 1987/88, a year in which 90 percent of base acreage was in compliance (table 16).

Compliance increased threefold nationally between 1982 and 1987, but the distribution of deficiency payments was quite similar. The major loser was the Plains region, which lost more than 30 percent of its share of national deficiency payments. Base acreage went up slightly or remained the same in all regions except the South, which surrendered more than 20 percent of its corn base yet doubled its share of deficiency payments. Participation rates were up in all regions but were highest in the Plains, North Central, and Southwest regions.

Table 15--Value of crop and program payments received by corn farmers, crop years, 1983-88

Item	1983	1984	1985	1986	1987	1988
			Million dollars			
Value of crop[1]	13,402	20,183	19,795	12,792	13,228	12,646
Program payments:						
Deficiency payments	--	1,653	2,479	6,030	5,874	2,300
Diversion payments	904	--	--	120	1,416	560
Reserve storage payments	22	100	165	519	447	307
Disaster payments	--	--	--	--	--	909
PIK entitlement	5,639	--	--	--	--	--
Total	6,565	1,753	2,644	6,669	7,737	4,076
			Percent			
Program payments as percentage of sales receipts	48.9	8.7	13.3	52.1	58.4	32.2
			Dollars			
Per bushel:						
Sales receipts--						
Nominal	3.21	2.63	2.23	1.55	1.94	2.57
Real[2]	3.09	2.44	2.01	1.36	1.65	2.11
Program payments--						
Nominal	.65	.23	.30	.81	1.08	.82
Real	.63	.21	.27	.71	.92	.68
			Percent			
Program payments as percentage of returns above cash expenses[3]	79.1	38.2	53.8	151.2	98.4	127.3

-- = No payments.
[1] Corn production times season average price received by farmers.
[2] In 1982 dollars.
[3] Calculated by dividing program payments by farm returns above cash expenses in table 11.

Effects on Corn Production and Prices

Since 1956 and except for 1959-60, 1974-77, and 1980-81, the Government has attempted to reduce surplus production of corn by offering voluntary diversion, set-aside, or acreage reduction programs. However, the programs were not always as effective as intended. In 1987, about 21 million acres out of the 83-million-acre corn base were idled. Prior to the 1985 Act, without frozen program yields, a 1-percent increase in expected net returns from corn production, other things including feed grain program being equal, had resulted in a 0.66-percent increase in acreage planted to corn in the Corn Belt.

Effectiveness of acreage reduction is further eroded by the fact that farmers remove marginal land from production, and participants and nonparticipants alike usually devote more inputs to land in production. In the early 1980's, after farmers removed marginal land from production, corn yields on remaining acres increased an estimated 3 percent in the Corn Belt and 2.5 percent in the Lake States for each 10 percent of corn base idled.

Producers are required to idle a portion of the farm base acreage under the 1985 Act to be eligible for price and income protection through nonrecourse loans, deficiency payments, and paid land

Table 16--Distribution of corn acreage base and deficiency payments by region, crop year, 1982/83 and 1987/88

Region	Participation rate		Base acreage		Share of deficiency payments	
	1982/83	1987/88	1982/83	1987/88	1982/83	1987/88
	----Percent----		--Million acres--		----Percent----	
North Central	27.2	91.4	52.4	53.7	62.2	68.7
Plains	46.3	93.3	16.4	17.8	32.7	22.4
Northwest	10.7	65.9	.3	.3	.1	.3
Southwest	22.4	88.8	.5	.5	.3	.6
South	10.6	75.2	10.4	8.0	2.7	5.8
Northeast	38.7	67.4	1.2	2.9	2.0	2.3
Total	29.1	90.2	81.2	83.3	100.0	100.0

Sources: U.S. Senate, Committee on the Budget, 1982 Farm Program Benefits: Participants Reap What They Sow, 1985, and Agricultural Stabilization and Conservation Service, U.S. Department of Agriculture, 1987 Deficiency Payment System, Compliance Report, 1988.

diversion payments. Program enrollment ranged from 21 percent in 1979 to nearly 90 percent in 1987. The low rate of the late 1970's and early 1980's reflected low expected net gains, estimated at less than 2 percent, due to market prices near or above the loan rate and relatively low target prices. Participation rates went from about 19 percent in 1982 to 50 percent in 1984 (table 13) because of nationwide drought in 1983 and the late enrollment date of the payment-in-kind program and remained at high levels. The expected gain for being in the program was estimated at 240 percent for 1987, with a resulting 90 percent of the corn base enlisted in the program.

The disaster payments program (as written in the 1973 and 1977 Acts) offered a form of free insurance against production risk for program participants. The program has induced larger production of corn in more risky areas. This effect has been dampened somewhat since 1982 as the payments were excluded in areas where crop insurance was available.

The loan program protects participating farmers from down-side price risk, since the loan rate sets the floor under market prices. Thus, the program not only reduces price risk but also raises expected prices to participants. Record ending stocks of 4.9 billion bushels were held at the end of 1987 (table 12). Farmers essentially produced corn for the farmer-owned reserve program or the CCC, not necessarily for the market. In 1988, farmers with good crops received high prices in the market, while those struck by the drought held on hoping for a drought relief bill.

Acreage reduction programs, coupled with the operation of the farmer-owned reserve and the regular CCC loan program, tend to keep prices higher than they would otherwise be, at least in the short run. Until corn placed into the farmer-owned reserve loan program reaches release status, stocks under the program are not available to the market. In times of large corn surpluses such as 1982/83 and 1986/87, the operation of the loan program could reduce free stocks and strengthen prices above what they would otherwise be.

Livestock Producers and Consumers

Corn programs are designed to strengthen farm prices for corn, other feed grains, and soybeans through acreage reduction programs, paid land diversion, set aside, and the operation of CCC loan and the farmer-owned reserve. But strengthening crop prices represent a cost to the livestock sector and, thus, to consumers of red meat, poultry, milk, and eggs. On the other hand, more unstable grain prices such as those during the early to mid-1970's can force the livestock sector to make more major adjustments in the volume of feeding from year to year in response to changing feed grain prices.

Higher corn prices directly affect livestock producers by raising feed cost in livestock and poultry production, resulting in the curtailment of livestock inventories (the liquidation phase of

livestock cycles) and the marketing of livestock at lighter weights. Consumers pay higher retail prices for those food items than they would otherwise. In addition, consumers pay higher prices for sweeteners, beverages, starch, and corn flour because of the higher corn price resulting from the programs.

Corn program effects on retail prices of red meat, poultry, milk, and eggs depend on farm-retail price spreads, the proportion of corn feed costs in livestock and poultry production, corn program effects on corn prices, and supply and demand elasticities for livestock products. In the Corn Belt, for example, corn feed cost accounted for about 16 percent of total expenses of cattle feeding in 1986. By the time cattle are marketed, the retail price effect of corn prices is even smaller. Since the farmer's share of the retail price of beef was $1.36 (57 percent) out of $2.38 per pound in 1983, the retail price of beef was nearly 1 percent higher as a result of the program, assuming the farm-retail price spread remained unchanged.

In the case of pork, the farmer's share of the retail price, although smaller than for beef, still amounted to 45 percent. In the Corn Belt where corn feed costs account for about 25 percent of total expenses of hog production, a 6-percent increase in corn prices due to the corn program meant hog production expenses rose by 1.9 percent. Retail prices of pork increased by almost 1 percent. The corn program also affects retail prices of poultry, milk, and eggs, since their production requires corn, other feed grains, and soybean meal. The corn program, through effects on retail prices of these food items, has caused consumers to pay more for corn-based products and consume less, although these costs may be offset by the gains due to increased price stability for consumer goods.

The programs have clearly provided a degree of stability to retail prices for these food items due to price supports, the operation of regular CCC loan programs, and the farmer-owned reserve. The relatively narrow farm-retail price spreads for beef, pork, and other livestock products suggest that less variability in corn prices means more stable retail prices for meat, poultry, milk, and eggs. Conversely, less stability of grain prices results in a more unstable livestock sector. During the early to mid-1970's, for example, livestock producers faced greatly fluctuating feed grain supplies and prices, making normal planning for short-term production decisions more difficult, and posing difficulties for long-term investment decisions. The dramatic growth in export demand essentially emptied the CCC stocks during 1972-77. Corn prices rose from $1.16 per bushel in 1969 to $1.33 in 1970 due to corn blight. Prices increased to $3.02 in 1974 in response to the dramatic growth in exports, which stemmed from the shortfall of world grain production. This increase reduced feeding margins. Due to inelastic demand for meat and poultry products and biological constraints affecting livestock supply response, livestock producers experienced a great deal of instability and numerous adjustments in feeding volume during this period. Cattle-on-feed inventories, for example, began dropping in 1974 due to the narrowing feeding

margins after an upward trend from 1967. The livestock sector, in effect, serves as a buffer stock to smooth out grain price fluctuation during volatile periods.

Taxpayers

Corn programs affect taxpayers directly through the disbursement of deficiency, diversion, disaster, and storage payments. In addition, CCC loan programs are operated by borrowing from the U.S. Treasury. Total program costs, expressed as the sum of net price support (CCC) outlays plus related expenditures in appendix table 4, fluctuated from year to year and reached $14.1 billion in fiscal year 1986 and $17.5 billion in fiscal year 1987, up from $299 million in 1955. At the $5.2-billion total payments level in crop year 1982, each corn program participant (about 200,000 corn farmers) received an average of about $25,000 in total program payments, or $0.63 per bushel of U.S. corn produced. At the $17.5-billion total price support outlays level in fiscal year 1987, net program expenditures amounted to about $27,700 per program participant (totalling more than 600,000 corn farmers), or $2.47 per bushel of corn produced.

The $4.0-billion net CCC outlays for corn alone in fiscal year 1983 accounted for 30 percent of total CCC outlays for all crops. Corn program costs averaged over $4.6 billion a year during the 1983-87 crop years or 30 percent of the $15.6-billion corn crop value.

Indirect

Corn programs also have had some indirect effects on land value, resource use, other crops, and trade competition.

Program benefits, particularly those associated with a base or allotment, are capitalized into the value of land. Landowners, originally allocated a base or allotment, benefit from an increase in both current income and wealth. Renters or tenants, who account for 60 percent of farmers growing corn, receive a share of the current income, but they also face increased rents because of higher land values. Subsequent landowners have to pay a higher price for land. This dilutes the program benefits, particularly in the longer run, and also increases the subsequent cost of entry for new farmers. The above effect became less acute when program participation was no longer tied to historical allotment. Farmers with 2 years of corn production records essentially can now request ASCS to certify their base acreage for program participation. Nevertheless, loan rates above market-clearing levels kept land prices from falling more prior to the passage of the 1985 farm act.

Corn programs encourage irrigation of corn acreage partly because higher corn prices increase the demand for irrigation and partly because irrigation was a means of boosting program yields before such yields were frozen in 1986. The programs also were a factor contributing to the 80-percent increase in pesticide use and 35-percent increase in fertilizer use in the 1970's. Moreover,

35-percent increase in fertilizer use in the 1970's. Moreover, corn producers have expanded their base acreage in the past decade from about 61 million acres in 1973 to the present 83 million acres, anticipating the continuation of the programs. The bulk of expanded corn acreage was irrigated land, especially in Nebraska and Kansas.

Policy provisions for corn have particularly far-reaching effects because they affect not only the corn industry but also indirectly the soybean, wheat, and livestock sectors. Higher loan rates and target prices for corn have encouraged some farmers to switch from soybeans to corn. This has occurred primarily in the North Central and the South regions. In addition, higher corn prices resulting from the programs may have induced substitution of soymeal for corn in the feed ration, further raising soybean prices. In 1978, for example, soybean prices were an estimated 2 percent higher as a result of the supply controls on the other crops, mainly corn. In the Northern Plains where irrigation expanded rapidly in recent years, corn programs have further attracted irrigated land for corn production away from wheat.

Issues for the 1990's

Debate about farm legislation for the 1990's will probably focus on many issues relevant to corn producers. Important among them are opportunities to establish loan rates to make producers more responsive to market conditions, to operate the reserve explicitly to either stabilize prices or enhance income, and to make the program flexible enough to permit Corn Belt farmers the option of planting other crops without penalty. Legislators will be in a position to make substantial changes in the agricultural sector by altering program structure or they could choose to continue present programs with only minor modifications.

Aside from potential program changes, other issues that may be dealt with could affect the corn industry. Chief among these are the GATT trade negotiations and environmental considerations. It is conceivable that significant reform could result by December 1990 in the GATT agricultural negotiating group, which could affect U.S. corn production and exports by reducing trade barriers and the scope of agricultural programs throughout the world. Similarly, pressure for preserving clean water and reducing soil erosion could succeed in expanding conservation provisions in farm legislation and remove additional marginal cropland from production. Finally, all farm legislation will be constrained by the need to reduce the Federal budget deficit.

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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 farmers must idle a portion of their base acreage of wheat, feed grains, upland and extra long staple (ELS) cotton, or rice. The remaining base acreage must be planted in the base crop. Farmers must participate to be eligible for benefits like Commodity Credit Corporation loans and deficiency payments.

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. If total deficiency payments are less than the advance amount, producers must refund the excess portion.

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

Bilateral trade agreement -- A trade agreement between any two nations. The agreement may be either preferential (the obligations and benefits apply only to the two countries involved) or most-favored-nation (the benefits and obligations negotiated between the two countries are extended to all or most other countries). Also long-term agreement.

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.

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. The CCC was created to stabilize, support, and protect farm income and prices through loans, purchases, payments, and other operations. The CCC functions as the financial institution through which all money transactions are handled for agricultural price and income support and related programs. 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, fair and rising standards of living for the farm population, stable agricultural markets, increased agricultural productivity, and methods of dealing with food supply security. The variable levy and export subsidies (see definitions) are the two principal elements of the CAP.

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 inkind 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.

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

Crop acreage base -- The average of the wheat, feed grains, upland and extra long staple (ELS) cotton, or rice acreage on a farm planted for harvest, plus land not planted because of acreage reduction or diversion programs or the conservation reserve during a period specified by law.

Cross compliance (full or strict) -- A requirement that a farmer participating in a program for one crop and meeting the qualifications for production adjustment payments and loans for that 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 1960s.

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 progam yield established for the particular farm.

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.

Economies of size -- Increasing returns as use of factors is expanded in least-cost combinations. Once the size of an operation has reached a certain point, the marginal cost of producing additional output begins to decline.

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).

Export enhancement program (EEP) -- Begun in May 1985 under a Commodity Credit Corporation charter to help U.S. exporters meet competitors' prices in subsidized markets. Under the EEP, exporters are awarded bonus certificates which are redeemable for CCC-owned commodities, enabling them to sell certain commodities to specified countries at prices below those of the U.S. market.

Farm act -- The omnibus agricultural legislation that expires every 4 or 5 years. The act's titles include program commodity titles, trade, conservation, credit, agricultural research, food stamps, and marketing.

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.

Federal crop insurance -- A subsidized insurance program which provides farmers with a means for risk management and financial

stability against crop production loss. Currently provided by the Federal Crop Insurance Corporation (FCIC).

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

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 grain by all livestock types. It is a measure estimated by the 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 grains consumed.

High fructose corn syrup (HFCS) -- A byproduct of corn wet-milling which serves as a substitute for sugar in food manufacturing.

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 board -- A major form of government involvement by other countries to control the marketing of a commodity. These boards generally handle all export sales for the commodity; they may administer provisions to guarantee farmers a minimum price each year. Canada and Australia use marketing boards for selected grains.

Marketing loan program -- Authorized by the Food Security Act of 1985, this program allows producers to repay nonrecourse price support loans at less than the announced loan rates. Under the act, the programs are mandatory for upland cotton and rice and discretionary for wheat, feed grains, and soybeans. To date, the discretionary programs have not been implemented.

Marketing quota -- Authorized by the Agricultural Adjustment Act of 1938, marketing quotas are used to regulate the marketing of some commodities when supplies are excessive. The quota represents, in general, the quantity USDA estimates to be required for domestic use and exports during the year. When marketing quotas are in effect, growers who produce more of a commodity than their farm acreage allotments should yield are subject to marketing penalties on the "excess" production and are ineligible for Government price-support loans.

National farm program acreage -- The number of harvested acres of feed grains, wheat, upland cotton, and rice needed nationally to meet domestic and export use and to accomplish any desired increase or decrease in carryover levels. Program acreage for an individual farm is based on that farm's share of the national farm program acreage.

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.

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. Except for wool, mohair, and certain minor tobaccos, parity is not currently used to set price-support levels for any program commodities.

Participation -- Also referred to as compliance. U.S. farmers wishing to receive program payments on their crops must satisfy certain requirements, such as retiring base acreage from production, before qualifying for those programs.

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. A PIK program in 1983 offered surplus agricultural commodities owned by the Government in exchange for agreements to reduce production by cutting crop acreage.

Price pooling - A policy tool used by state marketing boards to guarantee producers a certain price, then markets that grain and pools the revenue received. If the average price exceeds the minimum price established, producers are paid a pool bonus. Otherwise, the government assumes the cost of the differential.

Price support programs -- Government programs that aim to keep farm prices received by participating producers from falling below specific minimum prices. Price-support programs for major commodities are carried out by providing loans to farmers so that they can store their crops during periods of low 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.

Production flexibility -- The ability of a farmer to vary the crops mixture in response to prevailing market conditions. This capacity is hampered to some extent by the need to maintain base acreage in the commodities for which program payments are profitable, which restricts shifts to nonprogram crops, such as soybeans.

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.

Public Law 480 (PL 480) -- Common name for the Agricultural Trade Development and Assistance Act of 1954, which seeks to expand foreign markets for U.S. agricultural products, combat hunger, and encourage economic development in developing countries.

Set-aside -- A voluntary program to limit production by restricting the use of land. Such a program restricts a portion of a farmer's total cropland base used for production rather than a portion of the acres used to produce a specific crop (as is the case with acreage reduction programs). Introduced in 1970, set-asides may still be implemented at the discretion of the Secretary of Agriculture, but have not been offered since 1979. When offered, producers must participate to be eligible for Federal loans, purchases, and other payments. The EC also recently began to offer a voluntary set-aside program for cropland.

Soil bank -- Mandated by the Soil Bank Act of 1956, the program was an attempt to decrease the supply of agricultural products by reducing the amount of land used in crop production and to maintain other needed conservation practices. Land was retired

for 3, 5, or 10 years to a specified type of use, such as grass, trees, and water impoundments. This voluntary program was repealed by the Food and Agriculture Act of 1965.

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 (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.

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.

Appendix table 1--Acreage, yield, and production of corn, 1955-88

Crop year	Planted	Harvested	Diverted	Yield	Production
	---------Million acres---------			Bu./acre	Mil. bu.
1955	80.9	68.5	--	42.0	2,873
1956	77.8	64.9	NA	47.4	3,075
1957	73.2	63.1	NA	48.3	3,045
1958	73.4	63.5	NA	52.8	3,356
1959	82.7	72.1	--	53.1	3,825
1960	81.4	71.4	--	54.7	3,907
1961	65.9	57.6	19.1	62.4	3,598
1962	65.0	55.7	20.3	64.7	3,606
1963	68.8	59.2	17.2	67.9	4,019
1964	65.8	55.4	22.2	62.9	3,484
1965	65.2	55.4	24.0	74.1	4,103
1966	66.3	57.0	23.7	73.1	4,167
1967	71.2	60.7	16.2	80.1	4,860
1968	65.1	56.0	25.4	79.5	4,450
1969	64.3	54.6	27.2	85.9	4,687
1970	66.9	57.4	26.1	72.4	4,152
1971	74.2	64.1	14.1	88.1	5,646
1972	67.1	57.5	24.4	97.0	5,580
1973	72.3	62.1	6.0	91.3	5,671
1974	77.9	65.4	--	71.9	4,701
1975	78.7	67.6	--	86.4	5,841
1976	84.6	71.5	--	88.0	6,289
1977	84.3	71.6	--	90.8	6,505
1978	81.7	71.9	6.1	101.0	7,268
1979	81.4	72.4	2.9	109.5	7,928
1980	84.0	73.0	--	91.0	6,639
1981	84.1	74.5	--	108.9	8,119
1982	81.9	72.7	3.7	113.2	8,235
1983	60.2	51.5	32.2	81.1	4,175
1984	80.5	71.9	4.0	106.7	7,674
1985	83.5	75.2	5.4	118.0	8,877
1986	76.7	69.2	13.6	119.3	8,250
1987	65.7	59.2	21.1	119.4	7,072
1988[1]	67.6	58.2	23.6	84.6	4,921

NA = Not available.
-- = Not applicable (aspect of program not in effect).
[1] Estimate as of Aug. 12, 1989.

Source: Feed Situation and Outlook Report. U.S. Dept. Agr., Econ. Res. Serv., various issues.

Appendix table 2--Use and ending stocks for corn, 1957-88

Crop year	Feed and residual	Food, seed, and industrial	Exports	Total use[1]	Ending stocks	Stocks-to-use ratio
	Million bushels					Percent
1957	2,534	263	200	2,997	1,469	49.0
1958	2,783	289	230	3,302	1,524	46.2
1959	3,043	290	230	3,563	1,787	50.2
1960	3,092	295	292	3,679	2,016	54.8
1961	3,213	315	435	3,963	1,653	41.7
1962	3,156	323	416	3,895	1,365	35.0
1963	3,009	339	500	3,848	1,537	39.9
1964	2,956	349	570	3,875	1,147	29.6
1965	3,362	360	687	4,409	842	19.1
1966	3,333	364	487	4,184	826	19.7
1967	3,524	362	633	4,519	1,168	25.8
1968	3,607	359	535	4,501	1,118	24.8
1969	3,825	365	611	4,801	1,005	20.9
1970	3,593	385	517	4,495	666	14.8
1971	3,982	409	796	5,187	1,127	21.7
1972	4,292	450	1,258	6,000	708	11.8
1973	4,181	472	1,243	5,896	484	8.2
1974	3,180	497	1,149	4,826	361	7.5
1975	3,570	523	1,711	5,804	400	6.9
1976	3,590	542	1,657	5,789	1,136	19.6
1977	3,717	581	1,909	6,207	1,436	23.1
1978	4,264	608	2,124	6,996	1,710	24.4
1979	4,549	640	2,415	7,604	2,034	26.7
1980	4,157	718	2,408	7,283	1,392	19.1
1981	4,169	797	2,010	6,975	2,537	36.4
1982	4,521	895	1,834	7,250	3,523	48.6
1983	3,818	975	1,902	6,694	1,006	15.0
1984	4,079	1,091	1,865	7,036	1,648	23.4
1985	4,095	1,160	1,241	6,496	4,040	62.2
1986	4,717	1,191	1,504	7,412	4,882	65.9
1987	4,738	1,229	1,732	7,699	4,259	55.3
1988[2]	4,000	1,255	2,100	7,355	1,830	24.9

Note: Oct. 1 crop year 1957-75; Sept. 1 crop year 1976-88.
[1] Total may not add due to rounding.
[2] Estimate as of Aug. 12, 1989.
Source: Feed Situation and Outlook. U.S. Dept. Agr., Econ. Res. Serv., various issues.

Appendix table 3--Prices and ending stocks for corn, 1957-88

Crop year	Ending stocks CCC	FOR	Free	Total[1]	Price received[2]	Loan rate	Support level/ target price[3]	Direct payment[4]
	Million bushels				Dollars per bushel			
1957	1,046	--	423	1,469	1.11	1.40	--	--
1958	1,118	--	407	1,524	1.12	1.36	--	--
1959	1,285	--	502	1,787	1.05	1.12	--	--
1960	1,315	--	702	2,017	1.00	1.06	--	--
1961	810	--	843	1,653	1.10	1.20	1.20	--
1962	567	--	798	1,365	1.12	1.20	1.20	--
1963	815	--	722	1,537	1.11	1.07	1.25	0.18
1964	521	--	626	1,147	1.17	1.10	1.25	.15
1965	249	--	593	842	1.16	1.05	1.25	.20
1966	139	--	687	826	1.24	1.00	1.30	.30
1967	182	--	987	1,169	1.03	1.05	1.35	.30
1968	295	--	823	1,118	1.08	1.05	1.35	.30
1969	255	--	750	1,005	1.16	1.05	1.35	.30
1970	105	--	562	667	1.33	1.05	1.35	.30
1971	160	--	967	1,127	1.08	1.05	1.35	.32
1972	79	--	629	708	1.57	1.05	1.41	.40
1973	7	--	477	484	2.55	1.05	1.64	.32
1974	0	--	361	361	3.02	1.10	1.38	0
1975	0	--	633	633	2.54	1.10	1.38	0
1976	0	--	1,135	1,136	2.15	1.50	1.57	0
1977	4	212	1,220	1,436	2.02	2.00	2.00	0
1978	101	585	1,024	1,710	2.25	2.00	2.10	.03
1979	260	670	1,104	2,034	2.52	2.10	2.20	0
1980	242	0	1,150	1,392	3.12	2.25	2.35	0
1981	280	1,276	981	2,537	2.47	2.40	2.40	0
1982	1,143	1,890	490	3,523	2.55	2.55	2.70	.15
1983	201	447	358	1,006	3.21	2.65	2.86	0
1984	225	384	1,039	1,648	2.63	2.55	3.03	.43
1985	546	564	2,930	4,040	2.23	2.55	3.03	.48
1986	1,443	1,321	2,118	4,882	1.50	1.92	3.03	1.11
1987	750	1,200	2,415	4,365	1.94	1.82	3.03	1.09
1988[5]	400	750	680	1,830	2.57	1.77	2.93	.33

-- = Not applicable (aspect of program not in effect).
Note: Oct. 1 crop year 1950-74; Sept. 1 crop year 1975-88.
[1] Total may not add due to rounding.
[2] Adjusted (Findley) loan rate after 1985.
[3] Support level 1961-73; Target price 1974-88.
[4] Price support 1963-71; Set-aside 1972-73 (1973: .32 for 10% set-aside; .15 for 0% set-aside); deficiency 1974-88.
[5] Estimate as of Aug. 12, 1989.

Source: Agr. Stab. and Conserv. Serv., U.S. Dept. Agr.

Appendix table 4--Program costs for corn, 1961-88

Crop or fiscal year[1]	Direct or deficiency	Diversion	Disaster	Storage	CCC operations		
					Outlays	Redemp-tions	Net total
			Million dollars				
1961	0	645	0	0	1,180	395	785
1962	0	684	0	0	1,666	1,113	553
1963	305	375	0	0	1,528	861	667
1964	224	703	0	0	1,478	448	1,030
1965	334	760	0	0	1,382	696	659
1966	449	579	0	0	1,405	647	758
1967	429	302	0	0	1,402	550	852
1968	514	652	0	0	1,245	186	1,059
1969	585	780	0	0	1,795	304	1,491
1970	583	645	0	0	1,561	549	1,112
1971	893	0	0	0	1,630	776	854
1972	1,144	325	0	0	1,945	518	1,427
1973	910	0	0	0	2,006	976	1,030
1974	0	0	244	0	1,179	731	448
1975	0	0	90	0	338	188	150
1976	0	0	181	0	264	152	112
1977	0	0	281	0	671	407	264
1978	88	558	37	153	2,795	1,098	1,697
1979	0	110	16	223	2,089	1,222	867
1980	0	0	280	-72	2,123	866	1,257
1981	0	0	92	364	2,437	3,013	-666[3]
1982	291	0	1	625	5,506	1,225	4,281
1983[2]	-70	904	0	23	7,477	3,454	4,023
1984[2]	1,653	0	0	100	8,071	9,371	-1,299[3]
1985	2,479	0	9	165	3,317	1,608	1,709
1986	6,030	120	0	519	10,090	2,683	7,407
1987	5,874	1,416	0	447	23,088	13,330	9,758
1988[4]	2,300	560	909	307	NA	NA	NA

NA = Not available.

[1] Crop year is used for program payments while fiscal year is used for CCC operations data.
[2] Includes PIK outlays.
[3] Negative net CCC operations imply loans redeemed in that year exceeded loans taken out by farmers.
[4] Estimate as of Aug. 12, 1989.

Source: Agr. Stab. and Conserv. Serv., U.S. Dept. Agr.

Appendix table 5--Value comparisons for corn, 1955-88

Crop year	Loan value per acre		Market value per acre		Gross value of production		GNP deflator 1982=100
	Nominal[1]	1982 dollars[2]	Nominal[1]	1982 dollars[2]	Nominal[3]	1982 dollars[2]	
	Dollars				Billion dollars		Percent
1955	63.00	231.62	56.70	208.46	3.88	14.26	27.2
1956	66.36	236.16	61.15	217.60	3.97	14.12	28.1
1957	65.69	225.73	53.61	184.24	3.38	11.61	29.1
1958	59.14	199.11	59.14	199.11	3.76	12.66	29.7
1959	56.29	185.15	55.76	183.40	4.02	13.21	30.4
1960	65.64	212.43	54.70	177.02	3.91	12.64	30.9
1961	74.88	240.00	68.64	220.00	4.35	13.95	31.2
1962	69.23	217.02	72.46	227.16	4.04	12.66	31.9
1963	74.69	230.52	75.37	232.62	4.46	13.77	32.4
1964	66.05	200.74	73.59	223.69	4.08	12.39	32.9
1965	74.10	219.23	86.96	254.31	4.76	14.08	33.8
1966	76.76	219.30	90.64	258.98	5.17	14.76	35.0
1967	84.11	234.28	82.50	229.81	5.01	13.94	35.9
1968	83.48	221.42	85.86	227.75	4.81	12.75	37.7
1969	90.20	226.62	99.64	250.36	5.44	13.66	39.8
1970	76.02	181.00	96.29	229.27	5.52	13.15	42.0
1971	92.51	208.34	95.15	214.30	6.10	13.73	44.4
1972	101.85	219.03	152.29	327.51	8.76	18.84	46.5
1973	95.87	193.67	232.81	470.33	14.46	29.21	49.5
1974	79.09	146.46	217.14	402.11	14.20	26.29	54.0
1975	95.04	160.27	219.46	370.08	14.84	25.02	59.3
1976	132.00	209.19	189.20	299.84	13.52	21.43	63.1
1977	181.60	269.84	183.42	272.53	13.14	19.52	67.3
1978	202.00	279.78	227.25	314.75	16.35	22.65	72.2
1979	229.95	292.56	275.94	351.07	19.98	25.42	78.6
1980	204.75	238.91	283.92	331.30	20.71	24.17	85.7
1981	261.36	278.04	268.98	286.15	20.05	21.33	94.0
1982	288.66	288.66	288.66	288.66	21.00	21.00	100.0
1983	214.91	206.85	260.33	250.56	13.40	12.90	103.9
1984	272.09	252.63	280.62	260.56	20.18	18.74	107.7
1985	300.90	270.59	263.14	236.64	19.80	17.80	111.2
1986	229.06	200.75	178.95	156.84	12.38	10.85	114.1
1987	217.31	184.94	208.95	177.83	13.23	11.26	117.5
1988[4]	149.74	123.04	215.73	177.26	12.14	9.97	121.7

[1] Loan rate or average farm price times yield per harvested acre.
[2] GNP implicit price deflator (1982 = 100) was used.
[3] Production times average farm price.
[4] Estimate as of Aug. 12, 1989.

Source: Econ. Res. Serv., U.S. Dept. Agr.

Appendix table 6--World production, consumption, exports, and ending stocks for corn, 1960-88

Crop year[1]	Production	Consumption	Exports[2]	Ending stocks	Stocks-to-use ratio
	---------Million metric tons----------				Percent
1960	200.4	195.0	14.0	60.1	30.8
1961	208.5	209.8	20.1	55.8	26.6
1962	207.9	215.3	20.1	48.1	22.3
1963	217.3	213.2	21.9	52.6	24.7
1964	215.5	222.8	23.9	42.8	19.2
1965	225.8	232.5	28.1	33.5	14.4
1966	250.3	243.4	27.0	38.8	15.9
1967	262.4	252.9	29.2	47.0	18.6
1968	252.8	256.9	27.0	43.4	16.9
1969	270.2	269.4	31.2	41.3	15.3
1970	268.3	269.7	32.2	35.6	13.2
1971	308.7	293.1	35.8	48.4	16.5
1972	301.8	310.3	44.9	37.9	12.2
1973	330.7	327.0	54.1	38.3	11.7
1974	300.0	292.2	46.9	45.9	15.9
1975	339.5	330.7	60.0	52.1	15.8
1976	355.9	337.5	60.3	67.6	20.0
1977	365.1	353.5	65.6	76.5	21.6
1978	391.8	382.7	71.1	84.5	22.1
1979	425.1	413.1	78.1	97.5	23.6
1980	408.5	415.6	85.3	84.3	20.3
1981	441.2	421.7	73.2	108.2	25.7
1982	439.5	426.4	65.9	128.6	30.2
1983	347.5	407.9	67.6	65.5	16.1
1984	458.7	434.3	73.0	89.4	20.6
1985	479.8	425.2	62.2	144.1	33.9
1986	476.6	457.4	62.8	161.7	35.3
1987	442.7	466.0	63.8	140.2	30.1
1988[3]	390.2	461.6	71.4	74.4	16.1

[1] Based on aggregate of differing local marketing years.
[2] Includes intra-EC trade.
[3] Estimate as of Aug. 12, 1989.

Source: For. Agr. Serv., U.S. Dept. Agr.

Appendix table 7--U.S. and world production, trade, and ending stocks of corn, 1965-88

Crop year[1]	Production			Exports[2]			Ending stocks		
	World	United States	U.S. share	World	United States	U.S. share	World	United States	U.S. share
	--Million bushels--		Percent	---Million bushels---		Percent	---Million bushels---		
Percent									
1965	8,891.0	4,102.9	46.1	1,105.2	658.9	59.6	1,317.1	841.6	63.9
1966	9,851.9	4,167.6	42.3	1,063.7	477.8	44.9	1,526.3	826.3	54.1
1967	10,328.7	4,860.3	47.1	1,149.8	612.0	53.2	1,849.7	1,168.6	63.2
1968	9,953.3	4,449.5	44.7	1,061.0	523.6	49.4	1,707.6	1,118.3	65.5
1969	10,639.1	4,687.0	44.1	1,226.8	612.1	49.9	1,624.2	1,005.2	61.9
1970	10,563.6	4,152.2	39.3	1,265.9	506.0	40.0	1,402.6	663.0	47.3
1971	12,154.5	5,646.2	46.5	1,410.8	782.2	55.4	1,905.5	1,125.9	59.1
1972	11,882.0	5,579.8	47.0	1,768.2	1,241.5	70.2	1,490.4	707.9	47.5
1973	3,019.9	5,670.7	43.6	2,131.7	1,229.9	57.7	1,507.9	483.9	32.1
1974	1,811.6	4,701.4	39.8	1,847.3	1,149.0	62.2	1,805.1	558.0	30.9
1975	3,365.3	5,840.7	43.7	2,362.4	1,677.7	71.0	2,052.7	633.2	30.8
1976	4,010.7	6,289.1	44.9	2,375.4	1,656.7	69.7	2,660.4	1,135.6	42.7
1977	4,373.0	6,504.9	45.3	2,584.2	1,909.1	73.9	3,012.6	1,435.9	47.7
1978	5,425.4	7,267.8	47.1	2,798.4	2,123.7	75.9	3,325.7	1,709.5	51.4
1979	6,733.5	7,928.0	47.4	3,074.8	2,415.4	78.6	3,836.7	2,034.3	53.0
1980	6,083.2	6,639.3	41.3	3,357.2	2,407.9	71.7	3,318.6	1,392.1	41.9
1981	7,369.5	8,118.6	46.7	2,883.2	2,009.5	69.7	4,260.2	2,536.6	59.5
1982	7,303.0	8,235.1	47.6	2,594.3	1,833.8	70.7	5,062.3	3,523.3	69.6
1983	3,680.7	4,174.7	30.5	2,662.3	1,901.5	71.4	2,577.5	1,006.3	39.0
1984	8,059.9	7,674.0	42.5	2,873.4	1,865.4	64.9	3,520.5	1,648.2	46.8
1985	8,888.6	8,876.7	47.0	2,448.1	1,241.2	50.7	5,673.2	4,039.5	71.2
1986	8,764.2	8,249.8	44.0	2,470.7	1,504.0	60.9	6,363.9	4,881.7	76.7
1987	7,570.1	7,072.1	40.2	2,512.3	1,732.0	68.9	5,520.3	4,113.1	74.5
1988[3]	5,362.7	4,921.0	32.0	2,590.0	2,007.9	77.5	2,929.0	1,660.0	56.7

[1] Based on aggregate of differing local marketing years.
[2] Includes intra-EC trade.
[3] Estimate as of Aug. 12, 1989.

Source: For. Agr. Serv., U.S. Dept. Agr.

Appendix table 8--World corn trade, stocks, and consumption, 1962-88

Crop year	World trade to world consumption	World stocks to world consumption	U.S. exports to foreign consumption
		Percent	
1962	9.3	22.3	8.0
1963	10.2	24.7	9.5
1964	10.7	19.2	10.3
1965	12.1	14.4	12.2
1966	11.1	15.9	8.1
1967	11.5	18.6	10.1
1968	10.5	16.9	8.5
1969	11.6	15.3	9.5
1970	11.9	13.2	7.6
1971	12.2	16.5	11.0
1972	14.5	12.2	16.6
1973	16.6	11.7	15.0
1974	16.1	15.7	14.3
1975	18.1	15.8	18.8
1976	17.9	20.0	18.1
1977	18.6	21.6	19.8
1978	18.6	22.1	20.8
1979	18.9	23.6	21.8
1980	20.5	20.3	21.0
1981	17.4	25.7	17.3
1982	15.5	30.2	16.1
1983	16.6	16.1	16.9
1984	16.8	20.6	15.6
1985	14.6	33.9	10.8
1986	13.7	35.3	12.4
1987	13.7	30.1	13.9
1988[1]	16.2	17.2	16.3

[1] Estimate as of Aug. 12, 1989.

Source: For. Agr. Serv., U.S. Dept. Agr.

Appendix table 9--Corn production and exports, major foreign exporters and total foreign, 1962-88

Crop year	Argentina		South Africa		Thailand		Total foreign	
	Production	Exports	Production	Exports	Production	Exports	Production	Exports
	Million bushels							
1962	171.6	102.9	240.1	108.9	26.2	28.4	4,578.2	394.0
1963	210.6	134.7	168.5	43.3	33.8	36.3	4,533.7	385.3
1964	202.4	105.0	180.4	18.9	36.8	35.3	5,000.1	382.1
1965	277.2	151.8	201.5	19.0	40.2	44.6	4,788.1	446.2
1966	314.9	162.1	384.3	114.1	44.2	46.5	5,684.3	585.9
1967	258.3	127.1	209.3	105.2	51.8	47.8	5,468.3	537.8
1968	270.1	148.2	210.2	31.3	59.3	50.7	5,503.8	537.4
1969	368.5	218.8	241.4	43.5	66.9	59.1	5,952.0	614.7
1970	390.9	253.6	338.6	100.6	76.3	65.5	6,411.4	759.9
1971	230.7	99.9	373.3	140.2	90.5	83.1	6,508.2	628.6
1972	354.3	185.1	163.8	6.2	51.8	40.9	6,302.2	526.7
1973	389.7	225.0	437.2	127.0	92.5	83.9	7,349.2	901.8
1974	303.1	137.2	358.2	126.2	98.4	77.9	7,110.3	698.3
1975	230.5	127.5	287.9	57.7	112.7	93.9	7,524.5	684.7
1976	326.8	205.9	382.9	99.4	105.3	83.3	7,721.6	718.7
1977	381.9	232.9	395.9	118.6	66.0	47.9	7,868.0	675.1
1978	354.3	234.8	328.0	91.5	109.9	81.8	8,157.7	674.8
1979	252.0	134.5	423.7	135.6	129.9	84.6	8,805.5	659.4
1980	507.8	358.2	577.0	195.1	126.0	84.3	9,443.9	949.3
1981	377.9	227.0	329.1	149.1	171.3	128.3	9,250.9	873.7
1982	354.3	238.4	160.7	9.4	135.8	84.1	9,067.9	760.5
1983	374.0	214.5	173.4	.4	155.5	112.0	9,506.0	760.8
1984	468.5	280.5	320.3	20.4	171.3	125.2	10,385.9	1,008.0
1985	488.2	290.0	318.0	114.1	210.6	144.6	10,012.0	1,206.9
1986	364.2	141.7	281.5	102.4	196.6	114.8	10,514.4	966.8
1987	354.3	165.3	295.3	23.6	107.7	27.5	10,363.1	484.2
1988[1]	236.2	106.3	327.9	78.7	177.2	94.5	10,440.9	582.7

[1] Estimate as of Aug. 12, 1989.

Source: For. Agr. Serv., U.S. Dept. Agr.

Appendix table 10--Coefficients of variation for corn[1]

Period	Planted acres	Yield	Production	Exports	Price received	Value of output
1950-83	0.1015	0.3117	0.3538	0.8597	0.4089	0.7077
1954-63	.0864	.1688	.1279	.4780	.1132	.0644
1964-73	.0481	.1210	.1528	.3707	.3219	.4596
1974-83	.0867	.1388	.2030	.1807	.1540	.1897
1954-58	.0479	.1034	.0720	.2884	.1004	.0552
1959-63	.1058	.0947	.0438	.2638	.0418	.0553
1964-68	.0342	.0837	.1072	.1214	.0646	.0776
1969-73	.0535	.0940	.1202	.3522	.3466	.4280
1974-78	.0340	.1068	.1384	.1922	.1485	.0855
1979-83	.1166	.1257	.2200	.1137	.1150	.1429
1984-88	.0938	.1219	.1846	.0851	.1912	.2347

[1] Coefficient of variation is a measure of variability which equals the standard deviation divided by the mean.

Appendix table 11--Provisions of corn programs, 1961-90

Provision	1961	1962	1963	1964
Parity price ($/bu) 1/	1.62	1.61	1.59	1.56
Support price ($/bu)	--	--	1.25	1.25
Payment rate ($/bu)	--	--	0.18	0.15
Payment ($)	--	--	2/ 0.18*Yld*Plt	2/ 0.15*Yld*Plt
Target price ($/bu)	--	--	--	--
Deficiency payment: 3/				
Advance payment ($/bu)	--	--	--	--
Final payment ($/bu)	--	--	--	--
Allocation factor (%) 4/	--	--	--	--
Nonrecourse loan:				
Basic rate ($/bu) 5/	6/ 1.20	6/ 1.20	1.07	1.10
Adjusted rate ($/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum ($/bu) 9/	1.26+CC	1.26+CC	1.31+CC	1.31+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 ($)	11/ 0.60*Yld*Div	11/ 0.60*Yld*Div	2/ 0.25*Yld*Div	2/ 0.25*Yld*Div
Acreage diversion optional (%)	0-20	0-20	0-20	0-10
Payment rate ($/bu)	60% of loan rate	60% of loan rate	50% of support	50% of support
Payment ($)	11/ 0.72*Yld*Div	11/ 0.72*Yld*Div	2/ 0.625*Yld*Div	2/ 0.625*Yld*Div
Set-aside (%)	--	--	--	--
Payment rate ($/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 ($)	--	--	--	--
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	Yes	Yes	Yes	Yes
Cross compliance 13/	No	14/ Yes	No	No
Offsetting compliance 15/	No	No	No	No
Normal crop acreage 16/	--	--	--	--
National base acres (mil):				
Feed grain	107.9	123.3	132.4	132.5
Corn	87.4	86.4	90.0	90.1
Corn-sorghum	--	--	--	--
Corn base in CRP	--	--	--	--
National allotment acres (mil):				
Feed grain	--	--	--	--
Corn	--	--	--	--
National program acres (mil):				
Feed grain	--	--	--	--
Corn	--	--	--	--
National program yield (bu/ac)	--	--	52.9	56.4
Disaster program: 17/				
Prevented plantings payment ($/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 11--Provisions of corn programs, 1961-90--Continued

Provision	1965	1966	1967	1968
Parity price ($/bu) 1/	1.57	1.60	1.62	1.65
Support price ($/bu)	1.25	1.30	1.35	1.35
Payment rate ($/bu)	0.20	0.30	0.30	0.30
Payment ($)	2/ 0.20*Yld*Plt	21/ 2/ .30*Yld*Plt	21/ 2/ .30*Yld*Plt	22/ 21/ .30*Yld*Plt
Target price ($/bu)	--	--	--	--
Deficiency payment: 3/				
Advance payment ($/bu)	--	--	--	--
Final payment ($/bu)	--	--	--	--
Allocation factor (%) 4/	--	--	--	--
Nonrecourse loan:				
Basic rate ($/bu) 5/	1.05	1.00	1.05	1.05
Adjusted rate ($/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum ($/bu) 9/	1.31+CC	1.37+CC	1.42+CC	1.42+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 ($)	2/ 0.25*Yld*Div	--	--	--
Acreage diversion optional (%)	0-10	0-30	--	0-30
Payment rate ($/bu)	50% of support	50% of support	--	45% of support
Payment ($)	2/ 0.625*Yld*Div	2/ 0.65*Yld*Div	--	0.6075*Yld*Div
Set-aside (%)	--	--	--	--
Payment rate ($/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 ($)	--	--	--	--
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	Yes	Yes	Yes	Yes
Cross compliance 13/	14/ No	14/ No	14/ No	14/ No
Offsetting compliance 15/	Yes	Yes	Yes	Yes
Normal crop acreage 16/	--	--	--	--
National base acres (mil):				
Feed grain	132.7	133.2	114.9	115.1
Corn	90.3	90.4	90.4	90.4
Corn-sorghum	--	--	--	--
Corn base in CRP	--	--	--	--
National allotment acres (mil):				
Feed grain	--	--	--	--
Corn	--	--	--	--
National program acres (mil):				
Feed grain	--	--	--	--
Corn	--	--	--	--
National program yield (bu/ac)	58.0	72.0	75.0	78.0
Disaster program: 17/				
Prevented plantings payment ($/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 11--Provisions of corn programs, 1961-90--Continued

Provision	1969	1970	1971	1972
Parity price ($/bu) 1/	1.72	1.79	1.88	2.01
Support price ($/bu)	1.35	1.35	1.35	1.41
Payment rate ($/bu)	0.30	0.30	--	--
Payment ($)	22/ 21/ .30*Yld*Plt	22/ 21/ .30*Yld*Plt	--	--
Target price ($/bu)	--	--	--	--
Deficiency payment: 3/				
Advance payment ($/bu)	--	--	--	--
Final payment ($/bu)	--	--	--	--
Allocation factor (%) 4/	--	--	--	--
Nonrecourse loan:				
Basic rate ($/bu) 5/	1.05	1.05	1.05	1.05
Adjusted rate ($/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum ($/bu) 9/	1.42+CC	1.42+CC	1.42+CC	1.21+CC
Actual price ($/bu) 10/	1.38	1.59	1.37	1.91
Farmer-owned reserve:				
Loan level ($/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 ($)	0.6075*Yld*Div	0.54*Yld*Div	--	--
Set-aside (%)	--	--	20	25
Payment rate ($/bu)	--	--	24/ 0.32	24/ 0.40
Payment ($)	--	--	0.32*Yld*Bas/2	0.40*Yld*Bas/2
Set-aside alternate (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Set-aside voluntary (%)	--	--	--	26/ 0-10
Payment rate ($/bu)	--	--	--	0.52
Payment ($)	--	--	--	0.52*Yld*Bas/2
Acreage reduction (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Acreage reduction voluntary (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	Yes	Yes	Yes	Yes
Cross compliance 13/	23/ No	23/ No	No	No
Offsetting compliance 15/	Yes	Yes	Yes	Yes
Normal crop acreage 16/	--	--	--	--
National base acres (mil):				
Feed grain	133.1	132.9	27/ 112.1	27/ 129.9
Corn	90.3	90.3	27/ 88.8	27/ 88.7
Corn-sorghum	--	--	--	--
Corn base in CRP	--	--	--	--
National allotment acres (mil):				
Feed grain	--	--	--	--
Corn	--	--	--	--
National program acres (mil):				
Feed grain	--	--	--	--
Corn	--	--	--	--
National program yield (bu/ac)	81.0	81.0	81.0	81.0
Disaster program: 17/				
Prevented plantings payment ($/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 11--Provisions of corn programs, 1961-90--Continued

Provision	1973	1974	1975	1976
Parity price ($/bu) 1/	2.34	2.72	3.10	3.28
Support price ($/bu)	1.64	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Target price ($/bu)	--	1.38	1.38	1.57
Deficiency payment: 3/				
Advance payment ($/bu)	--	--	--	--
Final payment ($/bu)	--	0.00	0.00	0.00
Allocation factor (%) 4/	--	--	--	--
Nonrecourse loan:				
Basic rate ($/bu) 5/	1.05	1.10	1.10	1.50
Adjusted rate ($/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum ($/bu) 9/	1.21+CC	1.27+Adj+CC	1.59+Adj+CC	1.81+Adj+CC
Actual price ($/bu) 10/	2.93	3.21	3.11	None
Farmer-owned reserve:				
Loan level ($/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/ 0.32	Def	Def	Def
Payment ($)	0.32*Yld*Bas/2	0.00*Yld*Alt	0.00*Yld*Alt	0.00*Yld*Alt
Set-aside alternate (%)	25/ 0	--	--	--
Payment rate ($/bu)	0.15	--	--	--
Payment ($)	0.15*Yld*Bas/2	--	--	--
Set-aside voluntary (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Acreage reduction (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Acreage reduction voluntary (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	Yes	No	No	No
Cross compliance 13/	No	No	No	No
Offsetting compliance 15/	Yes	Yes	Yes	No
Normal crop acreage 16/	--	--	--	--
National base acres (mil):				
Feed grain	27/ 130.1	--	--	--
Corn	27/ 89.2	--	--	--
Corn-sorghum	--	--	--	--
Corn base in CRP	--	--	--	--
National allotment acres (mil):				
Feed grain	--	28/ 89.0	28/ 89.0	28/ 89.0
Corn	--	28/ 60.9	28/ 60.9	28/ 60.9
National program acres (mil):				
Feed grain	--	--	--	--
Corn	--	--	--	--
National program yield (bu/ac)	87.0	97.0	93.0	93.0
Disaster program: 17/				
Prevented plantings payment ($/bu)	--	0.46	0.46	0.52
Low yield criterion (%)	--	66.7	66.7	less than normal
Low yield payment ($/bu)	--	0.46	0.46	0.52 on the short fall
Payment limitation ($)	--	--	--	--
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 11--Provisions of corn programs, 1961-90--Continued

Provision	1977	1978	1979	1980
Parity price ($/bu) 1/	3.45	3.74	4.21	4.65
Support price ($/bu)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Target price ($/bu)	2.00	2.10	2.20	31/ 2.35/2.05
Deficiency payment: 3/				
Advance payment ($/bu)	--	--	--	--
Final payment ($/bu)	0.00	0.03	0.00	0.00
Allocation factor (%) 4/	--	97.1	100	100
Nonrecourse loan:				
Basic rate ($/bu) 5/	2.00	2.00	32/ 2.00/2.10	2.25
Adjusted rate ($/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum ($/bu) 9/	2.30+Adj+CC	3.00	0.00	3.42
Actual price ($/bu) 10/	None	None	None	None
Farmer-owned reserve:				
Loan level ($/bu)	2.00	2.00	32/ 2.00/2.10	33/ 2.25/2.40
Release level ($/bu)	2.50	2.50	32/ 2.50/2.63	2.81
Call level ($/bu)	2.80	2.80	32/ 2.80/3.05	3.26
Storage payment ($/bu)	0.25	0.25	0.25	0.265
Immediate entry	No	No	No	No
Feed grain ceiling (mil bu)	No	No	No	No
Feed grain floor (mil bu)	No	No	No	No
Acreage diversion (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Acreage diversion optional (%)	--	34/ 10	34/ 10	--
Payment rate ($/bu)	--	0.20	1.00	--
Payment ($)	--	0.20*Yld*Plt	1.00*Yld*Div	--
Set-aside (%)	None	34/ 10	34/ 10	None
Payment rate ($/bu)	Def	AF*Def	AF*Def	AF*Def
Payment ($)	0.00*Yld*Alt	0.029*Yld*Plt	0.00*Yld*Alt	0.00*Yld*Alt
Set-aside alternate (%)	--	35/ 5	35/ 10	36/ 0
Payment rate ($/bu)	--	Def	Def	Def
Payment ($)	--	0.03*Yld*Prg	0.00*Yld*Alt	0.00*Yld*Alt
Set-aside voluntary (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Acreage reduction (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Acreage reduction voluntary (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	No	No	No	No
Cross compliance 13/	No	37/ Yes	37/ Yes	No
Offsetting compliance 15/	No	38/ Yes	38/ Yes	No
Normal crop acreage 16/	--	Yes	Yes	Yes
National base acres (mil):				
Feed grain	--	--	--	--
Corn	--	--	--	--
Corn-sorghum	--	--	--	--
Corn base in CRP	--	--	--	--
National allotment acres (mil):				
Feed grain	28/ 89.0	--	--	--
Corn	28/ 60.9	--	--	--
National program acres (mil):				
Feed grain	--	39/ 88.7/97.4	39/ 83.4/109.4	39/ 103.9/105.2
Corn	--	39/ 67.6/76.2	39/ 63.7/85.7	39/ 82.1/84.1
National program yield (bu/ac)	90.0	94.0	95.4	96.2
Disaster program: 17/				
Prevented plantings payment ($/bu)	0.67	0.70 on 75% normal yield	0.73 on 75% normal yield	31/ 0.78/0.68 on 75% normal yield
Low yield criterion (%)	less than normal	60 % of normal	60 % of normal	60 % of normal
Low yield payment ($/bu)	0.67 on the short fall	1.05 on the short fall	1.10 on the short fall	31/ 1.18/1.03 on the short fall
Payment limitation ($)	--	--	--	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 11--Provisions of corn programs, 1961-90--Continued

Provision	1981	1982	1983	1984
Parity price ($/bu) 1/	4.91	5.06	5.17	5.33
Support price ($/bu)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Target price ($/bu)	2.40	2.70	2.86	3.03
Deficiency payment: 3/				
Advance payment ($/bu)	--	0.105	0.105	--
Final payment ($/bu)	0.00	0.15	0.00	0.43
Allocation factor (%) 4/	100	43/ NA	43/ NA	43/ NA
Nonrecourse loan:				
Basic rate ($/bu) 5/	2.40	2.55	2.65	2.55
Adjusted rate ($/bu) 7/	--	--	--	--
CCC domestic sales: 8/				
Legislated minimum ($/bu) 9/	3.31	3.58	3.58	3.58
Actual price ($/bu) 10/	3.52	3.80	3.87	3.90
Farmer-owned reserve:				
Loan level ($/bu)	44/ 2.55	45/ 2.90	46/ 2.65	2.55
Release level ($/bu)	44/ 3.15	45/ 3.25	46/ 3.25	3.25
Call level ($/bu)	44/ 3.15	--	--	--
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 ($)	0.00*Yld*Plt	--	--	--
Set-aside alternate (%)	36/ 0	--	--	--
Payment rate ($/bu)	Def	--	--	--
Payment ($)	0.00*Yld*Plt	--	--	--
Set-aside voluntary (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Acreage reduction (%)	--	10	10	10
Payment rate ($/bu)	--	Def	Def	Def
Payment ($)	--	0.15*Yld*Plt	0.00*Yld*Prg	0.43*Yld*Prg
Acreage reduction voluntary (%)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
PIK acreage diversion (%)	--	--	48/ 10-30	--
Payment rate (bu)	--	--	80% of yield	--
Payment (bu)	--	--	.8*Yld*PIK	--
Compliance restrictions:				
Soil conserving base 12/	No	No	No	No
Cross compliance 13/	No	No	No	No
Offsetting compliance 15/	No	No	No	No
Normal crop acreage 16/	Yes	43/ NA	43/ NA	43/ NA
National base acres (mil):				
Feed grain	--	119.9	120.5	120.6
Corn	--	81.3	82.6	80.8
Corn-sorghum	--	99.0	--	99.0
Corn base in CRP	--	--	--	--
National allotment acres (mil):				
Feed grain	--	--	--	--
Corn	--	--	--	--
National program acres (mil):				
Feed grain	39/ 115.2/105.0	43/ NA	43/ NA	43/ NA
Corn	39/ 90.1/80.5	43/ NA	43/ NA	43/ NA
National program yield (bu/ac)	102.5	102.0	104.0	112.0
Disaster program: 17/				
Prevented plantings payment ($/bu)	0.80 on 75% normal yield	49/ 0.90	49/ 0.95	49/
Low yield criterion (%)	60 % of normal	--	--	--
Low yield payment ($/bu)	1.20 on the short fall	49/ 1.35	49/ 1.43	49/
Payment limitation ($)	40/ 100,000	40/ 100,000	40/ 100,000	40/ 100,000
Advanced payment (%)	--	No	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 11--Provisions of corn programs, 1961-90--Continued

Provision	1985	1986 53/	1987	1988
Parity price ($/bu) 1/	5.07	4.94	4.94	5.11
Support price ($/bu)	--	--	--	--
Payment rate ($/bu)	--	--	--	--
Payment ($)	--	--	--	--
Target price ($/bu)	3.03	3.03	3.03	2.93
Deficiency payment: 3/				
Advance payment ($/bu)	0.235	0.412	0.484	0.44
Final payment ($/bu)	0.48	1.11	1.09	0.33
Allocation factor (%) 4/	43/ NA	43/ NA	43/ NA	43/ NA
Nonrecourse loan:				
Basic rate ($/bu) 5/	2.55	2.40	2.28	2.21
Adjusted rate ($/bu) 7/	--	1.92	1.82	1.77
CCC domestic sales: 8/				
Legislated minimum ($/bu) 9/	3.58	3.33	3.33	3.22
Actual price ($/bu) 10/	3.90	3.94	3.80	3.65
Farmer-owned reserve:				
Loan level ($/bu)	2.55	1.92	1.82	1.77
Release level ($/bu)	3.25	3.03	3.03	2.93
Call level ($/bu)	--	--	--	--
Storage payment ($/bu)	0.265	0.265	0.265	0.265
Immediate entry	No	No	No	54/ No
Feed grain ceiling (mil bu)	47/ Could be	55/ Yes	55/ Yes	Yes
Feed grain floor (mil bu)	No	--	--	--
Acreage diversion (%)	--	2.5	--	--
Payment rate ($/bu)	--	0.73	--	--
Payment ($)	--	0.73*Yld*Div	--	--
Acreage diversion optional (%)	--	--	15	10
Payment rate ($/bu)	--	--	2.00	1.75
Payment ($)	--	--	2.00*Yld*Div	1.75*Yld*Div
Set-aside (%)	--	--	--	--
Payment rate ($/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 ($)	0.48*Yld*Plt	1.11*Yld*Plt	1.21*Yld*Plt	Def*Yld*Plt
Acreage reduction voluntary (%)	--	56/ 50-92 rule	56/ 50-92 rule	57/ 0-92 rule
Payment rate ($/bu)	--	Def	Def	Def
Payment ($)	--	.92*1.11*Yld*Pmt	.92*1.21*Yld*Pmt	.92*Def*Yld*Pmt
PIK acreage diversion (%)	--	--	--	--
Payment rate (bu)	--	--	--	--
Payment (bu)	--	--	--	--
Compliance restrictions:				
Soil conserving base 12/	No	No	No	No
Cross compliance 13/	No	No	58/ Limited	58/ Limited
Offsetting compliance 15/	No	No	No	No
Normal crop acreage 16/	43/ NA	43/ NA	43/ NA	43/ NA
National base acres (mil):				
Feed grain	126.2	122.3	119.8	120.1
Corn	84.2	81.7	81.5	82.9
Corn-sorghum	103.5	100.6	98.9	--
Corn base in CRP	--	0.2	2.3	2.8
National allotment acres (mil):				
Feed grain	--	--	--	--
Corn	--	--	--	--
National program acres (mil):				
Feed grain	43/ NA	43/ NA	43/ NA	43/ NA
Corn	43/ NA	43/ NA	43/ NA	43/ NA
National program yield (bu/ac)	106.0	59/ 104.2	59/ 104.2	59/ 104.2
Disaster program: 17/				
Prevented plantings payment ($/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 11--Provisions of corn programs, 1961-90--Continued

Provision	1989	1990
Parity price ($/bu) 1/	--	--
Support price ($/bu)	--	--
Payment rate ($/bu)	--	--
Payment ($)	--	--
Target price ($/bu)	2.84	--
Deficiency payment: 3/		
Advance payment ($/bu)	0.356	--
Final payment ($/bu)	0.89	--
Allocation factor (%) 4/	43/ NA	43/ NA
Nonrecourse loan:		
Basic rate ($/bu) 5/	2.06	--
Adjusted rate ($/bu) 7/	1.65	--
CCC domestic sales: 8/		
Legislated minimum ($/bu) 9/	3.02	--
Actual price ($/bu) 10/	--	--
Farmer-owned reserve:		
Loan level ($/bu)	1.65	--
Release level ($/bu)	2.84	--
Call level ($/bu)	--	--
Storage payment ($/bu)	0.265	--
Immediate entry	54/ No	--
Feed grain ceiling (mil bu)	Yes	--
Feed grain floor (mil bu)	--	--
Acreage diversion (%)	--	--
Payment rate ($/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 ($)	Def*Yld*Plt	--
Acreage reduction voluntary (%)	57/ 0-92 rule	--
Payment rate ($/bu)	Def	--
Payment ($)	.92*Def*Yld*Pmt	--
PIK acreage diversion (%)	--	--
Payment rate (bu)	--	--
Payment (bu)	--	--
Compliance restrictions:		
Soil conserving base 12/	No	No
Cross compliance 13/	58/ Limited	58/ Limited
Offsetting compliance 15/	No	No
Normal crop acreage 16/	43/ NA	43/ NA
National base acres (mil):		
Feed grain	119.1	--
Corn	82.8	--
Corn-sorghum	--	--
Corn base in CRP	3.1	--
National allotment acres (mil):		
Feed grain	--	--
Corn	--	--
National program acres (mil):		
Feed grain	43/ NA	43/ NA
Corn	43/ NA	43/ NA
National program yield (bu/ac)	59/ 104.2	--
Disaster program: 17/		
Prevented plantings payment ($/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

See footnotes at end of table.

Footnotes for Appendix table 11--Provisions of corn programs

1/ Average parity price of corn 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 can not 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 participants can receive either grain or the cash equivalent of the grain as the CCC acts as their 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, sugarbeets, sugar cane, sunflowers, upland cotton, and wheat -- planted on a farm plus acres setaside 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 maybe paid 50 percent of the total payment for which he or she will become eligible by carrying out the program.
20/ At signup, the producer maybe 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 their maximum acreage eligible for price support payment will be considered as having planted their 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 this additional voluntary set-aside was $0.52 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 on his land. It is only used 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 3 consecutive years of zero planting, the allotment will be removed.

29/ Applies to feed grain program and public access payments a person can receive, 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 $2.35, otherwise is $2.05.

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 off of current plantings.

35/ By voluntarily reducing current year plantings of corn 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, the 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 their farms' 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 deficiency and diversion 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 programs 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 counties 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 permitted 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 permitted 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 these 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 the wheat, feed grain, upland cotton, extra-long staple cotton, and rice programs.

Source: Green, Robert C. A Database for Support Programs of Program Crops, 1960-90. Staff Report (forthcoming). U.S. Dept. Agr., Econ. Res. Serv.

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UNITED STATES DEPARTMENT OF AGRICULTURE
ECONOMIC RESEARCH SERVICE
1301 NEW YORK AVENUE, NW.
WASHINGTON, DC 20005-4788