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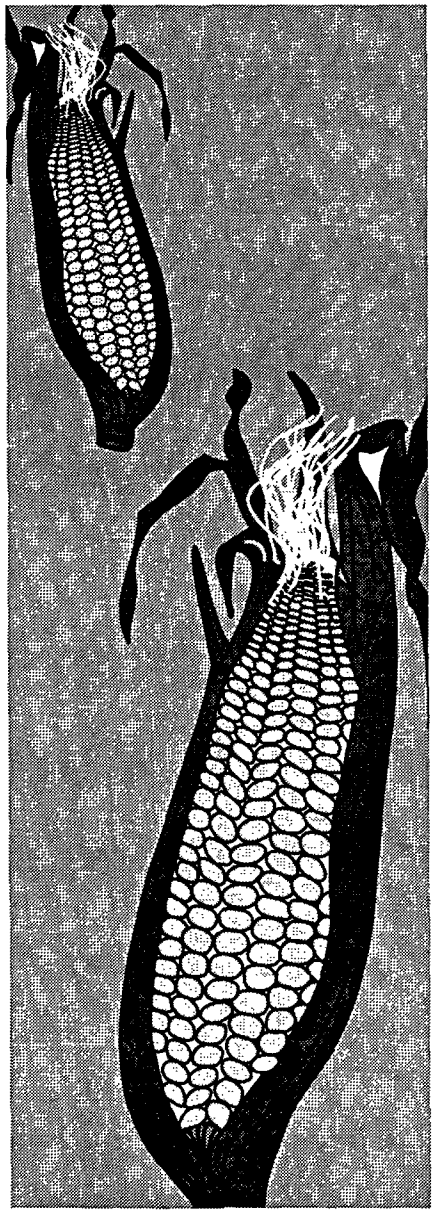
Feed Grains

Background for 1995 Farm Legislation

William Lin
Peter Riley
Sam Evans



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Feed Grains: Background for 1995 Farm Legislation. By William Lin, Peter Riley, Sam Evans. Commercial Agriculture Division, Economic Research Service, U.S. Department of Agriculture. Agricultural Economic Report No. 714.

Abstract

Feed grains are the leading crop grown in the United States. U.S. feed grain production averaged 239 million tons per year in 1990-94. Total disappearance of feed grains is forecast to reach a record 267 million tons in the 1994/95 marketing year: 211 million tons for domestic use and 56 million tons for exports. Much of the expansion during the last two decades came from domestic use. Returns over cash expenses for corn producers during 1991-93 were only two-thirds of those during 1988-90 due to rising cash expenses and declining government payments, but are expected to improve considerably in 1994/95 due to record yields. During 1990-93, world trade in coarse grains was sluggish and the U.S. share of world coarse grain trade was relatively low, averaging 52 percent. Slower growth of competitor exports and increased world import demand projected for the next decade, however, suggest that U.S. exports are likely to increase fairly steadily. During 1991-93, direct government payments as a percentage of annual gross income ranged from 12 to 17 percent for corn production. Policy issues likely to be considered in 1995 farm legislation are discussed, including planting flexibility, acreage idling under the acreage reduction program and conservation reserve program, and the malting barley assessment, as well as policy options to address these issues.

Keywords: Feed grains, production, domestic use, exports, farm programs, farm costs and returns, world markets, policy issues

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Foreword

Congress will soon consider new farm legislation to replace the expiring Food, Agriculture, Conservation, and Trade Act of 1990. In preparation for these deliberations, the U.S. Department of Agriculture and other groups are studying previous legislation to see what lessons can be learned that are applicable to the 1990's. This report updates *Corn: Background for 1990 Farm Legislation* (Staff Report No. 89-47), by Stephanie Mercier. It is one of a series of updated and new Economic Research Service background reports for farm legislation discussions. These reports summarize the experiences with various farm programs and the key characteristics of the commodities and the industries that produce them. This report integrates all feed grains (corn, sorghum, barley, and oats) into one report, but focuses on corn. For more information, see Additional Readings at the end of the text.

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Summary

Key issues to be addressed in the feed grains portion of this year's farm legislation deliberations include planting flexibility and acreage idling under both the Conservation Reserve Program (CRP) and the Acreage Reduction Program (ARP). Policy options in regard to the planting flexibility issue include (1) expanding the normal flex acreage beyond the current 15 percent, (2) combining all crop acreage base into a farm program base and allowing complete planting flexibility within the base, and (3) implementing a normal crop acreage concept, such as the one under the 1977 Farm Act.

Options for the CRP include extending the current program for another 10-15 years but under more critical criteria to reduce soil and wind erosion and to preserve water quality and other environmental benefits.

Policy decisions that continue to hold land out of production will be critical given expectations for continued growth in both domestic use and exports. However, the program cost is likely to be the dominant criterion for legislation.

Producers benefit from participating in the government feed grains program directly through support prices and direct payments and indirectly through higher market prices. U.S. feed grain farmers have received program payments since 1961. During 1991-93, direct payments as a percentage of annual gross income were in ranges of 12-17 percent for corn, 19-22 percent for sorghum, 24-31 percent for barley, and 18-25 percent for oats. These percentages were well under those during much of the 1980's. In 1986-88, for example, direct payments were 25-37 percent of annual gross income from corn production. Deficiency payments averaged $5.5 billion for feed grain producers during that late-1980's period, compared with $2.8 billion during 1991-93.

During 1991-93, returns over cash expenses for corn producers averaged $0.66 per bushel (in 1987 dollars), compared with $0.71 in 1985 and $0.86 in 1990. However, returns over cash expenses for corn producers were still the highest among feed grain producers on a per acre basis. Overall, returns over cash expenses are expected to improve considerably in 1994/95 because of record yields, greater domestic and export demands, and higher deficiency payments.

U.S. feed grain production has trended upward since the 1930's, reaching a record 285 million metric tons in 1994/95. Much of the increase was due to yield improvements, especially for corn. Corn production increased from 5.8 billion bushels in 1975 to 10.1 billion bushels in 1994. However, acres planted to sorghum, barley, and oats have declined.

In the 1980's and the early 1990's, weather and, at times, set-aside programs caused larger fluctuations in feed grain production and stocks than in earlier years. The CRP, a long-term conservation program that is credited with conservation and environmental benefits, is a policy factor that could have significant effects on future feed grain production.

Total disappearance of feed grains has trended upward during the last two decades and is expected to reach a record 267 million metric tons in the 1994/95 marketing year. That total is likely to include 211 million metric tons for domestic use and 56 million for exports.

Much of the expansion is coming from domestic use. Food, seed, and industrial (FSI) use of feed grains, although accounting for only 20-25 percent of domestic use, has been steadily increasing in recent years. FSI use of corn exceeded 1 billion bushels in 1984/85 and reached a record 1.6 billion bushels in 1993/94, exceeding corn exports for the first time.

Livestock and poultry feeding remains the predominant domestic use, accounting for about 75 percent, which averaged about 140 million metric tons over the last decade. The upward trend in domestic feed grain use is expected to continue over the next decade.

World trade in coarse grains was sluggish in 1990-93, averaging about 89 million metric tons per year. Corn is the major component, averaging about 60 million metric tons. Most of the trade in coarse grains is for livestock feed.

The U.S. share of world coarse grains trade was relatively low during the early 1990's, averaging about 52 percent, as competing corn exporters captured a larger share of the world market at the expense of the United States. Recent competitor gains have been led by China. However, competitor exports are not expected to increase substantially in the next decade. This, in combination with expected growth in world import demand, suggests that U.S. exports of coarse grains are likely to increase fairly steadily over the next decade. Also, a greater share of U.S. exports will move to the higher income developing countries, with the most promising U.S. export opportunities among the coarse grains expected for corn.

Feed Grains

Background for 1995 Farm Legislation

William Lin, Peter Riley, and Sam Evans

Introduction

Feed grains are comprised of corn, sorghum, barley, and oats. While these field crops are grown in most States, production of each of these crops is concentrated in various regions of the United States—corn is primarily grown in the Midwest and Central Plains States, sorghum in the Central and Southern Plains States, and barley and oats in the Northern Plains and Northwest. Over the last 5 years (1990-94), feed grain planted area averaged 104 million acres annually, accounting for 32 percent of total principal crop area, which averaged 324 million acres.

Feed grains rank highest among all crops in terms of total crop value, accounting for more than 25 percent of total value of crop production in the United States. Over the last 5 years, the value of feed grain production averaged $21.4 billion annually. The value of all crops, including field and miscellaneous crops plus fruit and nut crops, averaged $85.4 billion during this period.

Corn is the major U.S. feed grain, accounting for slightly more than 85 percent of total production. Sorghum is the second largest feed grain crop at 7 percent, with barley and oats representing the remaining 4 and 2 percent, respectively. The share of feed grain production represented by sorghum and oats has been declining over time. In the mid-1970's, sorghum and oat production averaged 10 and 5 percent of total feed grain production, respectively. Barley production, as a share of total production, has remained relatively stable while corn's share of production has increased from 81 percent in the mid-1970's to its current share of 87.

Feed grains are versatile commodities. Although they are major inputs for livestock production, feed grains are also processed and used for human food and beverage consumption, and industrial purposes. Corn is processed by wet millers into (1) high-fructose corn syrup (HFCS), (2) glucose and dextrose, (3) starch, (4) alcohol, and (5) cereal and other food products. Dry millers process corn into cereal and other food products and alcohol. Both milling processes produce high-protein grain byproducts, which are utilized by the livestock feed industry.

Feed grains are the major ingredient in livestock feeding enterprises, and feed and residual use has accounted for about 60 percent of the total annual use since 1975. Food, seed, and industrial (FSI) uses have increased over time from less than 10 percent in the mid-1970's to nearly 20 percent in recent years. In contrast, exports of feed grains declined from nearly 30 percent of total use in the mid-1970's to just under 20 percent over the last 3 years (1991/92-1993/94).

The United States is the largest producer of feed grains in the world, averaging 239 million tons annually during the last 5 years.[1] During this period, the U.S. share of world production averaged 29 percent. This is more than twice the average production of China, the second largest producer, which averaged 114 million tons annually.

Corn is the major component of global coarse grain trade, generally accounting for about two-thirds of the volume over the last decade. Barley follows with nearly 20 percent, sorghum at slightly less than 10 percent, and oats and rye make up the balance with about 5 percent.

The United States is the leading exporter of feed grains in the world, averaging 50 million tons annually during the last 5 years and representing 56 percent of world coarse grain trade. Exports of feed grains from China, the second largest exporter, averaged just under 9 million tons annually. The United States dominates world trade in both corn and sorghum with average market shares of 70 and 80 percent during the last 5 years.

In recent years, the United States has become a significant importer of barley and oats. Since 1983, the United States has been the world's largest importer of oats. These imports have increased fairly steadily over

[1] "Tons" refers to metric tons hereafter unless otherwise specified.

the last decade, reaching a record in 1993/94. Barley imports also reached a record in 1993/94 at 71 million bushels, exceeding exports for the first time since 1969. Exports of U.S. barley were 66 million bushels in 1993/94 compared with the previous 5-year average of nearly 85 million bushels.

With the large volume of exports, feed grains contribute significantly to the U.S. balance of trade. On a fiscal year basis, feed grain and feed grain product exports were valued at $6.5 billion annually during the last 5 years, accounting for 16 percent of the value of agricultural exports ($41.1 billion).

Farm legislation has played a major role in the farm sector since the 1930's. Government payments to feed grain producers increased from less than $250 million in 1975 and 1976 to $9.5 billion in 1987, and declined significantly to an average of $3.8 billion during 1991-93. More market-oriented farm programs were implemented with the 1985 farm legislation and were continued with the 1990 legislation, the current law.

Characteristics of the Feed Grain Industry

Feed grains comprise the single largest category of crops grown in the United States. During the last decade, area planted to feed grains averaged 108 million acres, representing nearly a third of the total area planted to principal crops (table 1). Area planted to corn, the leading feed grain, averaged nearly 75 million acres or 23 percent of total principal crops and 70 percent of all feed grains (fig. 1). Area planted to sorghum averaged 12 million acres, representing about 4 percent of principal crops. Barley and oats plantings averaged 10 and 11 million acres, respectively. The area planted to sorghum, barley, and oats trended downward during the last 10 years, declining from 45 million acres in 1985 to 24 million in 1994.

Feed grains are also the leading crop based on farm values. The value of feed grains ranged from $15 billion in 1986 to over $25 billion in 1982 (table 2). During the last 5 years, the value of feed grain produc-

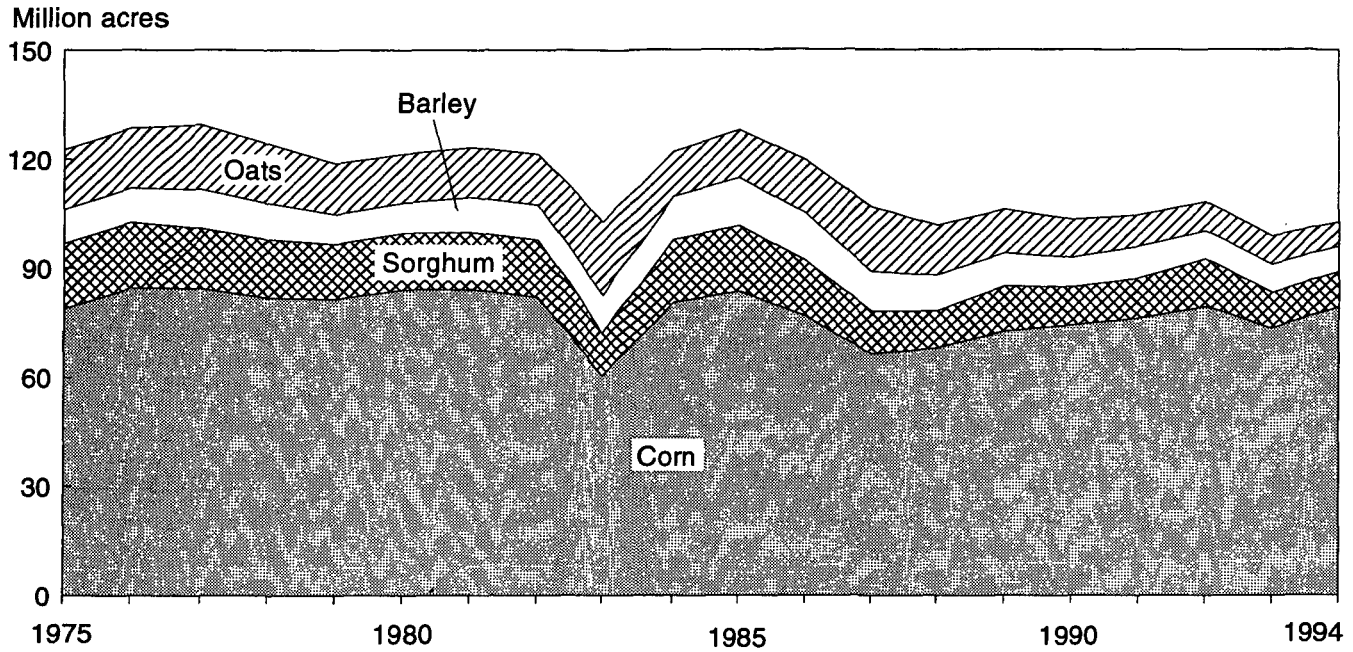
Table 1—Comparison of feed grains to principal crops: Planted area

Year	Principal crops	Feed grains	Corn	Sorghum	Barley	Oats
			Thousand acres			
1975	336,091	122,606	78,719	18,080	9,373	16,434
1976	344,873	128,652	84,588	18,143	9,301	16,620
1977	336,438	129,474	84,328	16,636	10,778	17,732
1978	345,803	124,268	81,675	16,197	9,989	16,407
1979	355,677	118,747	81,394	15,277	8,116	13,960
1980	363,167	121,383	84,043	15,639	8,320	13,381
1981	358,708	123,277	84,097	15,930	9,618	13,632
1982	345,020	121,385	81,857	16,028	9,549	13,951
1983	342,146	102,787	60,207	11,880	10,411	20,289
1984	358,257	122,119	80,517	17,254	11,934	12,414
1985	353,042	128,057	83,398	18,285	13,139	13,235
1986	338,220	119,614	76,580	15,339	13,024	14,671
1987	315,263	106,792	66,200	11,756	10,929	17,907
1988	318,032	101,798	67,717	10,343	9,831	13,907
1989	331,152	106,174	72,322	12,642	9,125	12,085
1990	326,337	103,345	74,166	10,535	8,221	10,423
1991	325,362	104,615	75,957	11,064	8,941	8,653
1992	326,453	108,193	79,311	13,177	7,762	7,943
1993	319,553	98,840	73,235	9,882	7,786	7,937
1994	324,256	102,733	79,158	9,772	7,159	6,644
1985-94 average	327,767	108,016	74,804	12,280	9,592	11,341
Percent of total		33.0	22.8	3.8	2.9	3.5

Principal crops include corn, sorghum, oats, barley, winter wheat, durum wheat, other spring wheat, rice, rye, soybeans, peanuts, sunflowers, cotton, all hay, dry edible beans, potatoes, tobacco, sugar beets, and sugar cane.

Source: *Crop Production*, various issues, NASS, USDA.

Figure 1
Feed Grains: Planted Acreage



tion averaged $21 billion, or 25 percent of all principal crops. The value of corn averaged $19 billion annually over the last 5 years, representing 22 percent of the value of all crops. The value of the corn crop as a percent of total feed grains has increased over the last 20 years, from an average of 83 percent during 1975-80 to 88 percent during the last 5 years. The farm value of sorghum since 1975 peaked at $2.2 billion in 1985. Since 1985, the farm value of sorghum has declined nearly 50 percent to $1.3 billion in 1994. The value of oats has declined nearly 70 percent from $954 million in 1981 to $293 million in 1994. The value of barley production has remained relatively stable, at nearly $1 billion since 1975.

Structure of the Feed Grain Industry

Trends in Production

Total U.S. feed grain production has trended upward since the 1930's. Production of corn has more than doubled since 1965, reaching a record 10 billion bushels in 1994 (app. table 1). Much of the increase was due to yield improvements, especially for corn. Year-to-year fluctuations in production occur, however, because of such factors as the weather and feed grain programs. Drought in 1988, for example, reduced production by more than 30 percent from the previous year. In 1993, excess rainfall caused late plantings, abandoned acreage, and reduced yields, which, together with a 10-percent set-aside, reduced corn production by a third from 1992 levels.

Corn production in the United States increased from 5.8 billion bushels in 1975 to 9.5 billion in 1992, and is estimated to have reached a record 10.1 billion bushels in 1994 (fig. 2). Yields during this time increased from 86 bushels per acre to nearly 139 bushels in 1994. The long-term increase in yields is about 1.5 to 2.0 bushels per acre annually. Corn yields have varied significantly, due mainly to weather. Over the last decade, both drought and floods have reduced yields by as much as 30 percent from the previous year. In 1983, corn yields averaged 81 bushels per acre, 28 percent below the 1982 average yield of 113 bushels, which was then record high (fig. 3). Similarly in 1988, drought reduced average yields to 85 bushels per acre, down 29 percent from the then record 1987 yield of 120 bushels. In 1993, severe flooding in the Midwest and drought in the Southeast reduced average corn yields to 101 bushels per acre, down 23 percent from the record 1992 yield.

Increases in corn yields over time have been attributed mainly to improvements in technology and production practices. Technological innovations and improvements have occurred with hybrid seeds, fertilizers, pesticides, and machinery. Soil and water conservation practices, including reduced tillage, irri-

gation, crop rotations, and pest management systems, are examples of improved production practices. Irrigated corn acres accounted for 14 percent of all corn acres harvested in 1992, up slightly from 12 percent in 1982. Improved management of farm resources has also been cited as a source of increased productivity. Application rates of fertilizers have declined since 1984, yet yields have continued to rise.

While corn is grown in most States, most production occurs in a region bounded by Ohio to the east, Nebraska to the west, Missouri to the south, and Minnesota to the north. The top 10 States in this region produced 8.5 billion bushels in 1994, 84 percent of the U.S. corn crop (table 3). Iowa and Illinois, the two top producing States, typically account for slightly more than a third of the crop.

Production of sorghum, barley, and oats all trended down over the last decade, primarily reflecting reductions in acreage (fig. 4). Acres planted to feed grains are all lower than in the mid-1980's, when acreage of all the feed grains except oats spiked upward. The declines in acreage were especially pronounced for oats, barley, and sorghum. In the case of oats, acres planted dropped by about 50 percent between 1985 and 1994, continuing the long-term downward trend that started in the mid-1950's. Acres planted to sorghum and barley each declined by more than 45 percent during this period.

During 1990-94, the share of malting barley acreage planted in 9 major producing States (including Wyoming) remained stable at around 62 percent, while feed barley share remained at 38 percent (table 4). Acreage planted to malting barley varieties in the major pro-

Table 2—Crop values: 1975-94

Year	Principal crops	Feed grains	Corn	Sorghum	Barley	Oats
			Million dollars			
1975	56,778	18,425	14,818	1,777	906	924
1976	55,666	16,642	13,524	1,431	852	835
1977	57,256	16,102	13,107	1,412	760	823
1978	64,866	19,305	16,281	1,464	871	689
1979	77,272	23,339	19,877	1,876	872	714
1980	81,641	24,081	20,554	1,697	1,017	813
1981	83,247	24,387	20,200	2,079	1,154	954
1982	81,094	25,568	21,641	1,928	1,115	884
1983	70,125	17,001	13,553	1,384	1,270	794
1984	79,598	24,350	20,144	2,050	1,357	799
1985	74,553	23,534	19,519	2,243	1,130	642
1986	60,521	15,288	12,507	1,323	989	469
1987	98,857	16,860	14,108	1,179	967	606
1988	72,746	15,306	12,661	1,337	775	533
1989	80,635	20,674	17,869	1,288	968	549
1990	80,782	20,743	18,192	1,221	912	418
1991	79,582	20,500	17,864	1,331	996	309
1992	87,450	22,736	19,723	1,667	946	400
1993	84,129	18,371	16,032	1,235	813	291
1994	94,953	24,561	22,158	1,331	779	293
1975-94 average	76,088	20,389	17,217	1,563	972	637
Percent of total		26.8	22.6	2.1	1.2	0.8
1990-94	85,379	21,382	18,794	1,357	889	342
Percent of total		25.0	22.0	1.6	1.0	0.4

Value of principal crops includes field and miscellaneous crops, fruits and nuts, and commercial vegetables.

Source: *Crop Values*, various issues, NASS, USDA.

Figure 2
U.S. Corn Production

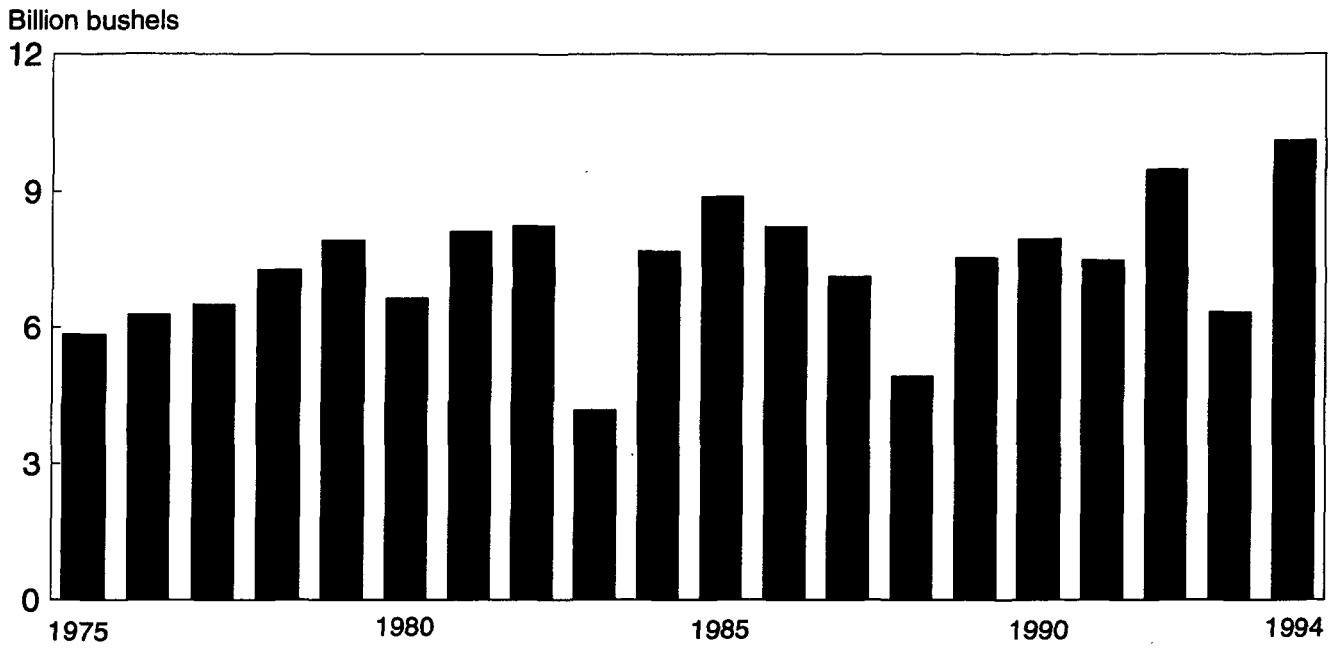
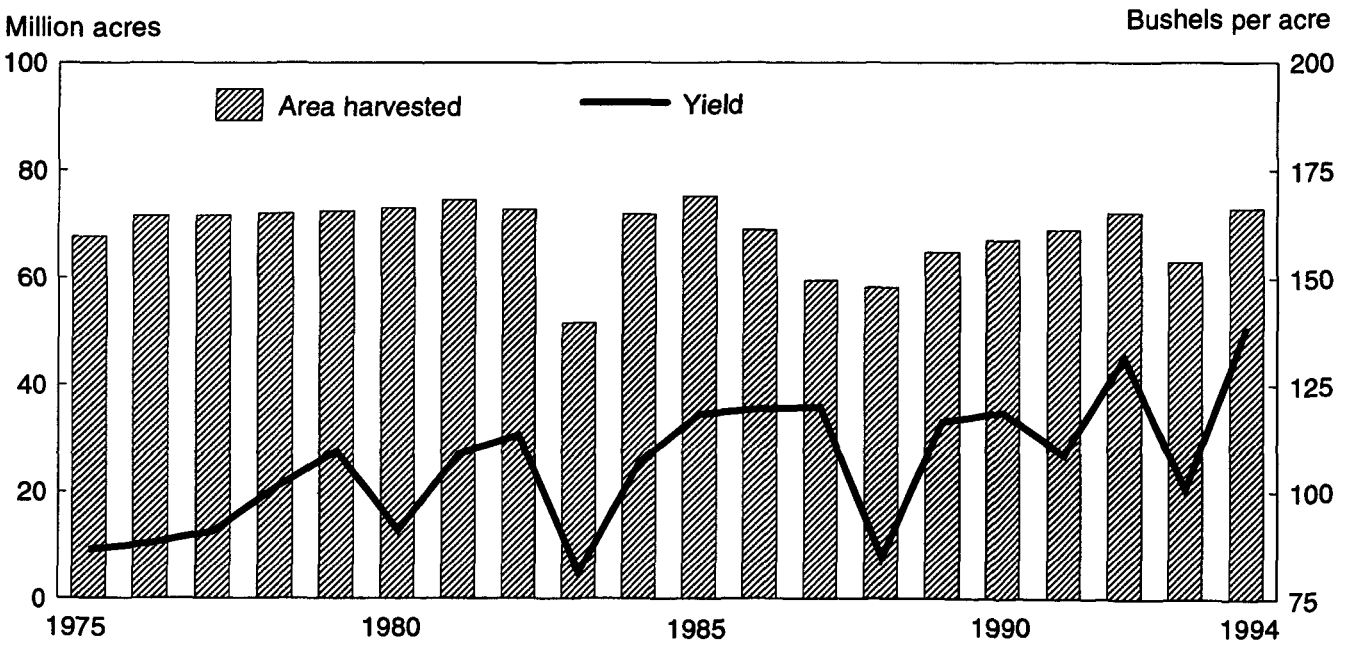


Figure 3
Corn: Area Harvested and Average Yield



ducing States stood at about 4 million acres in 1994, down from 6.4 million acres in 1985. This does not mean that all the crops on these acres were of "malting" quality or, even if of malting quality, that they were used for malting. Excess malting barley is used for feeding.

A policy factor that would have a significant effect on future feed grain production is the long-term Conservation Reserve Program (CRP). In 1994/95, about 11 million feed grain acres were enrolled in the CRP, the equivalent of 11 percent of all acres planted to feed grains. Unless Congress renews the CRP, acres planted to feed grains in the future are projected to increase because the CRP contracts will begin to expire in late 1995. According to a USDA-funded survey conducted by the Soil and Water Conservation Society,

Table 3—Top corn-producing States

1994 rank	State	1975	1980	1985	1990	1994[1]
				Million bushels		
1	Iowa	1,118	1,463	1,707	1,562	1,930
2	Illinois	1,254	1,064	1,535	1,321	1,786
3	Nebraska	503	604	954	934	1,154
4	Minnesota	407	610	725	763	916
5	Indiana	552	603	756	703	858
6	Ohio	311	441	512	417	487
7	Wisconsin	198	348	358	354	437
8	S. Dakota	83	122	252	234	367
9	Kansas	141	111	152	189	305
10	Missouri	170	110	273	238	274
10-State total		4,737	5,475	7,224	6,715	8,514
Percent of U.S.		81.1	82.5	81.4	84.6	84.3
U.S. total		5,841	6,639	8,875	7,934	10,103

[1]Estimate as of January 12, 1995.

Source: *Field Crops: Estimates by States*, various issues, NASS, USDA.

Figure 4
Barley, Oats, and Sorghum Production

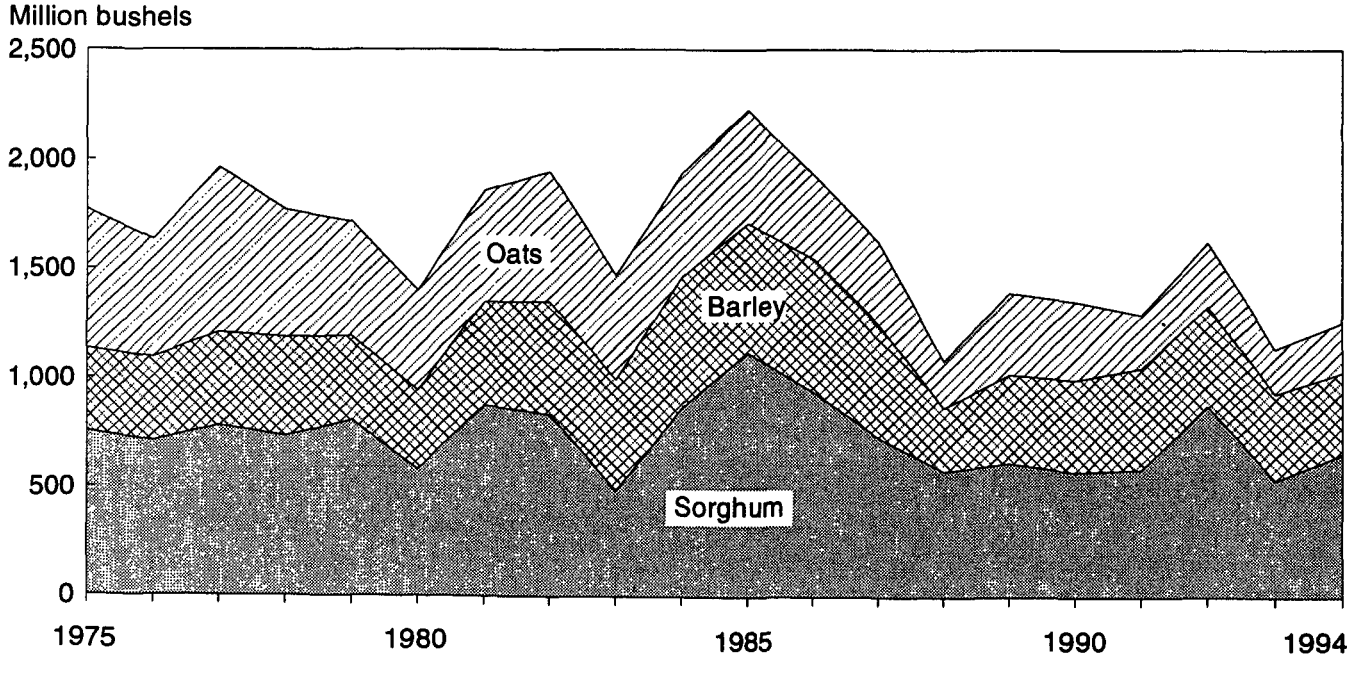


Table 4—Acreage of feed and malting barley planted in major producing States

State	1980	1985	1990	1991	1992	1993	1994
				1,000 acres			
North Dakota:							
Total	1,850	3,500	2,600	2,900	2,700	3,000	2,600
Feed	209	560	594	652	609	685	510
Malting	1,641	2,940	2,006	2,248	2,091	2,315	2,090
Montana:							
Total	1,180	2,350	1,600	1,800	1,350	1,300	1,300
Feed	615	1,182	931	1,111	967	878	826
Malting	565	1,168	669	689	383	422	474
Idaho:							
Total	900	1,280	790	800	740	770	740
Feed	513	870	346	354	329	353	381
Malting	387	410	444	446	411	417	359
Minnesota:							
Total	900	1,200	850	900	700	725	650
Feed	45	60	106	41	35	10	17
Malting	855	1,140	744	859	665	715	633
South Dakota:							
Total	535	760	630	500	400	400	380
Feed	176	245	172	182	168	179	180
Malting	359	515	458	318	232	221	200
Washington:							
Total	440	1,200	350	580	450	350	310
Feed	381	1,125	299	497	392	310	277
Malting	59	85	51	83	58	40	33
Oregon:							
Total	170	360	135	190	170	165	140
Feed	124	328	122	173	152	151	130
Malting	46	32	13	17	18	14	10
Colorado:							
Total	265	360	155	140	130	100	90
Feed	144	293	51	33	31	25	24
Malting	121	67	104	107	99	75	66

Note: Malting varieties planted include all those recommended by the American Malting Barley Association for malting and brewing and other nonrecommended varieties used for malting and brewing. Not all malting barley varieties harvested meet malting quality specifications.

Source: American Malting Barley Association and U.S. Department of Agriculture, National Agricultural Statistics Service.

as much as 60 percent of cropland currently enrolled in the CRP could return to production. However, in December 1994, the Secretary of Agriculture announced several new provisions modifying and extending CRP contracts. These include options for early termination of contracts and targeting more environmentally sensitive acres for new enrollments. These changes suggest that less than 60 percent of enrolled acreage will return to production and total CRP acreage will likely stay closer to current levels.

Number and Size of Farms

The number of farms in the United States has continued its long-term declining trend, down from 2.3 million in 1974, to 2.2 million in 1982, and to 1.9 million in 1992. During 1974-92, average farm size expanded from 440 acres to 491 acres. Changes in the number of feed grain farms and average farm size followed a similar pattern, but at a more rapid rate. For example, the number of farms growing corn declined from

883,300 in 1974 to 503,900 in 1992, while the average corn acreage per farm expanded from 69.8 acres to 137.6 acres. This general trend for farms growing corn also applied to farms growing sorghum, barley, and oats. Although the number of farms growing barley increased temporarily between 1982 and 1987 due to brighter net returns in the late 1980's, it declined again in 1992 according to the newly released 1992 Census of Agriculture data, reflecting the enrollment of more barley acreage in the CRP.

Feed grain production has continued to be concentrated on larger farms. About 11 percent of farms growing corn averaged more than 1,000 acres in 1992, up from 8 percent in 1987 (table 5). In 1992, farms with 500 acres of farmland or more accounted for 29 percent of farms growing corn but nearly 70 percent of corn production. Farms with less than 100 acres of farmland accounted for 19 percent of farms growing corn, but produced only 2 percent of the corn. The farms' sales receipts from all production also expanded—3 percent of the farms had more than $500,000 worth of sales in 1992, compared with 1.6 percent in 1987 (table 6).

Most farms harvesting corn were cash grain farms, while other farms were also involved in livestock operations. More of the large farms tended to be cash grain farms. Corn was the primary crop grown by all farms growing corn, while soybeans and hay crops were also common, along with livestock production. 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.[2] The planting flexibility provision in 1990 farm legislation permits producers to plant the crop of their own choice on up to 25 percent of their base acreage—a 15-percent "normal flex acres" (NFA) and an additional 10-percent "optional flex acres" (OFA). No payments are made on the NFA, but producers can plant program or other crops. Planting to the other crops allowed by the Secretary of Agriculture does not affect their farm program base acreage and thereby encourages producers to base their planting decisions more on market forces and less on Government farm programs (see box, "Crop Acreage Base," on page 10).

[2]Eastern Corn Belt States include Illinois, Indiana, Ohio, and Wisconsin, while western Corn Belt States include Iowa, Minnesota, Nebraska, Kansas, Missouri, and South Dakota.

Program Participation in the Early 1990's

An important aspect of the feed grain programs is to balance expected supply and use through the implementation of annual acreage reduction programs (ARP). The ARP often requires participants to set aside a certain percentage of their base acreage for conserving use in exchange for price and income supports. Program participation depends on relative net returns between participation and nonparticipation: a higher ratio of net returns from program participation relative to nonparticipation provides economic incentives for participation. A high rate of program participation, given the set-aside requirement, would in turn lead to larger set-aside acres and reduce acre-

Table 5—Number of farms in the United States by size of farm, 1992 and 1987

Size of farm	Farms		Percentage	
	1992	1987	1992	1987
Acres	*- - - - Number - - - -*		*- - Percent - -*	
Corn				
1-99	95,016	131,880	18.9	21.0
100-259	148,939	199,907	29.6	31.9
260-499	112,521	142,552	22.3	22.7
500-999	90,403	100,706	17.9	16.0
1,000+	57,056	52,557	11.3	8.4
Total	503,935	627,602	100.0	100.0
Sorghum				
1-99	5,276	7,227	7.4	8.1
100-259	11,187	16,014	15.8	17.9
260-499	13,052	17,864	18.4	19.9
500-999	18,153	22,762	25.6	25.4
1,000+	23,290	25,775	32.8	28.8
Total	70,958	89,642	100.0	100.0
Barley				
1-99	4,758	6,732	8.2	7.5
100-259	10,010	14,347	17.1	16.0
260-499	9,693	15,643	16.6	17.4
500-999	11,098	19,247	19.0	21.4
1,000+	22,871	33,979	39.1	37.8
Total	58,430	89,948	100.0	100.0
Oats				
1-99	18,494	29,168	13.1	14.1
100-259	43,933	68,947	31.2	33.4
260-499	34,207	51,012	24.3	24.7
500-999	23,895	32,991	17.0	16.0
1,000+	20,226	24,074	14.4	11.8
Total	140,755	206,192	100.0	100.0

Source: 1992 and 1987 Census of Agriculture.

Table 6—Number of farms in the United States by sales class, 1992 and 1987

Sales class	Farms		Percentage of total	
	1992	1987	1992	1987
	Percent		*Percent*	
Corn				
Less than $10,000	81,622	139,801	16.2	22.3
$10,000-$39,999	129,397	179,328	25.7	28.5
$40,000-$99,999	118,365	153,745	23.5	24.5
$100,000-$249,999	117,354	115,264	23.3	18.4
$250,000-$499,999	40,516	29,282	8.0	4.7
$500,000 or more	16,681	7,579	3.3	1.6
Total	503,935	627,602	100.0	100.0
Sorghum				
Less than $10,000	7,963	14,852	11.2	16.6
$10,000-$39,999	18,926	28,359	26.7	31.6
$40,000-$99,999	18,334	23,583	25.8	26.3
$100,000-$249,999	16,624	16,264	23.4	18.1
$250,000-$499,999	6,159	4,717	8.7	5.3
$500,000 or more	2,952	1,867	4.2	2.1
Total	70,958	89,642	100.0	100.0
Barley				
Less than $10,000	5,080	9,915	8.7	11.0
$10,000-$39,999	11,849	24,416	20.3	27.1
$40,000-$99,999	15,716	28,199	26.9	31.4
$100,000-$249,999	16,932	19,817	29.0	22.0
$250,000-$499,999	5,964	5,276	10.2	5.9
$500,000 or more	2,889	2,325	4.9	2.6
Total	58,430	89,948	100.0	100.0
Oats				
Less than $10,000	22,745	38,276	16.1	18.6
$10,000-$39,999	35,050	58,603	24.9	28.4
$40,000-$99,999	37,690	59,299	26.8	28.8
$100,000-$249,999	33,846	39,857	24.0	19.3
$250,000-$499,999	8,651	7,947	6.2	3.8
$500,000 or more	2,773	2,210	2.0	1.1
Total	140,755	206,192	100.0	100.0

Source: 1992 and 1987 Census of Agriculture.

age planted to feed grains. However, producers probably do not make decisions on whether to participate or not simply based on 1-year expected returns, because of a desire to maintain their base. Also, bankers and financial lenders often make major contributions to the farmer's decision of whether to participate in the ARP or not. Conservation compliance requirements also play a role.

Feed grain producers have maintained a high rate of program participation in the early 1990's, suggesting that net returns from program participation were higher than those from nonparticipation for most producers. Since 1991, the first year that 1990 farm legislation was implemented, about 80 percent of corn, sorghum, and barley effective base acres were enrolled in the programs. Program participation in the early 1990's was slightly lower than in the late

1980's for corn, but slightly higher for sorghum and barley. As in the past, program participation for oats tends to be lower than for other feed grains. Only 41 percent of oats effective base acreage was enrolled in the oat program in the early 1990's. However, this rate of participation is higher than the late 1980's level, likely because of the ability to flex acres to other crops.

Trends in Domestic Use and Stocks

In the 1980's and the early 1990's, weather and government programs caused larger fluctuations in feed grain production and stocks than during earlier times. The combination of the PIK (payment in kind) program and summer drought reduced U.S. corn production in 1983 to 4.2 billion bushels, the smallest corn harvest since 1970. An early summer drought and heat wave greatly reduced the corn harvest to 4.9 billion bushels in 1988. The combined floods in the Midwest and drought in the Southeast in 1993 once again reduced the corn harvest to 6.3 billion bushels, down from the 9.5-billion-bushel bumper crop in 1992. Ending stocks of corn reached 850 million bushels, the lowest since the mid-1970's (table 8). However, the estimated record crop harvest of 10.1 billion bushels in 1994 is forecast to replenish ending stocks to 1.7 billion bushels (fig. 5).

Total disappearance of feed grains has trended upward during the last two decades. It is forecast to reach a record 267 million metric tons in the 1994/95 marketing year: 211 million metric tons for domestic use and 56 million metric tons for exports. Most of the expansion came from domestic use. Feed and residual use averaged around 140 million metric tons over the last decade, but dropped to below 120 million metric tons in 1988/89 due to drought. U.S. feed grain exports tended to fluctuate in response to changing import demands and changes by competing exporters. Over the last two decades, U.S. feed grain exports averaged 53 million metric tons, but fluctuated in a range from 34 million to 71 million.

Livestock and Poultry Feed. Livestock and poultry feeding accounted for about 75 percent of the domestic use of feed grains in recent years. "Feed and residual" use, which is a residual obtained by subtracting food, seed, and industrial use (FSI), exports, and ending stocks from total feed grain supply (including beginning stocks, production, and imports), is used to approximate feed use of feed grains. No direct feed use statistics are available. Corn, being the primary energy feed ingredient, accounted for 81 percent of feed and residual use of all grains in 1993/94 (table 9). Over the last decade, feed use of feed grains ranged from a low of 119 million metric tons in 1988/89 to a record 154 million metric tons in 1992/93 when cattle on feed stood at 10.9 million head in 13 major States and grain-consuming animal units (GCAU's) totaled 82.9 million.[3] Feed and residual use of feed grains, being a derived demand, is positively related to cattle on feed, or more generally to the number of animal units (includes hogs and poultry as well). For example, feed use of corn expanded in 1990/91 as cattle on feed in the 13 major States rose from 9.9 million head to 10.8 million and GCAU's increased from 77.7 million head to 80.3 million (tables 8 and 9).

Crop Acreage Base

The crop acreage base is the moving average of acres planted or considered planted (primarily acres put into conserving use under the acreage reduction program and acres planted to soybeans, minor oilseeds, and other permissible crops on the flex acreage) to the program crop for the previous 5 years. The 1990 farm legislation allows more planting flexibility while protecting the crop acreage base. For example, corn producers can plant the crop of their own choice (except fruits, vegetables, dry edible beans, or potatoes) on up to 25 percent of their crop base acreage—a 15-percent "normal flex acreage" and an additional 10-percent "optional flex acreage"—without losing their corn base acreage. No deficiency payments will be made on the 15-percent normal flex acreage even if a producer grows the program crop. During 1991-94, about 3.3 million acres of corn flex acres were planted to soybeans, minor oilseeds, and other nonprogram crops per year. For program participation purposes, corn and sorghum permitted plantings are combined into one permitted acreage on which producers have the flexibility to plant any combination of corn and sorghum. However, deficiency payments and planted and considered planted acreage credit will accrue as if corn were planted on corn base and sorghum were planted on sorghum base. Since 1986, the national corn effective base has remained stable at 82-83 million acres (table 7).

[3]Grain-consuming animal units, as reported by the U.S. Department of Agriculture, refer to livestock and poultry numbers weighted by all concentrates consumed via an indexing procedure. This indexing procedure converts livestock and poultry numbers into a common unit, called animal units, based on the feed consumed by one dairy cow in the 1969-71 feeding years.

Table 7—Feed grain base acreage, planted acreage, yield, and production, 1986-94

Item	Unit	1986	1987	1988	1989	1990	1991	1992	1993	1994[1]
Corn										
Base acres	Mil. ac.	81.7	81.5	82.9	82.7	82.6	82.7	82.2	81.8	81.5
Planted acres	Do.	76.6	66.2	67.7	72.3	74.2	76.0	79.3	73.2	79.2
Program yield	Bu./ac.	105.0	104.0	104.3	104.6	104.6	104.6	105.4	105.2	105.5
Yield	Do.	119.4	119.8	84.6	116.3	118.5	108.6	131.5	100.7	138.6
Production	Mil. bu.	8,226	7,131	4,929	7,532	7,934	7,475	9,477	6,336	10,103
Sorghum										
Base acres	Mil. ac.	19.0	17.4	16.8	16.2	15.4	13.5	13.6	13.5	13.5
Planted acres	Do.	15.3	11.8	10.3	12.6	10.5	11.1	13.2	9.9	9.8
Program yield	Bu./ac.	60.0	59.0	57.9	58.3	57.7	58.0	59.1	59.0	59.2
Yield	Do.	67.7	69.4	63.8	55.4	63.1	59.3	72.6	59.9	73.0
Production	Mil. bu.	939	731	577	615	573	585	875	534	655
Barley										
Base acres	Mil.ac.	12.4	12.5	12.5	12.3	11.9	11.5	11.1	10.8	10.7
Planted acres	Do.	13.0	10.9	9.8	9.1	8.2	8.9	7.8	7.8	7.2
Program yield	Bu./ac.	49.0	48.0	47.3	45.6	45.2	46.2	46.4	47.0	47.1
Yield	Do.	50.8	52.4	38.0	48.6	56.1	55.2	62.5	58.9	56.2
Production	Mil. bu.	609	522	290	404	422	464	455	398	375
Oats										
Base acres	Mil. ac.	9.2	8.4	7.9	7.6	7.5	7.3	7.2	7.1	6.8
Planted acres	Do.	14.7	17.9	13.9	12.1	10.4	8.7	7.9	7.9	6.6
Program yield	Bu./ac.	50.0	50.0	47.0	45.0	43.6	48.7	48.6	48.6	49.6
Yield	Do.	56.3	54.3	39.3	54.3	60.1	50.6	65.4	54.4	57.2
Production	Mil. bu.	385	374	218	374	358	244	294	207	230

[1]Estimate as of Jan. 12, 1995.

Table 8—U.S. feed grain supply and disappearance, 1986/87-1994/95

Marketing year	Supply			Disappearance				Ending stocks		
	Beginning stocks	Production	Total	Food, seed, and industrial	Feed and residual	Exports	Total	Government owned	Privately owned	Total
					Million metric tons					
Feed grains										
1986/87	126.4	251.6	379.4	36.4	144.3	45.9	266.6	48.7	103.4	152.1
1987/88	152.1	216.5	370.6	37.2	146.7	52.1	236.0	34.1	99.5	133.6
1988/89	133.6	149.3	285.4	38.7	118.5	61.1	218.3	18.6	47.3	65.9
1989/90	65.9	221.2	289.4	40.3	132.7	69.7	242.7	10.5	35.0	45.5
1990/91	45.5	230.5	278.6	40.6	137.5	51.5	229.6	11.3	36.4	47.7
1991/92	47.7	218.4	270.3	42.7	141.8	49.7	234.2	3.2	30.7	34.0
1992/93	34.0	277.1	312.3	44.1	154.4	51.1	249.7	1.6	61.5	63.1
1993/94	63.1	186.2	252.9	46.2	139.0	40.3	225.5	1.3	26.1	27.4
1994/95[1]	27.4	284.8	315.0	49.0	161.5	56.4	266.9	1.2	46.9	48.1
					Million bushels					
Corn										
1986/87	4,040	8,226	12,267	1,224	4,669	1,493	7,385	1,443	3,439	4,882
1987/88	4,882	7,131	12,016	1,243	4,798	1,716	7,757	835	3,424	4,259
1988/89	4,259	4,929	9,191	1,293	3,941	2,026	7,260	363	1,568	1,930
1989/90	1,930	7,532	9,464	1,356	4,396	2,368	8,120	233	1,111	1,344
1990/91	1,345	7,934	9,282	1,373	4,663	1,725	7,761	371	1,150	1,521
1991/92	1,521	7,475	9,016	1,454	4,877	1,584	7,915	113	988	1,100
1992/93	1,100	9,477	10,584	1,511	5,296	1,663	8,471	56	2,057	2,113
1993/94	2,113	6,336	8,470	1,588	4,704	1,328	7,620	45	805	850
1994/95[1]	850	10,103	10,958	1,700	5,650	1,950	9,300	43	1,615	1,658
Sorghum										
1986/87	551	939	1,490	12	536	198	747	409	334	743
1987/88	743	731	1,474	25	555	232	812	464	199	663
1988/89	663	577	1,239	22	466	312	800	341	99	440
1989/90	440	615	1,055	15	517	303	835	163	57	220
1990/91	220	573	793	9	410	232	651	65	78	143
1991/92	143	585	727	9	374	292	674	8	45	53
1992/93	53	875	928	8	469	277	753	4	171	175
1993/94	175	534	709	8	453	202	662	1	47	48
1994/95[1]	48	655	703	8	400	220	628	1	74	75

Continued—

Table 8—U.S. feed grain supply and disappearance, 1986/87-1994/95 (cont.)

Marketing year	Supply			Disappearance				Ending stocks		
	Beginning stocks	Production	Total	Food, seed, and industrial	Feed and residual	Exports	Total	Government owned	Privately owned	Total
					Million bushels					
Barley										
1986/87	327	609	942	175	298	134	606	76	261	336
1987/88	336	521	869	174	253	121	548	50	271	321
1988/89	321	290	622	175	171	79	425	30	166	196
1989/90	196	404	614	176	193	84	453	19	142	161
1990/91	161	422	596	176	205	81	461	8	127	135
1991/92	135	464	624	176	225	95	496	7	122	129
1992/93	129	455	595	171	192	80	444	5	146	151
1993/94	151	398	621	175	241	66	482	5	134	139
1994/95[1]	139	375	574	175	225	60	460	5	109	114
Oats										
1986/87	184	385	601	83	385	1	468	4	129	133
1987/88	133	374	552	81	358	1	440	4	108	112
1988/89	112	217	392	100	194	1	294	2	96	98
1989/90	98	374	538	115	266	1	381	1	156	157
1990/91	157	358	578	120	286	1	407	0.4	171	171
1991/92	171	244	490	125	235	2	362	0.2	128	128
1992/93	128	294	477	125	233	6	364	0.1	113	113
1993/94	113	207	427	125	193	3	321	0	106	106
1994/95[1]	106	230	435	125	200	1	326	0	109	109

[1]Forecast as of Jan. 12, 1995.

Table 9—Feed use and animal numbers, marketing years 1985/86-1993/94

Item	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
					Million metric tons				
Feed:									
Corn	104.5	118.6	121.9	100.1	111.5	118.4	123.9	134.7	119.7
Sorghum	16.9	13.6	14.1	11.8	13.1	10.4	9.5	12.1	12.4
Feed grains[1]	135.1	144.3	146.7	118.5	132.7	137.5	141.7	154.4	140.1
Wheat	7.7	10.9	7.9	4.1	3.8	13.5	6.8	5.1	7.6
All grains	142.8	155.2	154.6	122.6	136.5	151.0	148.5	159.5	147.7
Meals[2]	19.8	20.7	21.9	20.3	22.5	23.3	23.9	25.0	25.8
All grains and meals	162.6	175.9	176.5	142.9	159.0	174.3	172.4	184.5	173.5
					Million units				
Animals:									
GCAU[3]	74.5	74.4	76.8	77.0	77.7	80.3	81.1	82.9	84.1
					Million head				
Cattle[4]	10.0	9.6	10.1	9.7	9.9	10.8	10.1	10.9	11.1
					Dollars per bushel				
Prices:									
Corn	2.23	1.50	1.94	2.54	2.36	2.28	2.37	2.07	2.50
Sorghum	1.93	1.37	1.70	2.27	2.10	2.12	2.25	1.89	2.31
Wheat	3.08	2.42	2.59	3,72	3.72	2.61	3.00	3.24	3.26
					Metric tons per GCAU				
Feed rate[5]	2.18	2.36	2.30	1.86	2.05	2.17	2.13	2.23	2.06

[1]Includes corn, sorghum, barley and oats.

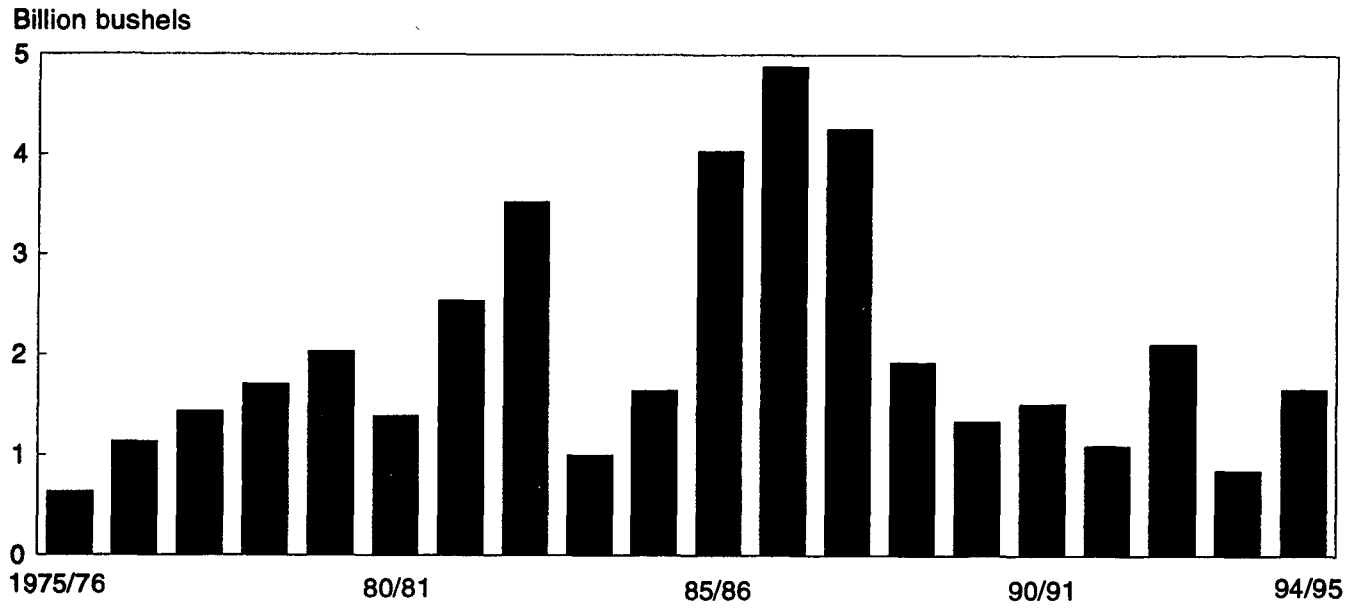
[2]Includes the following meals: soybean, cottonseed, peanut, linseed, sunflowerseed, rapeseed, and fish.

[3]Grain-consuming animal units (GCAU's) (see footnote 3 in the text).

[4]13 major States, Jan. 1 of the second year indicated.

[5]Total grains and meals per grain-consuming animal unit.

Figure 5
Corn Ending Stocks



1994/95 forecast.

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, "Substitution Among Feedstuffs"). Higher corn prices, because of drought and increased exports, lowered corn feed use from 4.8 billion bushels in 1987/88 to 3.9 billion bushels the following year. The record corn feed and residual use of 5.3 billion bushels in 1992/93 reflected not only the steady level of GCAU's since the late 1980's but also the decline in corn prices from $2.37 per bushel in 1991/92 to $2.07 in 1992/93 (fig. 6). Factors such as variations in crop quality and the volume of feed required to achieve a particular ingredient content can also affect feed value and thus affect the amount of grain needed to maintain a particular level of animal weight gain.

Prices of competing feed grains and feed wheat also are important determinants of feed use of feed grains. For example, the corn-to-sorghum feed use ratio increased from 11 to 1 in 1990/91 to 13 to 1 in 1991/92, partly because corn became cheaper relative to sorghum as the corn-to-sorghum price ratio declined from 1.08 to 1 in 1990/91 to 1.05 to 1 in 1991/92. As a rule, livestock feeders and feed manufacturers tend to increase (decrease) feed use of a feed grain when the price of that feed grain relative to corn is lower (higher) than its feed value (in corn equivalent). Wheat feeding, which occurs mostly in late summer

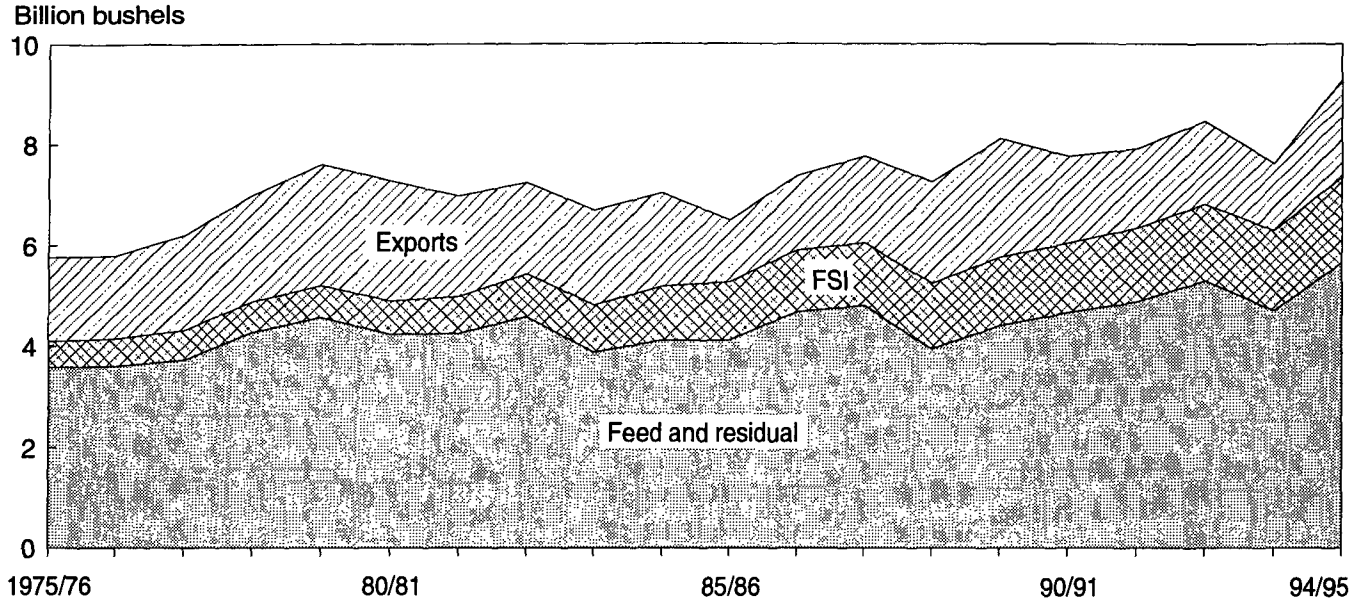
Substitution Among Feedstuffs

Numerous feedstuffs are used to satisfy the nutritional requirements of livestock and poultry. Roughage feeds generally account for about 60 percent of total feeds consumed, while concentrates make up the remainder. Feed concentrates include feed grains, wheat, rye, oilseed meals, animal protein feeds, grain byproducts, mineral supplements, and micoringredients.

Competition among feed ingredients depends on relative prices and their relative feed values. Average feed values on a bushel-for-bushel basis differ from the pound-for-pound basis because bushel weights generally are different, although corn and sorghum each weigh 56 pounds. Feed values (based on one criterion, total digestible nutrients) for major grains averaged across all livestock classes are shown below in terms of a percentage of corn's value (that is, in corn equivalent):

	Pound for pound	Bushel for bushel
Corn	100	100
Sorghum	95	95
Barley	90	77
Oats	90	51
Wheat	105	113

Figure 6
Corn Disappearance



1994/95 forecast.

before corn is harvested, greatly expanded from 3.8 million metric tons in 1989/90 to 13.5 million metric tons in 1990/91 because wheat became much cheaper relative to its feed value than corn in 1990/91. The ratio of wheat prices to corn prices declined from 1.58 to 1 in 1989/90 to 1.14 to 1 in 1990/91, which is comparable with the feed value of wheat.

Some feed grains do not enter the commercial market but are fed to livestock and poultry also raised on the farms. A smaller percentage of U.S. corn production is fed to onfarm livestock and poultry than is sold to commercial markets. Country elevators are the primary assemblers of corn sold from farms, although some corn moves directly from farms to subterminal and terminal elevators.

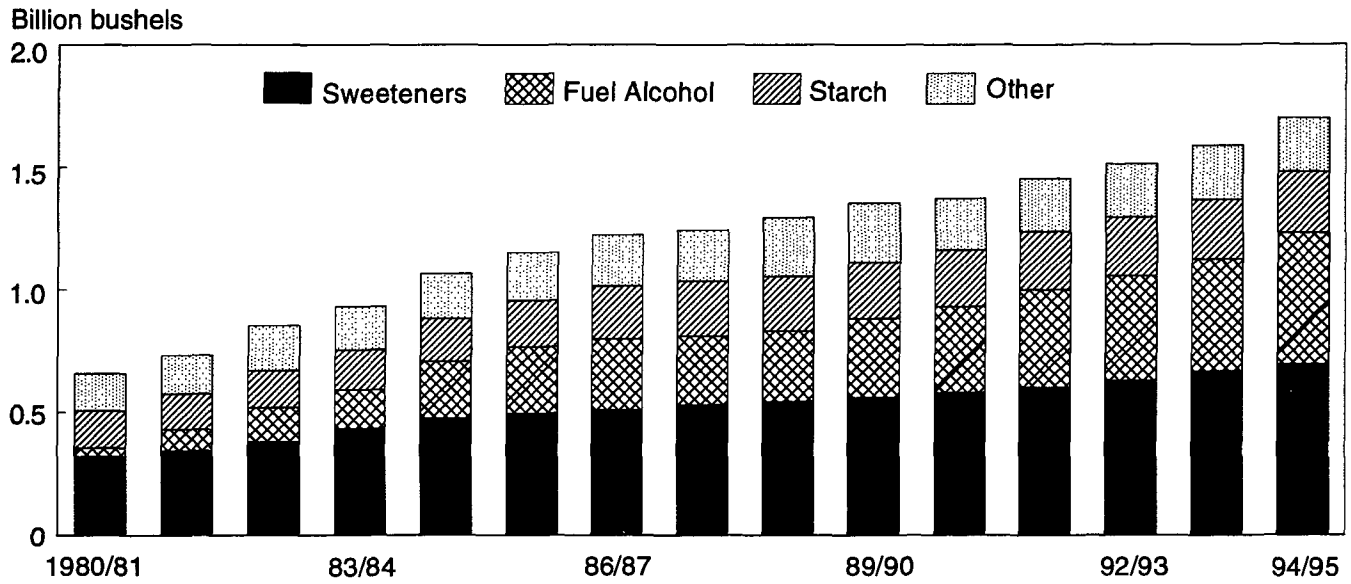
The feed manufacturing industry is the most important user of corn in terms of sales volume. In 1984 (the latest year data are available), 6,411 feed manufacturers with potential annual capacity to produce 1,000 tons or more of feed produced 109.5 million tons of formula feed. The industry processes and mixes feed ingredients to specifications. Ingredients include corn and other feed grains, oilseed meals, grain byproducts, animal protein, minerals, and micro-ingredients.

Food, Seed, and Industrial Uses. Food, seed, and industrial (FSI) uses of feed grains, although accounting for only 20-25 percent of domestic use, have been steadily increasing over the years. These uses of corn exceeded the 1-billion-bushel mark in 1984/85 and reached 1.6 billion bushels in 1993/94, exceeding corn exports for the first time (fig. 7). In general, demand for feed grains for FSI uses is related to the state of the economy and population growth. Legislation and government policy play a critical role in the use of corn for ethanol, however, and indirectly in the use of corn sweeteners.

The rates of increase in FSI use vary depending upon the use. Typically, a new use is found and use increases rapidly until the market "matures." It then tends to grow with population. Seed uses vary with the amount of the crop grown—demand for seed oats will increase if farmers need cover-crops on ARP land enrolled in the program. Seed uses are likely to remain stable in the future assuming the number of acres available for plantings does not expand significantly.

Food uses of grains will continue to increase as the population grows in the future. Food uses of corn are expected to remain in the mature market phase. Demand for corn sweeteners is stimulated indirectly by the sugar program. 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, making high-fructose corn syrup (HFCS) and other sweeteners more attractive to the soft drink industry and other users. Use of corn sweet-

Figure 7
Corn: Food, Seed, and Industrial Use



1994/95 forecast.
Other includes cereals, beverage alcohol, and seed.

eners will likely continue to grow but future growth is unlikely to match the very rapid growth of the early 1980's (fig. 8). Also, future adjustments in sugar policies could lead to some shifts in corn sweetener use.

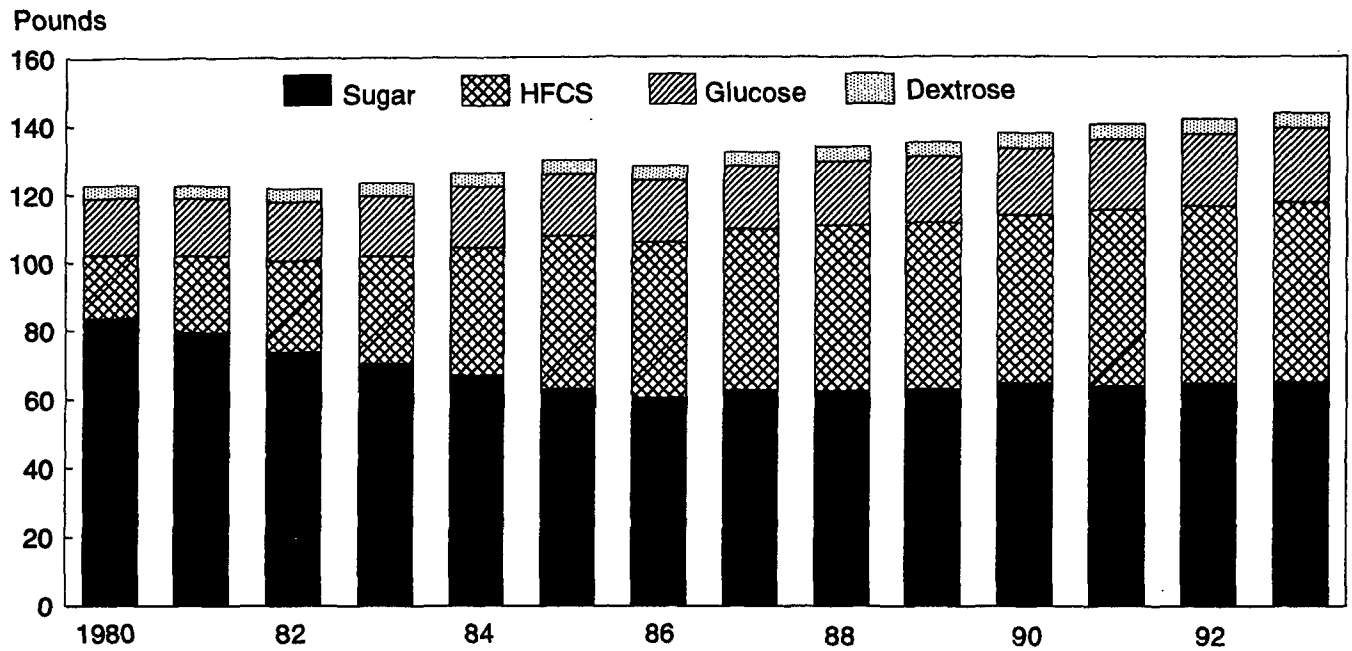
Demands for corn-based cereals, snack foods, and other corn-based baked goods are expected to grow at the same rate as the population—1 to 2 percent per year. There is no reason to believe corn grits, oatmeal, cooked pearled barley, or cooked sorghum will develop into staples in future U.S. meals; food shifts generally are made slowly so future meals are likely to be much like present meals. Food uses of oats increased rapidly when oat bran became popular and have remained at relatively high levels, but future rapid growth is not expected at the current time. Food use of barley has been relatively constant with pearled barley used in soups and barley malt or extract used as a flavoring in many products but at a relatively low level.

The products made from corn starch have been expanding over the years and chemists are continuing to find new uses for corn starch. Many of these are not now economically viable, but that will likely change. Currently, the most important uses are by the paper industry as a coating on paper, and also by the construction material industry as a component in the manufacture of wall board. These are mature uses and the rate of growth is generally comparable with the growth in population and expansion of the economy. In addition, food use in many prepared foods, primarily as a thickening agent, is estimated to account for 15 percent of total corn starch use.

Alcohol Fuel. In contrast to food and other industrial uses of feed grains, which expand at the rate of population growth or vary with income growth, fuel alcohol use of corn depends more on a mix of government incentives, legislation, technology, and prices of substitute products. Use of corn for fuel production has been growing rapidly in recent years. Corn used for fuel alcohol is expected to reach 535 million bushels in 1994/95, 6 percent of total corn use, up from less than 1 percent 14 years ago.

The demand for ethanol is enhanced by Federal and State incentives begun during the energy crisis of the early 1970's. In 1994, the U.S. ethanol industry (concentrated in the Corn Belt area) produced about 1.3 billion gallons of ethanol. Most fuel alcohol is made from the starch component of corn kernels. Wet corn millers have been making alcohol because the alcohol provided a use for the "extra" starch in the winter when demand for sweeteners is lower. The winter carbon monoxide reduction program helped even out demand for the corn starch during the year. An income tax credit of 54 cents per gallon of alcohol is allowed to blenders of alcohol and gasoline for use as a fuel, assuming a blend of 10-percent alcohol and 90-percent motor fuel. Thus, in addition to corn and petroleum

Figure 8
U.S. Per Capita Sweetener Consumption



prices, government tax incentives play a key role in determining the competitive position of ethanol.

The Clean Air Act Amendments (CAAA) of 1990 have led to greater use of corn in fuel alcohol production. The addition of alcohol helps to meet clean air standards by reducing carbon monoxide emissions, especially in the winter. The CAAA required 39 cities that fail to meet carbon monoxide air quality standards to sell only oxygenated gasoline during winter months no later than November 1, 1992. Another 9 cities, which have the most serious ozone pollution problems, are required to sell reformulated gasoline year round, beginning January 1, 1995. The Environmental Protection Agency (EPA) has approved methyl tertiary butyl ether (MTBE), ethyl tertiary butyl ether (ETBE), fuel ethanol, and others as oxygenates for blending in these oxygenated and reformulated fuels. In addition, in June 1994, EPA announced a rule that renewable resources must account for 15 percent of the oxygenates in reformulated fuels by 1995 and 30 percent thereafter. Implementation of this rule is presently in abeyance because of litigation pending in the courts. The oil industry has challenged this renewable oxygenate requirement, and the courts are currently evaluating the requirement to determine if mandated use of renewable oxygenates is legal.

In the long run, the prospects of demand growth of alcohol fuel will also be shaped by technological developments in the use of corn, competition with other oxygenated substitute products and other biomass materials that can be converted into ethanol, and Federal and State tax incentives for alcohol fuel.

Beverages and Other Alcohols. Beverage uses of the four feed grains have tended to be more variable than food uses because alcohol consumption varies with the health of the economy. Also, various campaigns to reduce consumption of alcohol may have slowed increases in beverage use of grains, while aging of the population may have also contributed to lower per capita use of beer. Barley is the leading ingredient used by brewers to produce beer, followed by corn and rice. Light beers may use corn sweeteners to cut the calories from the grain, holding down growth in brewers' grain use. Currently, small "traditional" brewers have been increasing beverage production, using barley as the base and, in some cases, wheat. If these small brewers continue to multiply, grain use in beer production could increase somewhat in the future.

Distilled alcohol is made from corn, barley, wheat, rye, and sorghum, with corn being the most commonly used grain. Some of the alcohol is distilled to make grain neutral spirits—nearly all alcohol—which are then used to make gin and vodka and, to a lesser extent, blended whiskey. Some of the grain neutral spirits are made from corn starch or wheat starch. Alcohol plants that are licensed as beverage plants make alcohol for human

consumption, but sometimes the alcohol is sent to denaturing facilities and used for manufacture of fuel alcohol.

Financial Characteristics

Trends in Prices and Farm Returns

Over the last decade, feed grain prices received by farmers mostly exceeded the national loan rates. Feed grain farm prices were temporarily below the national loan rates during the 1985-87 crop years because of the issuance and exchange of generic certificates which could be used to repay outstanding CCC (the Commodity Credit Corporation) loans and to acquire stocks owned by the CCC. These certificates, therefore, freed stocks that otherwise would be unavailable to the market when corn ending stocks exceeded 4.0 billion bushels and the stocks-to-use ratio averaged about 60 percent.

Feed grain prices fluctuate in response to changing market conditions. Prices of sorghum, barley, and oats, due to their substitutability for corn as an energy feed ingredient, tend to follow the price movement of corn (fig. 9).

Corn prices tend to be inversely related to ending stocks. In 1987, corn ending stocks grew to a record 4.9 billion bushels, which, together with the issuance and exchange of generic certificates, temporarily lowered farm prices below the loan rates.

Severe drought in 1988 resulted in a 31-percent jump in corn prices to $2.54 per bushel. Prices slipped back to $2.36 per bushel in 1989/90 and remained relatively stable until 1992/93 when record corn production of 9.5 billion bushels led to a downturn. Between 1988 and 1991, corn ending stocks were below 2 billion bushels. This, in combination with declining loan rates, kept corn prices above the national loan rates in these years (fig. 10).

Heavy rainfall and floods in 1993 caused late planting and abandoned acreage, which greatly reduced ending stocks from 2.1 billion bushels in 1992/93 to 850 million bushels (the lowest since 1975/76) and resulted in an upturn of corn prices. The record 1994 corn crop (10.1 billion bushels), however, is expected to replenish the ending stocks to about 1.7 billion bushels in 1994/95 and to bring corn prices received by farmers to $2.00-$2.40 per bushel.

There are many ways to indicate the financial health of feed grain producers. One measure, farmers' returns above cash expenses, shows their changing average cash-flow position (table 10). These net returns are determined by subtracting total cash expenses from gross receipts. The gross receipts include corn sales receipts and direct Government payments. Returns

Figure 9
Farm Prices of Feed Grains

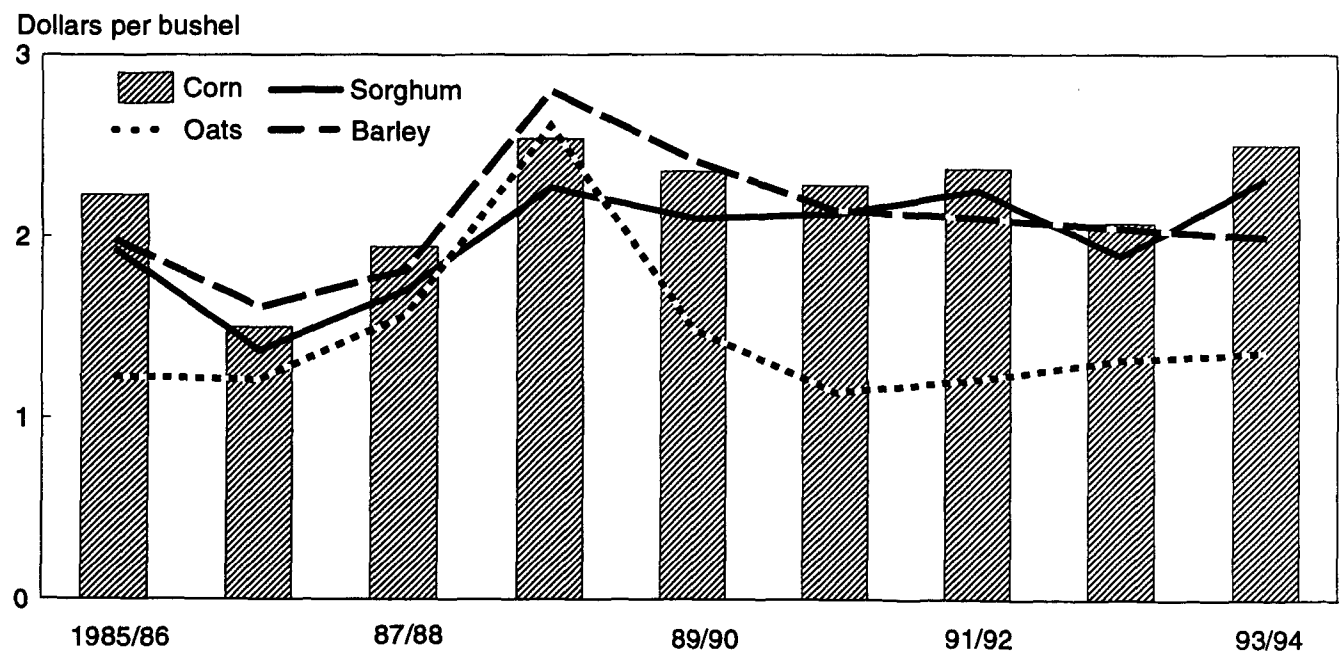
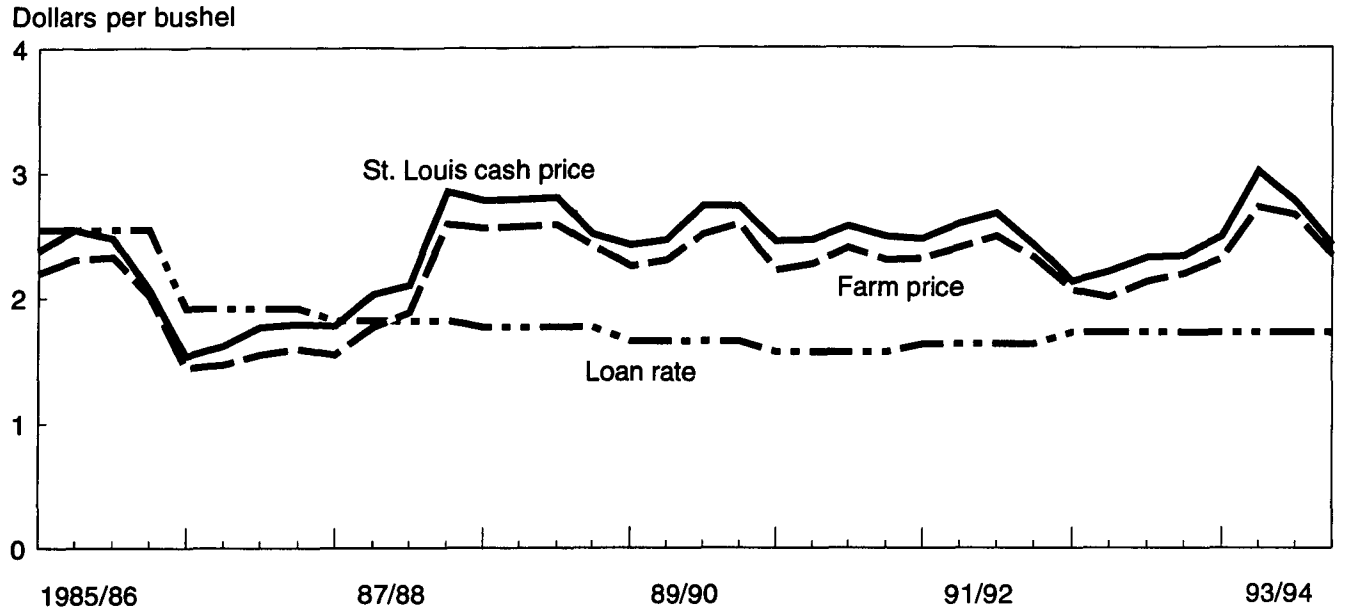


Figure 10
Corn Prices and Loan Rates by Quarter, 1985/86 - 1993/94



Crop year beginning September 1.

above cash expenses are available for paying expenses associated with land, capital replacement, family debt, and living expenses.

The cash-flow position of feed grain producers depends on market prices, crop yields and the level of Government payments on the revenue side, and interest payments and input prices on the expense side. The declines in interest payments and increases in Government payments during the late 1980's strengthened feed grain producers' cash-flow positions. During 1987-89, returns over cash expenses for corn producers averaged $1.20 (in 1987 dollars) per bushel, compared with $0.71 in 1985.

In recent years, however, cash expenses (primarily seed, chemicals, taxes, and insurance) rose again and thereby contributed to the weakening of the cash- flow positions of feed grain producers. Returns over cash expenses for corn producers during 1991-93 were only two-thirds of those during 1988-90, the years before 1990 farm legislation was enacted by Congress. The floods of 1993 greatly reduced corn yields to an average of 101 bushels per acre and thus lowered the value of total output. In the meantime, Government payments declined from $4.0 billion in 1992/93 to $2.7 billion in 1993/94. The lower value of 1993 corn crops, together with the lower Government payments, caused the cash-flow position of corn producers to reach its lowest point over the last decade. The cash-flow position of corn producers is expected to strengthen in 1994/95 due to higher value of output, brighter demand, and larger deficiency payments.

Cash-flow positions for other feed grains were relatively brighter in recent years, compared with those before 1990 farm legislation was implemented. Nonetheless, returns over cash expenses for corn were still the highest of the feed grains on a per acre basis, averaging about $76 (in 1987 dollars) per acre over the last 3 years. Sorghum and barley producers had lower returns, and oats producers continued to have the lowest returns over cash expenses, averaging $16 per acre. Overall returns over cash expenses are expected to improve considerably in 1994/95 resulting from record corn yields, strong demand, and higher deficiency payments.

The significance of Government payments as a component of gross income has varied over the last few decades. Corn program payments fluctuated from less than $200 million per year in the mid-1970's to $8 billion in 1987. Government payments, however, have declined since 1987 as corn prices strengthened. Over the last decade, the proportion of Government payments in most feed grain producers' gross income ranged from 10 percent to 40 percent, although that proportion was lower for oats producers, ranging from 1 percent to 25 percent. Government payments accounted for an average of 14 percent of corn producers' gross income since the 1990 farm legislation was en-

Table 10—Returns above cash expenses in U.S. feed grain production, 1985-93

Crop year	Value of output[1]	Direct payments[2]	Gross income	Total cash expenses[3]	Returns over cash expenses[4]		
					Total	Per bushel	
						Nominal	Real
	Billion dollars					*Dollars*	
Corn							
1985	19.79	2.685	22.48	16.55	5.93	.67	.71
1986	12.34	6.864	19.20	13.03	6.17	.75	.77
1987	13.83	8.102	21.93	11.08	10.85	1.52	1.52
1988	12.52	4.154	16.67	11.60	5.07	1.03	.99
1989	17.76	4.061	21.82	12.93	8.89	1.18	1.09
1990	18.09	3.241	21.33	13.58	7.75	.98	.86
1991	17.72	2.382	20.10	14.22	5.88	.79	.67
1992	19.62	3.989	23.61	14.79	8.82	.93	.76
1993[5]	15.84	2.708	18.55	14.26	4.29	.68	.54
Sorghum							
1985	2.16	.248	2.41	1.65	.76	.68	.72
1986	1.29	.642	1.93	1.27	.66	.70	.72
1987	1.14	.832	1.97	1.03	.95	1.29	1.29
1988	1.31	.472	1.78	.97	.81	1.41	1.36
1989	1.29	.560	1.85	1.32	.53	.86	.79
1990	1.22	.448	1.66	1.08	.58	1.02	.90
1991	1.32	.308	1.62	1.14	.48	.82	.70
1992	1.65	.456	2.11	1.42	.69	.79	.65
1993[5]	1.23	.320	1.55	1.18	.37	.70	.56
Barley							
1985	1.17	.181	1.35	1.13	.22	.36	.39
1986	.98	.395	1.38	1.08	.29	.48	.49
1987	.95	.460	1.41	.85	.56	1.07	1.07
1988	.81	.306	1.12	.78	.33	1.15	1.11
1989	.98	.203	1.18	.81	.37	.92	.84
1990	.90	.207	1.11	.75	.36	.86	.75
1991	.97	.313	1.29	.81	.48	1.04	.89
1992	.93	.299	1.23	.77	.46	1.01	.83
1993[5]	.80	.363	1.16	.80	.36	.90	.72
Oats							
1985	.83	.009	.84	.58	.26	.51	.54
1986	.60	.039	.64	.46	.18	.48	.49
1987	.66	.066	.72	.42	.30	.80	.80
1988	.67	.109	.78	.36	.42	1.90	1.84
1989	.67	.074	.74	.49	.25	.67	.61
1990	.49	.077	.57	.43	.14	.40	.35
1991	.30	.098	.40	.33	.07	.29	.25
1992	.39	.084	.47	.35	.12	.42	.35
1993[5]	.28	.093	.37	.31	.06	.30	.24

[1]Grain production times season-average price received by farmers. Value of output for oats also includes value of oats straw, which applies to acres harvested for grain.
[2]The sum of deficiency, diversion, disaster, reserve storage, and long-term CRP payments.
[3]Costs per planted acre times acreage planted; cost of maintaining conserving-use acreage is 20 percent of variable expenses reported in *Economic Indicators of the Farm Sector: Costs of Production,* U.S. Dept. of Agr., Econ. Res. Serv., various years. Cash expenses for 1993, which are not yet available, are estimated based on 1992 costs of production and prices paid by farmers.
[4]The difference between gross income and total cash expenses; this difference was divided by quantity produced and was then deflated by the GNP implicit price deflator (1987 = 100) for per-bushel returns.
[5]Preliminary.

acted, compared with 17 percent during 1989-90 (fig. 11).

The North American Free Trade Agreement (NAFTA) and the GATT Uruguay Round Agreement promise to raise the level of global income and thereby boost demand for U.S. feed grains. Larger domestic demand is also expected. Whether the expanding demand leads to higher prices depends on farmers' productivity and how much land remains in the CRP. Nevertheless, budget constraints, which will drive the 1995 Farm Bill, will mean that feed grain producers can expect to rely more on the marketplace and less on the government as a source of income in the future.

Costs of Production

During 1991-92, producers experienced a slight increase in their cash expenses of growing feed grains over the 1989-90 level, ranging from 1 percent for oats to 2 percent for sorghum and barley, and 5 percent for corn (ERS-USDA). According to the ERS Farm Costs and Returns survey, total cash expenses of growing corn averaged $183 per planted acre for 1991-92, about 5 percent higher than the expenses in 1989-90, of which $139 were variable cash expenses, or $1.14 per bushel. Fertilizer, chemicals, seed, energy, taxes and insurance, repair expenses, and interest payments are major expense items.

About half of feed grain producers had their variable cash costs below the average cash expenses of production. In 1991, 49 percent of corn farms, covering 60 percent of production, had variable cash costs at or below the average variable cost of $1.25 per bushel (McBride). Similarly, 57 percent of sorghum farms had variable cash costs at or below the average cost of $1.26 per bushel in 1990, which covered about 70 percent of the total grain sorghum harvest (Jinkins and McBride). Figures 12 and 13 illustrate the cumulative distribution of corn and sorghum variable production costs. Similar patterns in the cumulative distribution of variable production costs exist for barley and oats.

Given the $1.62 loan rate for corn in 1991, the loan rate more than covered variable costs for over 80 percent of corn production. Similarly, given the $1.49 loan rate for sorghum in 1990, the loan rate more than covered variable costs for about 75 percent of sorghum production. Thus, the current levels of loan rates are effective in serving as a marketing tool, when needed, for feed grain producers.

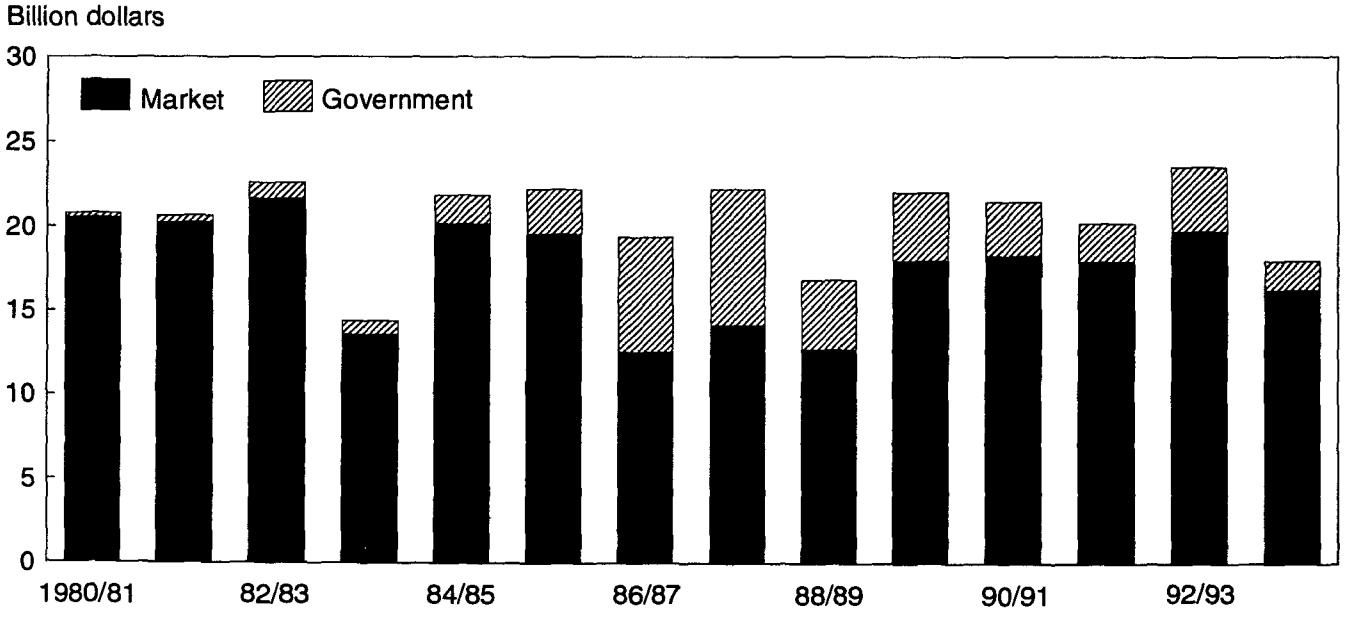
Characteristics of World Feed Grain Markets

World Feed Grain Trade

Corn is the major component of global coarse grain trade, generally accounting for about two-thirds of total volume over the last decade. Barley follows with

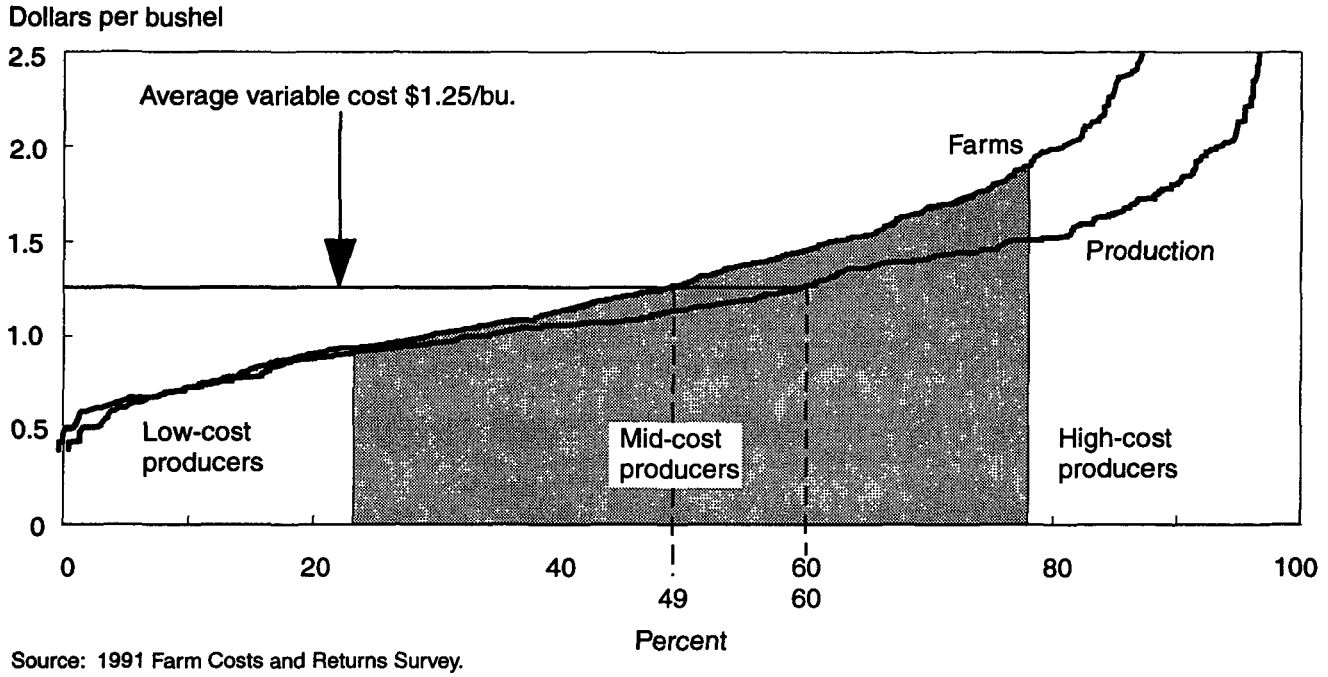
Figure 11

U.S. Corn Sector: Sources of Revenue 1980/81 - 1993/94



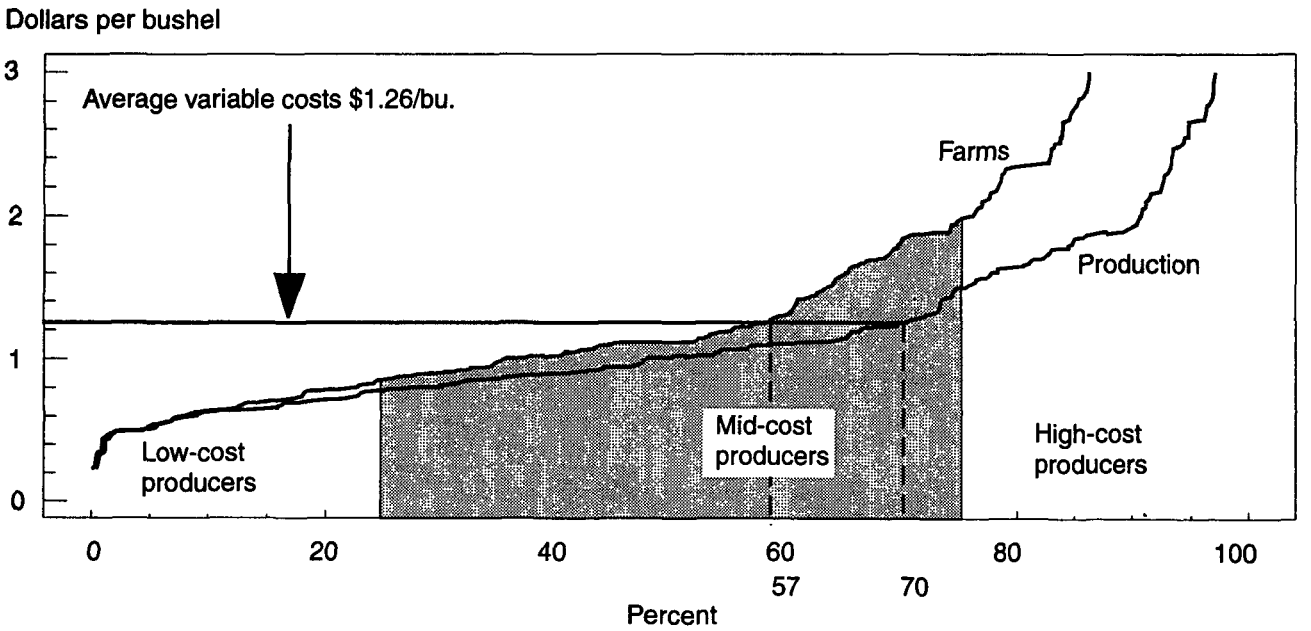
Government sources include deficiency payments, CRP, disaster payments, paid land diversion and FOR.

Figure 12
Cumulative Distribution of Variable Cash Production Costs for Corn, 1991



Source: 1991 Farm Costs and Returns Survey.

Figure 13
Cumulative Distribution of Sorghum Variable Production Costs, 1990



Source: 1990 Farm Costs and Returns Survey.

nearly 20 percent, sorghum at slightly less than 10 percent, and oats and rye make up the balance with about 5 percent. In contrast to the wheat market, export subsidies are not widely used for corn and sorghum. The main exceptions are for corn exported by the European Union and South Africa. A large share of barley exports are subsidized, chiefly from the EU and the United States. Scandinavian oats exports and EU rye exports are also subsidized, accounting for large portions of world trade in these grains.

Most of the coarse grain traded is for feed. Much smaller amounts go for industrial uses, such as starch-making and malting. Trade for food use is small, with occasional spurts in response to droughts. Grain imported for food or industrial use is usually of better quality than that used for feed, and price premiums reflect this.

Feed. There is a certain amount of flexibility in coarse grain trade for feed purposes, with the grains largely competing against each other, against wheat for feed use, and, to a lesser extent, against other nongrain feedstuffs such as tapioca and various byproducts used as energy sources. Oilseed meal and other protein sources largely serve as complements to grains rather than competitors, except in the EU. Flexibility in many markets, however, is quite limited in the interest of fairly stable rations, local preferences, or import laws. Thus, many importers avoid substituting among the grains, even though they switch suppliers on the basis of price, quality, availability, credit, or other trade services. For example, many Asian markets do not import barley for feeding because it is considered a food grain.

Industrial. Imports of corn for industrial processing, for products such as starch, alcohol, and sweeteners, are largely restricted to Japan, South Korea, Canada, and Mexico. Trade for this type of use will likely continue to increase, and could expand to other markets. However, foreign demand will be subject to technological change and internal policy changes that adjust prices or availability of competing products, such as sugar or raw materials such as sweet potatoes used for starch. The experience of the EU is illustrative. Formerly the largest market for U.S. corn used for starch, the EU during the 1980's began to replace imported corn with domestic wheat and more locally grown corn. Now it imports little U.S. corn for this use. EU trade policies and developments in wheat gluten technology provided the incentive to do this.

A small but growing share of barley is imported for malting, a more dynamic component than feed trade. Most countries import barley malt (discussed below) rather than importing the barley to process themselves. The number of malting barley importers is small, excluding trade within the EU, and consists primarily of China and a few countries in Latin America. However, strong growth in China's imports, and thus world trade in this category, is likely because economic and population growth will lead to further increases in China's beer production.

Food. This component of trade is generally small, mainly restricted to white corn, except in years of crop failures in countries where coarse grains are still staple foods. Thus, the potential market is basically corn in Latin America and corn and sorghum in Africa. Because locally produced varieties are generally preferred, and growth in incomes generally leads to more diversification of diets away from coarse grains, there is limited potential for sustained import gains in the future. However, NAFTA may lead to some increased imports of corn for food by Mexico, along with higher imports for feed and industrial processing.

Processed Products. Trade in value-added coarse grain products is small relative to trade in the grain itself. Barley malt is the main product that is widely traded, with smaller amounts of trade in products such as corn meal, flour, and sweeteners. Some byproducts of processing, such as corn gluten feed and meal, are also traded. Trade in manufactured feeds and pet foods, for which coarse grains are an ingredient, is growing fairly rapidly. Some U.S. feed manufacturers establish plants in overseas markets, which then import coarse grains for feed manufacturing locally.

Global trade in barley malt grew dramatically from the late 1960's up through the mid-1980's, when it stagnated. In recent years, growth has resumed but at a less rapid pace. A large component of this trade is subsidized, reflecting the dominant position of the EU, the leading malt exporter.

U.S. Role in World Trade

The United States is the largest coarse grain exporter, but the volume of exports and market share have fluctuated considerably in recent years (table 11). The United States is the largest exporter of corn and sorghum, but it usually ranks only fourth as a barley exporter (table 12).

U.S. coarse grain exports experienced their greatest growth in the 1970's, when world trade boomed. U.S. exports more than tripled during the decade, reaching a record high in 1979/80, along with a re-

cord market share. Import growth in this period was largely fueled by the Soviet Union, but strong gains were also registered by Japan, Eastern Europe, and the developing countries. Over the next few years, exports began to drop, bottoming out in the mid-1980's. World coarse grain trade slumped as widespread credit problems and economic difficulties cut import demand, at the same time that competing exporters gained market share at the expense of the United States.

During the second half of the 1980's, U.S. exports began to rebound and the U.S. market share made a strong recovery. This largely reflected a more competitive position bolstered by cuts in U.S. loan rates and very large U.S. supplies. However, in the early 1990's, U.S. exports experienced another serious slump mainly due to external developments. The breakup of the Soviet Union led to a severe drop in imports, pulling down world trade, while China, somewhat surprisingly, was increasing its corn exports. In 1993/94, U.S. coarse grain exports and market share declined to their lowest levels since 1985/86.

In 1994/95, U.S. exports will be up sharply, because of a dramatic gain in corn sales. Corn exports are forecast to rise more than 600 million bushels from 1993/94, the largest year-over-year gain on record (fig. 14). Key factors boosting U.S. export prospects are the record U.S. corn harvest that replenished supplies and a turnaround in China's corn trade, with China reducing exports and beginning to import. In addition, global import demand, even without significant imports by the former Soviet Union, has strengthened considerably in 1994/95.

As the world's dominant producer, user, and exporter, the United States is the price leader for corn and sorghum. No export subsidies are used for U.S. corn and sorghum exports. In the absence of export programs, export prices of corn primarily reflect domestic supply and demand conditions. In addition, developments

Table 11—Coarse grains: Global trade, U.S. exports, and U.S. market share[1]

Year	World trade	U.S. exports	U.S. share
	------Million tons------		*Percent*
Avg. 1970-74	58.1	30.9	52.0
Avg. 1975-79	88.1	56.9	64.3
Avg. 1980-84	97.6	58.6	59.9
1985/86	82.7	36.4	44.0
1986/87	82.9	47.5	57.3
1987/88	88.3	53.5	60.6
1988/89	95.5	60.4	63.3
1989/90	103.9	69.0	66.5
1990/91	88.3	51.8	58.7
1991/92	94.4	50.2	53.2
1992/93	90.0	50.1	55.7
1993/94[2]	84.6	40.0	47.3
1994/95[3]	89.4	56.9	63.7

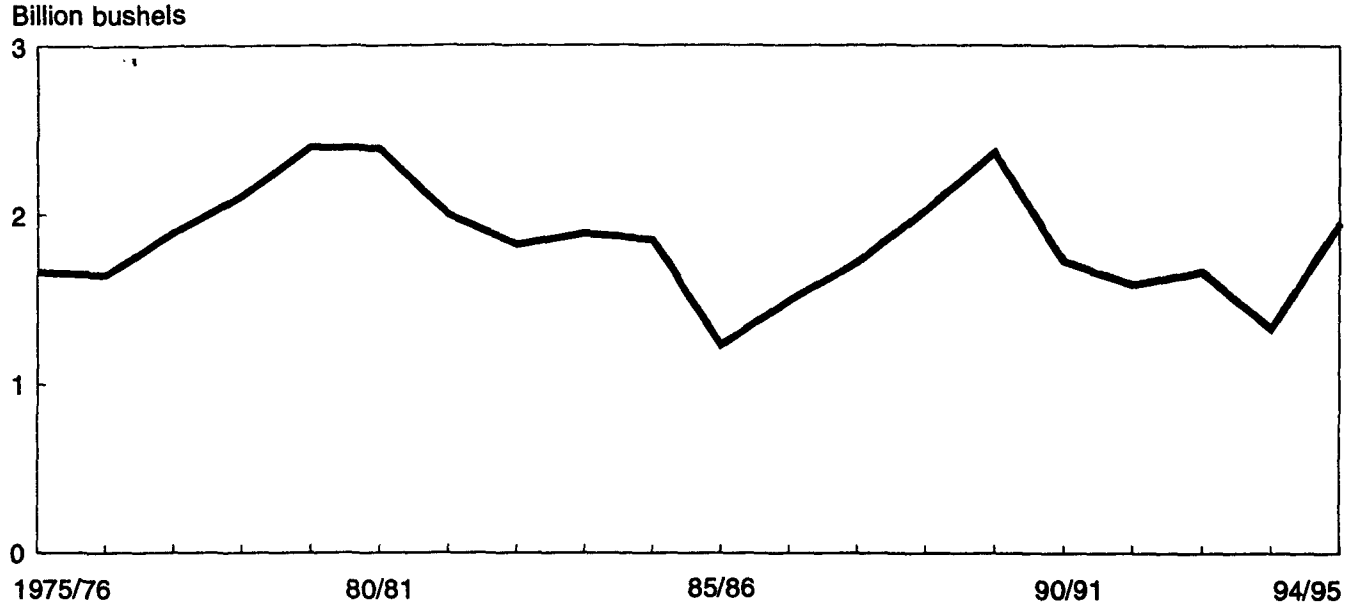
[1]Excludes intra-EU trade.
[2]1993/94 preliminary.
[3]1994/95 forecast.

Table 12—Corn, sorghum, and barley: Global trade, U.S. exports, and U.S. market share[1]

	Corn			Sorghum			Barley		
Year	World trade	U.S. exports	U.S. share	World trade	U.S. exports	U.S. share	World trade	U.S. exports	U.S. share
	-----Million tons-----		*Percent*	*-----Million tons-----*		*Percent*	*-----Million tons-----*		*Percent*
1985/86	54.5	31.5	57.8	8.5	4.1	48.2	18.5	0.8	4.3
1986/87	56.6	39.4	69.6	7.8	5.1	65.4	18.6	3.0	16.1
1987/88	56.7	44.5	78.5	8.3	6.1	73.5	16.0	2.9	18.1
1988/89	65.5	50.5	77.1	10.8	8.1	75.0	15.9	1.7	10.8
1989/90	74.4	60.0	80.6	8.9	7.3	82.0	17.7	1.8	10.2
1990/91	59.1	44.5	75.3	7.8	5.8	74.6	18.5	1.5	8.1
1991/92	62.6	40.6	64.8	9.4	7.5	79.6	18.6	2.1	11.2
1992/93	62.0	41.8	67.4	8.7	6.6	76.7	15.3	1.6	10.5
1993/94[2]	55.5	33.1	59.8	6.7	5.3	79.6	18.5	1.6	8.4
1994/95[3]	64.1	50.0	77.9	6.4	5.6	87.5	15.5	1.3	8.4

[1]Excludes intra-EU trade; based on Oct.-Sept. trade year.
[2]1993/94 preliminary.
[3]1994/95 forecast.

Figure 14
U.S. Corn Exports



1994/95 forecast.

in international markets also contribute to price formation. While the former Soviet Union's recent retreat from the corn market has removed a large source of price volatility, China has appeared as a new source. In 1994/95, China's corn exports are projected to decline to 4 million tons, a dramatic drop from its 11.5 million tons in 1993/94; China will also import corn in 1994/95 for the first time since 1989/90.

Although international prices for barley are influenced by the corn price, the EU, as the leading barley exporter, generally sets this price. Since 1985/86, most U.S. barley exports have been subsidized under the Export Enhancement Program, largely in competition with EC barley subsidies.

U.S. credit guarantees are used for a portion of U.S. coarse grain exports, typically around 10 percent but as high as 20 percent in some years. Food aid and concessional sales of coarse grains also account for some U.S. exports, but typically a very small portion. Food aid became much more important in 1992/93, because of the large amount, which included corn, provided to Russia and other republics of the former Soviet Union (FSU). These sales had historically been cash sales.

Importing Countries: Potential Demand

Global coarse grain trade in the early 1990's could be best described as depressed. The volume of trade in 1993/94 was the lowest since 1986/87 (table 11). One of the major factors depressing trade was a sharp decline in imports by the FSU (tables 13 and 14). Unusually large trade in wheat for feed also contributed to lower imports of coarse grains, mainly by South Korea, along with gains in self-sufficiency in a number of countries, such as Mexico.

World import demand for coarse grains is projected to grow steadily over the next decade after declining in the 1980's. In the next few years, potential import increases are expected to be bolstered by a reduction in the availability of competitively priced feed wheat. The annual rate of growth in coarse grain imports is expected to pick up after 2000, as the impact of GATT on income growth leads to higher demand for feed grains. Increased access commitments and reductions in subsidized exports under GATT will also provide trade opportunities. As the dominant exporter in world coarse grain trade, the United States will be the principal direct beneficiary.

A key issue is how fast growth in China and the developing countries will offset the recent sharp drop in imports by the former Soviet Union. Given the contraction in its livestock sector, there is little chance for the FSU to rebound as a huge importer in the next few years. Growth in imports will be concentrated in developing countries (and possibly China) because of large population and increases in income.

Table 13—World coarse grain imports, 1989/90-1994/95[1]

Country/region	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
			Million tons			
EU[2]	4.8	3.6	2.0	2.0	2.7	2.6
FSU[3]	26.3	17.4	17.1	10.2	4.4	4.3
China	1.0	0.9	1.0	0.6	1.2	4.2
East Europe	2.9	2.7	0.6	3.8	2.3	1.1
Latin America[4]	12.0	9.3	11.0	10.3	11.4	13.1
North Africa[5]	4.3	4.9	3.4	5.4	6.4	6.6
Sub-Saharan Africa[6]	0.6	1.0	5.3	4.8	2.2	1.1
Middle East	11.4	9.1	11.8	10.1	9.5	10.8
East Asia[7]	33.9	33.6	34.3	35.2	32.7	35.9
Other	6.6	5.8	8.0	7.6	11.8	9.7
Total[2]	103.9	88.3	94.4	90.0	84.6	89.4

[1]1993/94 preliminary. 1994/95 forecast. [2]Excludes intra-EU trade. [3]Former Soviet Union. Includes intra-FSU trade. [4]Includes Mexico. [5]Algeria, Egypt, Libya, Morocco, and Tunisia. [6]Includes South Africa. [7]Japan, Taiwan, South Korea, and Hong Kong.

Where incomes have grown rapidly in recent years, in the newly industrializing countries of Asia, such as Taiwan and South Korea, there has been tremendous growth in coarse grain demand. Slow growth in Taiwan's feed grain imports is likely in the next few years, since this growth is linked to growth in its pork exports. However, significant gains are expected in other areas, such as Latin America and parts of Southeast Asia. More moderate growth is expected in North Africa and the Middle East, while Sub-Saharan Africa's import prospects are weak.

Over the next decade, Japan's imports are expected to be flat, at best, and could possibly shrink. Still, it will easily remain the world's largest importer. Rising imports of coarse grains for industrial use are likely to partially offset declines in Japan's feed demand stemming from higher imports of meat and poultry. No growth is expected in EU imports. Eastern Europe is likely to become a net coarse grain exporter, with only sporadic imports due to weather-related shortfalls.

The greatest uncertainty concerns China. While strong growth in its malting barley imports is fairly certain, the likelihood that China will begin to import large amounts of corn consistently is more difficult to assess. In 1994/95, China began to import corn for the first time since 1989/90. Over time, China is projected to reduce corn exports and rely more on imports due to strong growth in internal corn demand, but the amount and timing of trade changes are very uncertain. Even though its imports are forecast to be relatively large in 1994/95, that does not necessarily mean that China will consistently import in the next few years.

Exporting Countries: Potential Competition

In the early 1990's, competing corn exporters captured a much larger share of the world market at the expense of the United States. The recent increase in foreign corn exports was largely in response to internal country developments and not stimulated by high U.S. prices, unlike the early 1980's. (The rise in U.S. corn prices in 1993/94 was a temporary spike, related to bad weather, rather than a sustained incentive to competitor expansion.) For sorghum and barley, aggregate competitor exports have not increased or shown any consistent pattern so far in the 1990's.

Recent competitor gains have been led by China which increased its corn exports dramatically in the 1990's—despite low international prices—because of sustained growth in domestic production that outpaced growth in domestic use. There has also been a strong interest in increasing foreign exchange earnings. Most of China's increased exports have gone to nearby Asian markets, where it can offer a lower delivered price than U.S. corn, as well as smaller shipments and shorter leadtime that also enhance its competitive edge. Quality problems in China's exports are common, however. China's corn is often perceived to have lower test weight than U.S. corn.[4] In addition, some Asian mar-

[4]Test weight is pounds of grain per bushel. Lower test weight corn has a lower feed value and, if used as a feedstuff, requires more corn to meet certain energy requirements for animal feeding.

Table 14—World corn, barley, and sorghum imports, 1989/90-1994/95[1]

Country/region	1989/90	1990/91	1991/92	1992/93	1993/94	1994/95
			Million tons			
Corn						
EU[2]	3.9	3.1	1.8	1.6	2.4	2.2
FSU[3]	19.4	11.5	10.4	6.4	2.8	2.5
China	0.4	0.0	0.0	0.0	0.0	3.0
East Europe	2.3	1.3	0.2	1.6	0.6	0.4
Latin America[4]	8.3	5.6	5.3	5.9	7.6	10.1
North Africa[5]	3.1	3.7	2.8	3.8	4.2	4.3
Sub-Saharan Africa[6]	0.6	0.7	5.0	4.6	2.0	1.1
Middle East	4.2	2.8	3.2	3.8	3.1	4.2
East Asia[7]	27.9	27.7	28.6	29.4	27.1	30.3
Other	4.3	2.8	5.4	5.0	5.7	6.0
Total[2]	74.4	59.1	62.6	62.0	55.5	64.1
Barley						
EU[2]	0.5	0.1	0.0	0.0	0.0	0.1
FSU[3]	5.8	5.7	5.3	2.6	1.1	1.1
China	0.6	0.9	1.0	0.6	1.2	1.2
East Europe	0.3	1.2	0.2	1.5	1.6	0.8
Latin America[4]	0.5	0.5	0.6	0.3	0.5	0.5
North Africa[5]	1.2	1.0	0.6	1.6	2.3	2.3
Sub-Saharan Africa[6]	0.0	0.0	0.1	0.0	0.0	0.0
Middle East	6.5	6.0	8.1	5.6	6.3	6.3
East Asia[7]	1.6	1.8	1.8	1.9	2.2	1.9
Other	0.8	1.3	1.0	1.2	3.3	1.4
Total[2]	17.7	18.5	18.6	15.3	18.5	15.5
Sorghum						
EU[2]	0.4	0.2	0.2	0.4	0.3	0.3
FSU[3]	0.4	0.0	0.0	0.0	0.0	0.0
China	0.0	0.0	0.0	0.0	0.0	0.0
East Europe	0.0	0.0	0.0	0.0	0.0	0.0
Latin America	3.2	3.1	5.1	4.0	3.2	2.4
North Africa	0.1	0.1	0.0	0.0	0.0	0.0
Sub-Saharan Africa[6]	0.0	0.3	0.2	0.2	0.2	0.0
Middle East	0.7	0.3	0.4	0.7	0.1	0.3
East Asia	4.1	3.7	3.4	3.4	2.9	3.0
Other	0.2	0.0	0.0	0.0	0.0	0.4
Total	9.0	7.8	9.4	8.7	6.7	6.4

[1]1993/94 preliminary. 1994/95 forecast

[2]Excludes intra-EU trade.

[3]Former Soviet Union. Includes intra-FSU trade.

[4]Includes Mexico.

[5]Algeria, Egypt, Libya, Morocco, and Tunisia.

[6]Includes South Africa.

[7]Japan, Taiwan, South Korea, and Hong Kong.

kets also commonly reported high moisture content in Chinese corn, especially the 1993/94 crop.[5]

In addition to China, exports by Argentina rebounded somewhat in the 1990's, based on improved yields and a modest recovery in acreage. Gains in yields apparently reflect greater input use. The stimulus for increases in production has been more internally directed, to maintain crop rotations and perhaps in response to a more stable investment climate, rather than export driven. The largest export gains by Argentina have come in Brazil, although Argentine exports are quite diversified across many regions.

Aggregate competitor exports of coarse grains are not expected to expand substantially over the next decade. It is difficult to generalize about foreign exporters because of their diverse nature.

Corn. In the corn market, reductions in exports by China and most smaller exporters are likely, while gains are expected for Argentina and Eastern Europe. China, the largest competitor, is expected to reduce exports over the next decade as its exportable surplus shrinks due to sharp growth in internal demand. In 1994/95, China's domestic corn use is forecast to reach 100 million tons, up from 81 million in 1990/91. Corn exports by the EU, which fluctuate considerably, are expected to remain fairly small as lower internal prices are expected to raise internal EU demand.

South Africa is likely to be a significant exporter only occasionally, after large crops. As it tries to reduce expenditures on export subsidies, South Africa is aiming toward self-sufficiency and possibly just small exports to neighboring countries. Because of large increases in domestic feed use, Thailand is not expected to rebound to its previous status as a major corn exporter and more likely will be a net importer.

This leaves most potential gains in competitor corn exports in Argentina and Eastern Europe. As a low-cost producer, Argentina is well placed to increase its corn exports. However, it will have to rely more on yield gains than growth in area to increase corn production because of continued competition for land with oilseeds. Economic reforms and privatization efforts are expected to improve Argentina's marketing and reduce its transportation costs in the future. Eastern Europe has good potential to expand corn exports: in the short term from Hungary and over the long term from Romania. Prospects for the former Yugoslavia, an important corn exporter in the past, are less certain because of civil strife.

Sorghum. Foreign exports of sorghum are expected to be flat at best and more likely to decline in the next decade. Argentina accounts for most of these exports. After many years of decline due to more attractive returns from other crops, Argentine sorghum area has recently stabilized. Unless prices rise dramatically above projections relative to other crops, such as oilseeds, the outlook is for little change by Argentina. Exports by Australia will likely shrink because of strong domestic growth for feed by the expansion of cattle feedlots.

Barley. The outlook for aggregate foreign barley exports is for moderate growth over the next decade. Compared with corn and sorghum, this outlook is more heavily influenced by policy adjustments, particularly GATT, and developments in wheat and other commodity markets. In the short run, exports by the EU are projected to increase due to a large amount of subsidized coarse grains allowed under GATT. After a few years, however, EU barley exports are likely to decline slightly and then flatten out as the allowed volume of subsidized exports is reduced.

Australia's exports of feed barley are likely to trend downward in the next decade because barley is a preferred feed for Australia's rapidly growing fed beef sector. Most of Australia's future exports will be malting barley due to stronger malting barley demand in Asia.

Canada's future barley exports are expected to increase, despite competition for land from oilseeds and wheat. However, larger barley crops will have to come from improvements in yields. Canada is likely to fill any opportunities to export malting barley to China if Australia is unable to supply this growing market.

U.S. Trade Outlook

U.S. Imports

In recent years, the United States has become a significant importer of barley and oats. Since 1983, the United States has been the world's largest importer of oats. These imports have increased fairly steadily over the last decade and reached a record in 1993/94. Canada has been the largest single supplier over this period, followed by Sweden and Finland. In the late 1980's, the Canadian Wheat Board relinquished control of oats marketing and exports to the private sector.

Scandinavia's oats are generally of high quality and are largely destined for milling into food products and

[5]Moisture content is the amount of water in grain. Corn with moisture above 15 percent is more susceptible to mold and other problems in storage.

the premium feed market for horses. Scandinavia's oats have also been heavily subsidized. Accession into the EU in January 1995 by both Finland and Sweden is not expected to disrupt these exports, assuming the oats are exported under EU export programs. If future Scandinavian exports are cut back due to adjustments in production or other reasons, Canada will likely continue to have large surplus supplies. Thus, U.S. oats imports are likely to remain large.

Barley imports have surged more recently. After a drought-induced shortfall in the late 1980's, imports of malting barley began to increase significantly. In 1993/94, however, large amounts of feed barley were imported in addition to malting barley, resulting in a record total. Virtually all U.S. barley imports come from Canada. The tremendous surge in barley imports from Canada in 1993/94 reflected tight U.S. supplies of feed grains after a poor corn crop. In fact, the supplies were so tight that unusually large volumes of wheat for feeding were also imported from Canada.

The weak Canadian currency and poor export prospects in other barley markets, notably the former Soviet Union, also provided greater incentives for Canadian sales to the United States, an attractive cash market. U.S. barley imports are expected to drop in 1994/95 as domestic demand for feeding in Canada is strong, and drought in Australia provides opportunities to export to countries other than the United States. For the future, Canada's exports of barley to the United States will depend on U.S. prices relative to domestic demand in Canada and prices available in other export markets.

U.S. Export Prospects

U.S. export prospects for corn and other feed grains are expected to improve over the next decade. The United States will benefit from both expansion in world import demand and gains in market share. The U.S. share of the world coarse grains market is projected to rebound from the unusually low 47 percent of 1993/94 and approach the 64-percent share of 1975-80, when the U.S. market share peaked. However, U.S. barley exports will face some restrictions due to implementation of GATT limits on export subsidies.

Changes in the pattern of world import demand will continue to reshape the direction of U.S. exports in the next decade (table 15). Import growth will be increasingly fueled by developing countries, driven by strong population growth, increasing incomes, and higher consumption of meat and livestock products. This implies that export credits will remain useful and perhaps grow in importance. Assuming the EU continues to subsidize its barley exports to the extent allowed by GATT, the Export Enhancement Program would be needed if the United States wants to maintain its current competitiveness. Trade agreements are likely to gain importance, perhaps with some expansion of NAFTA to include other countries.

The most promising U.S. export opportunities among the coarse grains are expected for corn. In part, this reflects most importers' preference of corn for their poultry sectors, which are projected to increase more than other meats. In addition, it reflects expectations that China's corn exports will drop.

U.S. exports may become less volatile than in the past, to the extent that the FSU no longer makes sudden large purchases that shock the market. Swings in China's trade, however, could increase volatility. In addition, periodic weather shocks can still be expected to spur demand or threaten U.S. supplies. The degree of potential market disruption will largely remain a function of the level of stocks.

Trade Issues and Uncertainties

Many uncertainties could contribute to changes in the export outlook. Some events would tend to reduce coarse grain trade, while others could expand it.

Developments in Meat Trade. Coarse grain demand in many countries will hinge on the price and availability of meat, poultry, and livestock products in the world market, competing with domestic production of meat. Even if some countries choose to import meat rather than feed grains, this can still benefit the United States. For example, Japan's market liberalization has brought significant increases in its meat imports, slightly reducing Japan's feed grain imports. Nevertheless, the United States still gains: increases in U.S. meat exports to Japan mean higher value-added exports; gains in corn exports to Taiwan, which exports pork to Japan; and reduced competition from Thailand's corn exports, as it uses more corn domestically and increases poultry exports to Japan.

Changes in Feed Wheat Trade. Global trade in wheat for feeding is expected to decline from the high level of the early 1990's. This prognosis mainly reflects expectations of tighter wheat markets, contributing to rising prices relative to coarse grains. In any given year, however, poor weather in an exporting country can damage the quality of milling wheat enough to push it into trade for feed. Australia has recently expressed interest in selling feed wheat to Asian feed grain markets on a more regular basis. To do that, however, Australia would probably have to develop

Table 15—U.S. exports by leading destinations, 1988/89-1993/94[1]

Country/region	1988/89	1989/90	1990/91	1991/92	1992/93	1993/94
			1,000 tons			
Corn						
Japan	13,133	14,166	13,378	13,411	14,138	12,214
Taiwan	3,812	5,083	4,939	4,955	5,333	5,077
Former Soviet Union	16,013	16,396	8,289	7,270	4,721	2,909
EU	2,303	3,241	2,974	1,571	1,378	1,765
Mexico	3,011	4,826	2,016	915	506	1,468
Egypt	1,201	1,145	1,683	1,067	1,397	1,553
Algeria	917	1,214	1,226	1,008	1,076	1,176
Caribbean	760	730	789	805	953	917
Saudi Arabia	564	805	657	622	752	916
Venezuela	0	415	448	534	718	809
Central America	314	543	542	563	686	790
Canada	880	578	395	212	1,247	603
S. Korea	4,578	5,663	2,161	1,558	991	508
Sub-Saharan Africa	162	165	216	1,080	1,601	394
East Europe	1,743	1,883	1,417	120	1,103	48
South Africa	--	0	14	1,757	2,354	12
Others	2,226	3,238	2,583	2,760	3,196	2,491
Total	51,617	60,091	43,727	40,208	42,150	33,649
Sorghum						
Mexico	2,138	3,009	2,981	4,881	4,147	2,942
Japan	2,518	3,225	1,949	1,669	1,922	1,640
Israel	399	363	166	75	230	83
EU	227	233	199	175	190	172
Turkey	--	52	115	85	147	0
Sub-Saharan Africa	55	21	217	173	98	136
Venezuela	1,175	104	0	0	13	0
Former Soviet Union	972	0	0	0	0	0
Others	381	622	241	172	131	41
Total	7,865	7,629	5,868	7,230	6,878	5,014
Barley						
Saudi Arabia	902	532	1,147	1,108	579	344
Israel	50	147	124	320	263	335
Former Soviet Union	0	7	0	161	235	0
Jordan	0	187	150	196	195	205
Algeria	250	124	103	92	115	222
Cyprus	46	22	50	77	101	110
Japan	126	104	39	52	50	49
Mexico	71	149	130	42	82	62
Others	273	558	12	9	128	107
Total	1,718	1,830	1,755	2,057	1,748	1,433

-- is greater than zero but less than 1,000 tons.

[1]September-August for corn and sorghum; June-May for barley.

varieties capable of generating sufficient returns to be attractive to farmers.

China's Future Trade Status. A major issue is whether China will sustain its corn exports at relatively high levels in the face of projected growth in domestic demand. The outcome will be affected by policy decisions, availability of alternative feeds, income growth, the ability to sustain yield increases, and improvements to internal distribution channels. If China begins large imports of corn or reduces exports more suddenly than expected, then U.S. exports could increase accordingly.

Government Programs for Feed Grains

The United States has implemented programs to support incomes of grain producers and stabilize grain prices since the 1930's. These programs have undergone substantial changes over time as Congress has sought to maintain the original purpose of the programs but adapt them to changing economic conditions and shifting government spending priorities.

The basic instruments of modern feed grain programs include target prices to support incomes, loan and storage programs to support prices, and acreage reduction programs to constrain production and limit Federal budget outlays. The 1991-95 crops of feed grains are affected by the Food, Agriculture, Conservation, and Trade Act (FACTA) of 1990 and the Omnibus Budget Reconciliation Acts (OBRA) of 1990 and 1993. The 1990 legislation made some important changes in program provisions for feed grains.

Target Prices

Target prices for corn, sorghum, and barley were established in the Agriculture and Consumer Protection Act of 1973 (1973 Act); a target price for oats was established in the Food and Agriculture Act of 1981 (1981 Act). Feed grain producers receive deficiency payments whenever the target price for the commodity exceeds its U.S. average market price during a specified time period. To be eligible for deficiency payments and other program benefits, a producer must participate in any acreage reduction program (ARP) in effect for the commodity.

In simplest terms, the deficiency payment to a producer equals the deficiency payment rate for the commodity (target price minus the higher of the loan rate or average market price) multiplied by the farm's program production of the commodity (payment acres times program yield per acre). Under current law, payment acres generally equal 85 percent of the farm's established acreage base for the commodity, less base acres that must be idled to comply with an ARP.

In recent years, deficiency payments for corn have accounted for 85-90 percent of total feed grain deficiency payments. This was not the case under the 1973 Act and the Food and Agriculture Act of 1977 (1977 Act). During the 8-year period covered by those two acts, payments were made on corn in only 1978/79, and the rate was just 3 cents a bushel. Payments on sorghum were made in 3 of the 8 years, and barley payments were made in 4 years. The reason for more frequent payments on barley and sorghum was that target prices, which were based on per bushel costs of production, were higher for barley and sorghum than for corn. However, market prices, which generally reflect relative feed values, were lower for barley and sorghum.

The 1981 Act made important changes in the target price provisions. The 1981 Act was debated during a period of rapid inflation and expectations of continued high rates of inflation. The cost-of-production formula was abandoned, and target prices for other feed grains were set in relation to corn, taking feed value into account. Thus, corn was to have the highest per bushel target price among the four feed grains.

Congress raised the corn target price from $2.40 per bushel in 1981/82 to $2.70 in 1982/83, the first year under the 1981 Act (table 16). Thereafter, annual increases of around 6 percent in the minimum corn target price were mandated, largely because of an expectation of continued high inflation rates. The corn target price was slated to reach $3.18 in 1985/86, the last year under the 1981 Act. However, by 1984, grain prices had weakened and the potential budget exposure from rising target prices had become an issue. The Agricultural Programs Adjustment Act froze the corn target price for 1985/86 at $3.03, the 1984/85 level.

Federal budget outlays for feed grain deficiency payments ballooned under the 1981 Act. Prior to the 1981 Act, deficiency payments on corn had totaled only $88 million, all on the 1978 crop. By contrast, deficiency payments totaled $4.1 billion for the 1984 and 1985 corn crops combined. This total would have been larger except for the $2.55 loan rate, which limited the maximum deficiency payment rate to 48 cents per bushel ($3.03 minus $2.55). Although high loan rates supported market prices and limited deficiency payments, they caused large-scale accumulation of stocks and loss of export markets. These developments set the stage for the Food Security Act of 1985 (FSA).

Table 16—Feed grain target prices, loan rates, and deficiency payment rates, 1982-95 marketing years

Crop	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
							Dollars per bushel							
Target price														
Corn	2.70	2.86	3.03	3.03	3.03	3.03	2.93	2.84	2.75	2.75	2.75	2.75	2.75	2.75
Sorghum	2.60	2.72	2.88	2.88	2.88	2.88	2.78	2.70	2.61	2.61	2.61	2.61	2.61	2.61
Barley	2.60	2.60	2.60	2.60	2.60	2.60	2.51	2.43	2.36	2.36	2.36	2.36	2.36	2.36
Oats	1.50	1.60	1.60	1.60	1.60	1.60	1.55	1.50	1.45	1.45	1.45	1.45	1.45	1.45
Basic loan rate														
Corn	---	---	---	---	2.40	2.28	2.21	2.06	1.96	1.89	2.01	1.99	1.99	1.94
Sorghum	---	---	---	---	2.28	2.17	2.10	1.96	1.86	1.80	1.91	1.89	1.89	1.84
Barley	---	---	---	---	1.95	1.86	1.80	1.68	1.60	1.54	1.64	1.62	1.62	1.58
Oats	---	---	---	---	1.23	1.17	1.14	1.06	1.01	0.97	1.03	1.02	1.02	1.00
Announced loan rate														
Corn	2.55	2.65	2.55	2.55	1.92	1.82	1.77	1.65	1.57	1.62	1.72	1.72	1.89	1.89
Sorghum	2.42	2.52	2.42	2.42	1.82	1.74	1.68	1.57	1.49	1.54	1.63	1.63	1.80	1.80
Barley	2.08	2.16	2.08	2.08	1.56	1.49	1.44	1.34	1.28	1.32	1.40	1.40	1.54	1.54
Oats	1.31	1.36	1.31	1.31	0.99	0.94	0.90	0.85	0.81	0.83	0.88	0.88	0.97	0.97
Deficiency payment rate														
Corn	0.15	0.00	0.43	0.48	1.11	1.09	0.36	0.58	0.51	0.41	0.73	0.28	0.57	---
Sorghum	0.18	0.00	0.46	0.46	1.06	1.14	0.48	0.66	0.56	0.37	0.72	0.25	0.59	---
Barley	0.40	0.21	0.26	0.52	0.99	0.79	0.00	0.00	0.20	0.62	0.56	0.67	0.52	---
Oats	0.00	0.11	0.00	0.29	0.39	0.20	0.00	0.00	0.32	0.35	0.17	0.11	0.19	---

--- means not available or not applicable.

Deficiency payment rates for 1994/95 are minimums based on the 5-month adjusted price.

The FSA of 1985 was developed under agricultural economic conditions that demanded a change in direction for U.S. farm programs. Outcomes under the 1981 Act—mounting grain surpluses, escalating program costs, and declining exports—illustrated the dangers in policies that were too rigid to allow U.S. producers and exporters to adjust to changing worldwide grain market conditions.

The goal of the FSA was "market orientation." For the first time, legislation provided for future, planned reductions in annual target price minimums. To lessen the impact on farm income during the transition to a more market-oriented agriculture, target prices for the 1986 and 1987 feed grain crops were frozen at 1985/86 levels. Target price reductions began in 1988/89 and by 1990/91, the last year covered by the FSA, target prices were down nearly 10 percent from 1987/88 levels.

Budget outlays for feed grain deficiency payments rose sharply under the FSA, particularly in 1986/87-1987/88. Loan rates for grains were reduced substantially in order to allow U.S. market prices to fall to market-clearing levels. Maximum permitted deficiency payment rates (target price minus loan rate) more than doubled. Payment rates exceeded $1.00 per bushel for both corn and sorghum in 1986/87-1987/88. However, the combination of severe drought in 1988 and lower target prices reduced corn and sorghum payment rates to 50-60 cents per bushel by 1989/90 through 1990/91.

The FACTA of 1990 was debated during a time of intense concern over the Federal budget deficit. A further reduction in target prices was one option to cut farm program spending. Congress chose instead to limit deficiency payments by reducing the acreage covered by target prices (see Acreage Reduction Programs section). Minimum target prices for the 1991/92-1995/96 crop years covered by the FACTA were frozen at 1990/91 levels ($2.75 per bushel for corn).

The FACTA made changes in deficiency payment rate calculations for the 1994-95 feed grain crops. Payment rates for the 1991-93 crops were to be calculated according to the 1985 FSA, namely: when the 12-month (season average) price is above the basic loan rate, the payment rate is the target price minus the higher of the basic loan rate and the average market price for the first 5 months of the marketing year; and when the 12-month price is less than the basic loan rate, the deficiency payment rate is the target price minus the higher of the announced loan rate and the 12-month average price (see the next section of this report for loan rate definitions). For the 1994-95 crops, the 5-month market price is replaced by the lesser of (1) the 12-month average price and (2) the 5-month price plus 7 cents per bushel. The new procedure for the 1994-95 crops likely will yield a smaller payment rate than the one for 1991-93 crops when the 12-month price is above the basic loan rate; the maximum reduction cannot exceed 7 cents per bushel.

Feed grain deficiency payments under the 1990 legislation have ranged from less than $2 billion in 1993/94 to more than $4 billion for 1992/93. Record corn yields in 1992 led to lower market prices and higher deficiency payments. A new record yield in 1994 may push feed grain deficiency payments toward $4 billion.

Loan and Storage Programs

Government loan programs have been in effect for corn since the 1930's and for the other feed grains since the 1950's. Under the program, producers pledge all or part of their production of a commodity as collateral and, in return, receive a loan equal to the product of the per bushel loan rate and the number of bushels placed under loan. Generally, the loan must be repaid with interest within 9 months. However, the loans are "nonrecourse," which means that the Government must accept the commodity under loan as repayment of the loan principal plus interest, if the producer so desires.

The nonrecourse feature of the loan program and the fact that the bulk of production is usually eligible (producers must participate in the ARP for the commodity to be eligible for loans) tend to make the loan rate a market price "floor." If the price floor is near or above market-clearing prices, producers have no incentive to repay loans with cash. This was the case in 1984 and 1985 for grains. As a result, the Government became owner of a massive amount of grain that had been placed under loan.

Congress reacted to the 1984-85 experience by making important changes in loan programs in the FSA of 1985. The FSA permitted the Secretary of Agriculture to set the "basic" loan rate for corn at 75-85 percent of past market prices. The announced or actual loan rate for the crop (the "reduced" or "Findley" rate) could be up to 20 percent lower than the basic rate, at the Secretary's discretion. Loan rates for sorghum, barley, and oats were to be based on corn, taking relative feed values into account. During 1986-90, loan rates for feed grains were reduced the maximum allowed by law. The loan rate for corn dropped from $2.55 per bushel in 1985/86, the last year under the 1981 Act, to $1.92 in 1986/87, and eventually to $1.57 in 1990/91.

Congress continued the market-oriented approach of the FSA in developing the FACTA. Under FACTA, the basic loan rate for corn is set at 85 percent of the average farm price for the previous 5 marketing years, excluding the years with the highest and lowest price. The basic loan rate may not be reduced more than 5 percent from the previous year's basic rate. Loan rates for the other feed grains continue to be set in relation to corn.

Under the 1985 FSA, the Secretary of Agriculture had discretionary authority to announce a loan rate up to 20 percent below the basic rate. The FACTA weakened this authority by linking permitted reductions in the loan rate to the projected ending stocks-to-use ratio for corn for the current marketing year. When projected ending stocks are excessive, more than 25 percent of use, the reduction from the basic rate may be up to 10 percent; when the projected ratio is 12.5-25 percent, the reduction may be up to 5 percent; and when the projected ratio is less than 12.5 percent, there may be no reduction. However, the reduction from the basic loan rate based on stocks-to-use may be limited under certain price conditions by a statutory minimum loan of $1.76 per bushel for corn.

The Secretary has discretion under FACTA to further reduce the loan rate by up to 10 percent on top of any reduction based on stocks-to-use. Loan rates for feed grains were reduced the maximum allowed in 1991/92 and 1992/93. Still, loan rates were higher than in 1990/91, the last year under the FSA. Maximum permitted reductions were not made in 1993/94 and 1994/95. By 1994/95, the announced corn loan rate had risen to $1.89, the highest since 1986/87, and 32 cents above the rate in 1990/91.

The Omnibus Budget Reconciliation Act (OBRA) of 1990 required USDA to implement *marketing loans* for the 1993-95 crops of feed grains and wheat if the United States had not entered into a GATT agreement by June 30, 1992. Because no agreement was entered into by that date, USDA implemented marketing loans for feed grains in 1993/94 and 1994/95.

Marketing loan provisions allow producers to repay loans at the lower of the announced loan rate or the prevailing world market price. The objective is to prevent the loan rate from becoming an artificial price floor which would cause stocks under loan to accumulate and U.S. grains to be less competitive in world markets. To administer the program, USDA uses daily posted county prices (PCP's) to represent the prevailing world market price. Generally, the PCP for a commodity is a terminal market price less transportation costs between the terminal market and the county.

Producers may benefit from the marketing loan either by repaying a loan at the PCP if the PCP is less than the loan rate plus accrued interest, or by receiving a loan deficiency payment (LDP). The LDP is the difference between the county loan rate and the PCP. In order to receive an LDP, the producer must agree not to put the grain under loan. Grain brought out of loan also cannot receive an LDP. In addition to these direct benefits, producers may also benefit if they use the marketing loan and then sell the grain at a price higher than the marketing loan repayment rate.

Federal budget exposure to marketing loan gains and LDP's is substantial because a large quantity of grain usually is eligible for the program. Producers who participate in the ARP for the commodity are eligible. Unlike the case for target price deficiency payments, however, which are paid on relatively fixed program production, a participant's entire production is eligible for the loan program. Marketing loan benefits (costs) are more likely when U.S. production is large, as in 1994/95 for corn. As the 1994 crop was harvested, PCP's at times were less than county loan rates in some areas of the Corn Belt. The combination of a 0-percent ARP, 82 percent program participation, and a record yield boosted loan-eligible corn production to around 8 billion bushels.

The *Farmer-Owned Reserve* (FOR) program offers producers an additional storage option when specified market price and supply triggers are met. Under the 1990 FACTA, the Secretary of Agriculture may authorize feed grains to enter the FOR when one of the following is met: 1) the projected ending stocks-to-use ratio for corn for the current marketing year is greater than 22.5 percent, or 2) the market price for corn is less than 120 percent of the announced loan rate for 90 consecutive calendar days. The Secretary may announce the opening of the FOR any time the conditions are met, but the Secretary is not required to do so. The exception is that an announcement must be made by March 15 in the year following corn harvest, and the Secretary must declare the FOR open only if both triggers are met at that time.

The maximum quantity of feed grains that may enter the FOR must be specified when the FOR is opened. This quantity must be between 600 million and 900 million bushels for feed grains. Producers must report the quantity they intend to place in the FOR to the local USDA office. If aggregate intentions ex-

ceed the maximum quantity specified, USDA determines a prorated amount for each producer.

Producers cannot enter grain directly into the FOR, but must first place it under the 9-month loan. When the 9-month loan matures, the grain, subject to the approved quantity limit, may be "rolled over" into the FOR. The FOR loan matures 27 months after the original 9-month loan matures. The producer receives quarterly storage payments at an annual rate of 26.5 cents per bushel. Storage payments cease for at least 90 days if market prices rise to 95 percent of the target price. Producers can redeem all or part of their FOR loans at any time over the 27-month term without penalty. Grain in the FOR not redeemed by the end of the 27-month period is forfeited to the government.

The FACTA provisions for the FOR have lessened its influence on grain marketing decisions. In the past (the 1977 Act established the FOR), the FOR was often a remunerative option for farmers and an expensive program for the government. At various times the FOR loan rate was set higher than the 9-month loan rate, and grain could be entered directly into the FOR during harvest. The FACTA made FOR less attractive to producers in the absence of a higher loan rate and direct entry after harvest.

The FOR was opened for the 1992/93 crops of corn, sorghum, and barley. About 300 million bushels of grain entered the FOR, and, as of December 1994, about 120 million bushels remained in the reserve. The FOR has also been opened for the 1994/95 crops, with the maximum quantity set at 900 million bushels. These quantities are small in comparison to earlier years, 1982/83 for example, when more than 2 billion bushels of feed grains were in the FOR at the close of the season.

Acreage Reduction Programs

Because government-set target prices for feed grains and other program crops exceed market prices, acreage reduction programs (ARP's) are needed to limit Federal budget outlays and to prevent the buildup of surplus stocks. ARP's limit planted area by requiring program participants to set aside, for conserving uses, a portion of their crop base (table 17). This reduces production from program participants, which raises market prices. Thus, ARP's control deficiency payment outlays by cutting the acreage eligible for payments and by raising market prices.

The precedent for idling acreage was set in the 1930's and was heavily used in the late 1950's, the 1960's, and sporadically in the 1970's. Programs in the 1980's-90's have their roots in the 1981 Act which replaced general acreage "set-asides" with commodity-specific programs. The Food and Agriculture Act of 1977 had defined the acreage base for program purposes as the sum of crops normally planted on the farm ("normal crop acres" or NCA). Under the NCA, as administered under the 1977 Act, acres required to be set aside were expressed as a percentage of acres of the set-aside crop planted in the current year. There were no restrictions on planting the set-aside crop, or any other approved NCA crop, except that total plantings plus set-aside acres could not exceed the NCA for the farm.

The 1977 Act defined deficiency payment acres as "current plantings" of the target price crop. This provision increased the role of target prices in planting decisions and permitted individual producers to decide how many acres of each commodity to plant for deficiency payments (subject to the NCA constraint on plantings). Substantial increases in target prices were called for in the 1981 Act. As a result, budget exposure became a primary concern, and the Act authorized crop-specific acreage bases (CAB's), based on recent plantings, and ARP's to replace the more general NCA and set-asides. ARP's permit USDA to limit plantings of a target price crop to a specified percentage of its CAB, as a condition for a producer to receive deficiency payments for the commodity.

The 1985 FSA continued the use of ARP's to limit acreages of feed grains and other program crops. Important changes included the establishment of the Conservation Reserve Program (CRP). Under CRP, producers bid to enroll environmentally sensitive land in the program. The contracts are for 10 years. Producers receive annual rental payments in return for keeping the land in conservation uses, but they forgo the opportunity to receive deficiency payments on these acres. Producers with program crop acreage bases had their bases reduced on a pro-rata basis when their bids were accepted. By 1994, 11 million acres of feed grain base were enrolled in the CRP.

The 1985 Act included a provision to allow producers to receive 92 percent of their expected deficiency payments while planting as little as 50 percent of permitted acreage (base less ARP acres) of the feed grain. The underplanted acres had to be put into conservation uses. This program provision, known as 50-92, was later changed to 0-92 and is now 0/85-92. This provision allows a producer to devote all the permitted acreage for a commodity to conservation uses and receive 85-92 percent of projected deficiency payments.

Table 17—Feed grain annual acreage reduction programs, program participation, and acres idled, 1982-95

Crop	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
							Percent							
Acreage Reduction Program (ARP)														
Corn	10	10*	10	10	20*	20*	20*	10	10	7.5	5	10	0	7.5
Sorghum	10	10*	10	10	20*	20*	20*	10	10	7.5	5	5	0	0
Barley	10	10*	10	10	20*	20*	20*	10	10	7.5	5	0	0	0
Oats	10	10*	10	10	20*	20*	5	5	5	0	0	0	0	0
Participation														
Corn	29	71	54	69	86	91	87	80	77	77	76	81	82	--
Sorghum	47	72	42	55	74	85	82	71	70	77	79	82	81	--
Barley	46	55	44	57	72	85	79	67	68	76	75	83	84	--
Oats	14	20	14	14	38	45	30	18	9	38	40	46	40	--
							Million acres							
ARP idled														
Corn	2.1	32.2	3.9	5.4	13.7	21.8	17.6	6.3	6.1	4.7	3.1	6.6	0	--
Sorghum	0.7	5.7	0.6	0.9	2.4	3.6	2.8	1.1	1.0	0.8	0.5	0.6	0	--
Barley	0.4	1.1	0.5	0.7	1.8	2.7	2.2	0.8	0.7	0.6	0.4	0	0	--
Oats	0.1	0.3	0.1	0.1	0.4	0.7	0.1	0.1	0	0	0	0	0	--
0-50/92 idled														
Corn	--	--	--	--	0.6	1.4	2.9	4.5	4.6	2.7	2.2	4.3	2.4	--
Sorghum	--	--	--	--	0.4	0.5	1.1	2.2	2.3	1.7	1.5	1.7	1.6	--
Barley	--	--	--	--	0.2	0.3	0.6	1.5	2.2	1.5	1.9	2.5	2.7	--
Oats	--	--	--	--	0.1	0.1	0.2	0.3	0.2	0.6	0.7	0.8	0.6	--
Idled annual programs														
Feed grains	3.3	39.4	5.0	7.1	19.6	31.0	27.5	16.7	17.2	12.7	10.4	16.5	7.2	--

*Programs had provision for additional paid diversion; the 20-percent reduction in 1986 included a 2.5-percent diversion.

Source: Consolidated Farm Service Agency (formerly Agricultural Stabilization and Conservation Service), USDA.

Even with the changes noted above, feed grain ARP's remained at high levels during 1986-88. During this period, deficiency payment rates soared following reductions in loan rates and, thus, market prices. The sharp increase in budget exposure intensified the need for ARP's. Following the 1988 drought, feed grain market prices rose and ARP's were reduced to half their earlier levels.

The 1990 farm program legislation made important changes in acreage programs. The most significant change was the planting flexibility provision in the 1990 Omnibus Budget Reconciliation Act (OBRA). The OBRA specified that deficiency payments not be made on 15 percent of base acres in addition to base acres idled under the ARP. Thus, even with a 0-percent ARP, payments are made on a maximum of 85 percent of the acreage base (see box). The 15-percent unpaid portion of base is known as "normal flex acres" or NFA. The farmer may plant the base crop, other program crops, soybeans and other oilseeds, or any other approved non-program crop on NFA without loss of base. Because deficiency payments are not made on NFA, producers' planting decisions on NFA are likely based on market returns and/or rotation needs.

Farmers wanting greater planting flexibility than the 15-percent NFA may use up to an additional 10 percent of the crop acreage base to grow crops other than the base crop ("optional flex acres" or OFA). Although base is protected if the farmer plants approved alternative crops on OFA, deficiency payments are forgone by not planting the base crop. Thus, deficiency payments influence planting decisions on OFA.

Feed grain producers have used the flexibility provisions, primarily NFA, to shift acres into alternative crops. During 1991-94, the shift from feed grains to other crops ranged from 3.3 to 5.0 million acres annually. Most of this shift is accounted for by a shift from corn to soybeans on corn base NFA.

The 1990 FACTA links permitted ARP levels to stocks-to-use ratios. This was a change from the 1985 FSA which tied ARP levels to the quantity of corn in ending stocks. The exception to the stocks-to-use provision is that the ARP for oats must be 0-percent for the 1991-95 crops. Under FACTA, the corn ARP may be 0 to 12.5 percent if the previous year's stocks-to-use ratio is less than or equal to 25 percent; the ARP may be 10 to 20 percent if the stocks-to-use ratio is greater than 25 percent. The Agricultural Reconciliation Act (ARA) of 1990 requires that ARP be set at not less than 7.5 percent for 1992-95 corn, sorghum, and barley if the stocks-to-use ratio is less than 20 percent. The so-called "GATT trigger" in the 1990 ARA, however, authorized the Secretary to waive minimum ARP requirements for 1993-95 feed grains if by June 30, 1992, the United States had not entered into a GATT agreement (Uruguay Round). The OBRA of 1993, however, struck out the minimum ARP level for barley and sorghum as established by the 1990 ARA, but retained it for corn. In addition, the OBRA of 1993 rescinded the ARP waiver under the "GATT trigger" provision for the 7.5-percent corn ARP as set out in the 1990 ARA.

The FACTA continued many of the 1985 FSA provisions for acreage programs. The legislation defines CAB as the 5-year moving average of acreage planted and "considered planted" to the program crop, but expands the definition of "considered planted"; the 0-92 program is continued, but the 1993 OBRA changed the program to 0-85 under certain circumstances to reduce budget outlays; the CRP is continued, but the pace of enrollment has dropped sharply from the initial years of the program; and program yields used to calculate production eligible for deficiency payments remain frozen at their 1985 levels.

The 1990 FACTA maintains the 1985 FSA provision for combining the permitted acreage for corn and sorghum. Under this provision, producers have the flexi-

Production eligible for deficiency payments: 1985 and 1990 farm acts

Assume:
100-acre corn base
ARP is 10 percent
Deficiency payment rate is $0.50 per bushel

	Item	1985 FSA	1990 FACTA
	Base acres	100	100
-	ARP acres	10	10
-	Normal flex acres	0	15
=	Maximum payment acres	90	75
x	Program yield, bu.	100	100
=	Maximum production for payment, bu.	9,000	7,500
x	Payment rate	$.50	$.50
=	Maximum def. payments	$4,500	$3,750

bility to plant any combination of corn and sorghum on the combined permitted acreage. Producers maintain the respective crop bases and receive the same total deficiency payment regardless of what combination of the two crops is planted on permitted acreage.

Feed grain ARP's have been smaller under the 1990 FACTA than under the 1985 FSA. For the first time since they were instituted in 1982/83, ARP's for all four feed grains were 0 percent in 1994/95. However, 7.2 million feed grain base acres were idled under the 0/85-92 provision. The record large 1994 corn crop and forecast 1.7-billion-bushel ending stocks have led to a 7.5-percent ARP for 1995/96 corn; ARP's for other feed grains will remain at 0 percent.

Payment Limitations

The 1990 FACTA changed rules governing per person payment limitations. The annual limit on the total of regular deficiency payments and diversion payments remains at $50,000. Marketing loan gains and loan deficiency payments are now subject to a limit of $75,000 per person, rather than $200,000 as under the 1985 FSA. These limits apply to combined payments from all program crops.

Crop Insurance Reform

The Federal Crop Insurance Reform Act of 1994 makes participation in at least the catastrophic coverage level of the crop insurance program a requirement in order to be eligible for price support or production adjustment programs, certain loans offered by USDA's Consolidated Farm Service Agency (formerly Farmers Home Administration), and CRP. Each crop that accounts for 10 percent or more of the total expected value of all crops grown by the producer must be insured.

The new catastrophic coverage level is available to farmers for a nominal processing fee of $50 per crop, with a cap of $200 per farmer per county, and $600 per farmer total. This fee will be waived for limited-resource farmers. Catastrophic coverage will compensate farmers for crop yield losses greater than 50 percent at a payment rate of 60 percent of the expected market price. The coverage levels are comparable to disaster relief programs in recent years. The Federal Crop Insurance Reform Act repeals current authorities for ad hoc disaster relief.

Effects of the 1990 FACTA

Farmers

Direct government payments continue to be an important source of income for feed grain producers (table 18). During 1991-93, direct payments as a percentage of annual gross income for all producers ranged from 12-17 percent for corn production, 19-22 percent for sorghum, 24-31 percent for barley, and 18-25 percent for oats. These percentages are well under those for the mid-1980's. During 1986-88, for example, direct payments were 25-37 percent of annual gross income from corn production.

Participation rates in ARP's remain high because producer returns for program participants remain above those for nonparticipants. Relatively low or 0-percent ARP's have maintained participation, even though overall support has been reduced by the 15-percent unpaid flex acres provision. In addition, average payment yields are now about 85 percent of trend yields. The flex acres provision and frozen payment yields have combined to cut deficiency payment coverage to 70-75 percent of a participant's expected corn production. When production from nonparticipants is added, deficiency payment coverage is around 50-55 percent of total production.

Taxpayers

The 1990 legislation reduced budget exposure to deficiency payments by cutting payment acres. Nevertheless, exposure remains large due to the sheer volume of feed grain production. With a 0-percent ARP, a 1-cent per bushel change in the average farm price for corn changes annual deficiency payments by $50-$60 million.

Changes in the FOR program have made that program less costly for taxpayers. Storage subsidies have been less than $10 million for the 1991-93 crops, compared with nearly $550 million as recently as 1987/88.

The sum of deficiency, disaster, FOR storage, and CRP rental payments has ranged from $3.1 to $4.8 billion for the 1991-93 feed grain crops versus $4.9 to $9.4 billion for the 1986-90 crops, the years covered by the 1985 FSA.

Consumers

Changes made in the 1985 FSA and in the 1990 FACTA have reduced the effects of feed grain programs on consumer prices for meat, dairy, and grain-based food and beverage products. These changes include lowered loan rates, provisions for marketing loans, and a smaller FOR program.

The effects of the program on market prices, compared with having no program, are difficult to evaluate. However, programs that idle productive feed grain

Table 18—Feed grain deficiency payments and FOR storage payments, 1982-93 crop years

Commodity	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
						Million dollars						
Deficiency payments												
Corn	291	0	1,653	2,480	6,195	5,910	2,163	3,504	3,014	2,080	3,625	1,502
Sorghum	64	0	158	227	557	576	266	390	317	175	328	150
Barley	60	43	50	159	345	320	40	23	59	173	153	204
Oats	0	5	0	8	30	19	4	0	8	30	15	12
Total	415	48	1,862	2,874	7,128	6,824	2,473	3,918	3,398	2,457	4,121	1,869
FOR storage payments												
Corn	684	(22)	79	205	519	480	275	155	(2)	0	0	8
Sorghum	118	39	34	21	32	28	11	5	0	0	0	--
Barley	27	25	25	23	33	38	8	0	0	0	0	1
Oats	1	--	0	1	1	1	--	0	0	0	0	0
Total	830	43	138	249	586	546	295	160	(2)	0	0	9

Source: Consolidated Farm Service Agency (formerly Agricultural Stabilization and Conservation Service), USDA

Numbers may not add due to rounding.

( ) denotes negative amount due to refunds.

-- denotes less than $0.5 million.

land lead to higher market prices. This raises feed costs for meat, dairy, and egg producers, who pass through to final consumers a portion of the higher costs. Under current programs, which allow domestic feed grain prices to seek market-clearing levels, these effects likely are minor. For processed food products with large farm-to-retail price spreads, the effects of the program on consumer prices are too small to measure.

Policy Issues and 1995 Farm Legislation

There are many issues raised for 1995 farm bill debates. This section discusses some key issues to be addressed in the feed grains portion of this year's farm legislation and policy options to address these issues.

Some Policy Issues To Be Addressed

Planting Flexibility

The planting flexibility provisions of 1990 farm legislation were designed in part to allow low-productivity feed grain base acres to be planted to alternative crops if the alternatives were more profitable than feed grains. However, planting flexibility is constrained by production practice considerations, such as crop rotations. In addition, deficiency payments play a role in planting decisions on optional flex acres (OFA). While producers' planting decisions on normal flex acres (NFA) are likely based on market net returns and/or rotation considerations (because no deficiency payment is made on NFA and no loss of crop acreage base is a concern), feed grain deficiency payments affect planting decisions on OFA. Also, NFA is primarily a means of reducing payment acreage.

During 1991-94, feed grain flex acres planted to alternative crops were limited. In 1991, the first year the 1990 farm legislation was implemented, of a total potential 20.7 million flex acres (including NFA and OFA) on corn cropland, only 3.0 million acres were planted to soybeans, minor oilseeds, and other non-program crops, or 14 percent of the maximum potential flex acres. Flex acres for all feed grains planted to these crops were 3.6 million acres, of which about 3.1 million acres were planted to soybeans (table 19). The percentage of corn flex acres planted to these crops remained the same in 1992, reflecting comparable soybeans-to-corn expected price ratios in March-April when producers had to make planting decisions. The percentage of corn flex acres planted to these crops increased to 16 percent in 1993 due to an improvement in the expected profitability of soybean plantings relative to corn. In 1994, this percentage increased to 21 percent primarily because the corn ARP was set at 0 percent. During 1991-94, an average of 3.3 million corn flex acres were planted to soybeans, minor oilseeds, and other nonprogram crops, or 16 percent of corn total flex acres.

The switch of plantings from feed grain to alternative crops was limited not only by a lack of economic in-

Table 19—Feed grain flexibility acreage planted to soybeans, minor oilseeds, and other nonprogram crops

Feed grain/ crop year	Flex acres planted to other crops: Soybeans	Minor oilseeds[1]	Other nonprogram crops	Total flex acres
	Million acres			
1991				
Corn	2.772	.029	.201	3.002
Sorghum	.198	.007	.057	.262
Barley	.080	.065	.083	.228
Oats	.081	.017	.023	.121
Feed grains	3.131	.118	.364	3.613
1992				
Corn	2.652	.018	.146	2.816
Sorghum	.182	.003	.031	.216
Barley	.076	.048	.061	.185
Oats	.086	.013	.018	.116
Feed grains	2.995	.083	.257	3.334
1993				
Corn	2.990	.043	.146	3.179
Sorghum	.233	.007	.029	.269
Barley	.090	.084	.073	.247
Oats	.098	.020	.020	.137
Feed grains	3.411	.153	.268	3.832
1994[2]				
Corn	4.070	.048	.172	4.290
Sorghum	.277	.007	.032	.317
Barley	.100	.096	.090	.286
Oats	.099	.019	.020	.138
Feed grains	4.546	.170	.314	5.030

[1]Includes canola, flaxseed, mustard seed, safflower, and rapeseed.

[2]Based on preliminary compliance figures.

Source: Consolidated Farm Service Agency (formerly Agr. Conserv. and Stab. Serv.), U.S. Dept. Agr.

centives for making the switch but also by production practice considerations, such as the corn-soybeans crop rotation.

Because the corn-soybeans crop rotation is common in the Corn Belt, producers are reluctant to plant NFA to alternative crops unless the increase in profitability from switching the plantings exceeds the potential benefit of the crop rotation. The extent to which corn OFA were planted to soybeans, given expected corn and soybean yields and variable costs, depends critically on (1) the soybeans-to-corn expected price ratio in March-April when planting decisions have to be made, and (2) the level of ARP requirement in the corn program. During 1991-94, the soybeans-to-corn expected price ratios (based on the December corn futures price and the November soybean futures price) were either below the breakeven price ratio (around 2.4-2.6 to 1) or within the low end of the breakeven price ratio range (table 20). The corn program distorts the net returns relationship between corn and soybean production by providing deficiency payments on OFA to corn producers participating in the program. A higher corn flex acreage (3.0 million acres) was planted to soybeans in 1993 due partly to a higher soybeans-to-corn price ratio (2.47 to 1, up from 2.33 to 1 in 1992). National prices and costs, however, can only indicate what to expect in general about the extent of flex acres that would likely be planted to alternative crops; individual producers base their planting decisions on what can be expected on their farms. In 1994, corn flex acres planted to soybeans reached 4.1 million acres primarily due to a 0-percent set-aside which makes more marginal corn land available for plantings to alternative crops.

Prospects of planting flexibility in the 1995 crop year and beyond are somewhat uncertain and, in fact, might meet with more restrictions. The 7.5-percent set-aside requirement for the 1995 corn program would make less corn land available for planting to alternative crops. In addition, recent market developments suggest that it is unlikely the soybeans-to-corn price ratio in March-April of 1995 will greatly surpass the 2.45 to 1 ratio of 1994. Perhaps even more important, starting January 1, 1995, all conservation plans are required to be fully implemented on highly erodible land before a producer is eligible for farm program benefits. These conservation plans, such as crop rotations, will place more restrictions on year-to-year changes in cropping patterns.

Acreage Idling

Concerns have been raised recently by some policymakers and many grain handlers, exporters and end-users about the wisdom of idling large acres of program commodities through annual set-aside (ARP), 50/92, 0/85-92, and long-term CRP. Some critics suggest that idling cropland acreage through supply control tends to raise average costs of production and export prices, lower farm income, and weaken U.S. competitiveness on the international market. Critics also point out that much land in CRP is suited for crop production. According to a survey conducted by the Soil and Water Conservation Society (SWCS) in late 1993, CRP contract holders intended to return 63 percent of their acres to crop production, including idling these acres to meet ARP, 50/92, and 0/85-92 requirements, or leasing these acres to other farmers (Osborn, Schnepf, and Keim). If this occurs, expiration of CRP contracts could return about 22.8 million acres to crop production out of the existing 36.4 million acres in CRP contracts. Of the 22.8 million acres in expiring CRP contracts, 23.6 percent (or 5.4 million acres) could return to feed grain production.

Since 1991, feed grain programs and CRP idled an average of 22 million acres per year, about 20 percent of the feed grain base acreage. This magnitude of idled acreage, although smaller than the 25 percent of feed grain base idled during 1986-90, will be subject to policy debates in light of expected growth in future exports.

The foregoing viewpoint must be tempered by concerns over the high cost of farm programs stemming from a

Table 20—Corn flex acres planted to soybeans, set-aside, and soybeans-to-corn, 1991-94

Year	Acres flexed to soybeans	Corn set-aside	Dec. corn futures price in Mar.-Apr.	Nov. soybean futures price in Mar.-Apr.	Soybeans-to-corn price ratio
	Million acres	*Percent*	*Dollars/bushel*		
1991	2.772	7.5	2.62	6.18	2.36 to 1
1992	2.652	5.0	2.61	6.08	2.33 to 1
1993	2.990	10.0	2.43	6.01	2.47 to 1
1994	4.070	0	2.60	6.36	2.45 to 1

low- or no-acreage idling. Under a low-acreage idling scenario, farm program costs would escalate as a result of larger payment acreages and higher deficiency payment rates. Even with the current acreage-idling, farm programs already cost $16 billion in fiscal 1993 and an estimated $12 billion in fiscal 1994. The cost of farm programs would have skyrocketed to a much higher level had acreage-idling programs been removed. Thus, the acreage-idling issue must be addressed by recognizing the tradeoff between the desire of enhancing U.S. competitiveness on the world market and the need of keeping the cost of farm programs under control because the 1995 Farm Bill will be driven by budget constraints. Also, debates over acreage idling must recognize that acreage idling supports farm prices and is favored by many grain producers.

Acreage Reduction Program, 50/92, and 0/85-92. Since 1991, feed grain acres idled under annual set-asides (including ARP, 50/92, and 0/85-92) averaged about 12 million acres per year, or 10 percent of feed grain base acreage. The ARP adjusts supply and demand imbalances by requiring that a certain percentage of producers' crop base acreage be set aside from production. However, an unduly large set-aside raises costs of production and export prices and thus weakens U.S. competitiveness on the world market. Set-aside is also the primary source of economic inefficiency (deadweight loss) in income transfer from taxpayers and consumers to producers. Also, the 50/92 and 0/85-92 provisions, which became popular beginning in the late 1980's, at times could work against their intent of supply control. These measures helped to reduce excessive feed grain ending stocks from 133.6 million metric tons in 1987/88 to 65.9 million in 1988/89, although the reduction was primarily achieved by droughts. Corn ending stocks were also reduced from 4.26 billion bushels in 1987/88 to 1.93 billion in 1988/89. However, in times when there is a production shortfall or stocks are tight relative to use, these measures could worsen the tight supply situation.

Conservation Reserve Program. What to do with expiring CRP contracts has become a contentious policy issue for 1995 farm bill debates. The issues revolve around budget outlays, environmental impacts, and the market effects of continuing to withhold acreage from production.

Current enrollment in CRP stands at 36.4 million acres, very close to the 38-million-acre target set by the OBRA of 1993. About 11 million acres of feed grain acres were enrolled in CRP in 1994, accounting for 10 percent of feed grain base acreage (table 21). Expiration of CRP contracts raises concerns about loss of the conservation and wildlife benefits that have been gained from the CRP, especially if commodity markets are favorable in 1996 and 1997 when the bulk of CRP contracts expire. However, critics suggest that CRP is very costly even though the program is credited with being effective in reducing soil erosion and in achieving other conservation and wildlife benefits. Annual rental payments average $50 per acre, with an annual $1.8 billion Federal Government outlay (Osborn and Heimlich).

In addition, some cropland in CRP is reported to be not highly erodible. Twenty-six percent of CRP acres were reported to have an erodibility index (EI) of less than 8, placing it in the least erodible land category, which requires no conservation compliance (Heimlich and Osborn). And of that land in the CRP that has an EI of 8 or more, only about half falls in the most erodible category. The percentage of land that is not highly erodible in CRP contracts might actually be even higher. According to USDA's Natural Resources Conservation Service (formerly Soil Conservation Service) 1992 National Resources Inventory database, 41 percent of acres in CRP contracts were not highly erodible cropland (Kellogg, TeSelle, and Goebel). Critics of CRP suggest that erosion control can be obtained at much lower cost than under the current CRP and that, instead of focusing on soil erosion control,

Table 21—Feed grain acres idled under long-term CRP

Crop	1986	1987	1988	1989	1990	1991	1992	1993	1994
					Million acres				
Corn	.2	2.3	2.8	3.4	3.8	3.9	4.1	4.3	4.3
Sorghum	.2	1.2	1.9	2.2	2.4	2.4	2.4	2.5	2.5
Barley	.1	1.1	1.9	2.4	2.7	2.8	2.8	2.8	2.8
Oats	.1	.5	.9	1.1	1.3	1.3	1.4	1.4	1.4
Total	.6	5.1	7.4	9.0	10.2	10.3	10.6	11.0	11.0

CRP should be extended to preserve water quality and protect fish and wildlife habitats.

Finally, in light of expected demand growth for U.S. feed grains, critics suggest that the CRP should focus narrowly on the highly erodible cropland and return a good portion of cropland in CRP to production. About 5.4 million acres out of the existing CRP contracts, as indicated earlier, could return to feed grain plantings.

Malting Barley Assessment

USDA recently announced that it will reduce the assessments on 1994- and 1995-crop malting barley to 0 percent. This announcement removed earlier concerns about implementing the malting barley assessment. Nonetheless, until Congress dismantles this provision, the barley assessment remains structurally part of the 1990 farm legislation. Furthermore, even if the U.S. Department of Agriculture continues a 0-percent barley assessment, critics suggest that this leaves nothing to offset the higher program cost resulting from the use of the feed barley price exclusively for calculating deficiency payments rather than including both feed and malting barley prices in the payment calculation.

Concerns were raised in recent years about implementing the malting barley assessment. Critics of the malting barley assessment believe that the assessment raises costs of producing and marketing malting barley, which could contribute to the decline of acreage planted to malting barley. Producers, particularly in the Midwest, in the interest of avoiding the assessment, may switch barley marketing away from malt use to feed, which would result in lower feed barley prices and higher deficiency payments. The assessment could make U.S. malting barley producers less competitive than Canadian producers. Finally, the assessment requires additional paperwork and adds administrative complexity.

Section 401 of the FACTA of 1990 requires the U.S. Department of Agriculture to implement an assessment for each of the 1991 through 1995 crop years to be levied on producers of malting barley who participate in the program. The assessment is to be no more than 5 percent of the value of malting barley produced on the farm. The assessment is deducted from deficiency payments for producers of malting barley. If malting barley sales are not certified by producers to be less than their payment production (program yield times payment acres), the entire payment production will be assessed. The legislative intent of the assessment was to partially offset higher program costs associated with using the feed barley price to determine barley deficiency payments.

Only malting barley receiving deficiency payments produced on payment acres is subject to the assessment. Those bushels were assessed at 5 percent of the State or national (if a State price is not available) average malting barley price received by producers during the first 5 months of the marketing year, as reported by NASS-USDA, prior to the end of 1993 but reduced to 2.5 percent afterward, and more recently, 0 percent.

This 0-percent barley assessment, however, raises an issue about the deficiency payment calculation for barley. According to 1990 farm legislation, the target price for barley cannot be less than 85.8 percent of the target price for corn. This relative target price relationship implies that the barley target price factors in both barley's feed and malt values, because barley's feed value is only 77 percent of corn's, bushel for bushel. However, barley's deficiency payments, as they currently stand, are based on the difference between the target price and the first 5-month feed barley market prices. Until USDA's announcement of 0-percent barley assessment, the larger payment rate as a result of excluding malting barley in the first 5-month barley market prices calculation was partially offset by the barley assessment. With a 0-percent barley assessment, critics suggest that this leaves nothing to offset the higher program cost resulting from the use of feed barley price exclusively in calculating the first 5-month barley market prices. As a result, the barley program cost will be higher than that obtained from including both feed and malting barleys in calculating the first 5-month barley market prices for determining the barley deficiency payment rate.

Effects of GATT and NAFTA on the Feed Grain Sector

The Uruguay Round Agreement of GATT (the General Agreement on Tariffs and Trade) and the North American Free Trade Agreement (NAFTA) promise to raise global income and thus help boost U.S. agricultural exports. Feed grains are an important component of this anticipated export growth because feed grain exports tend to be responsive to income growth which, in turn, would benefit U.S. feed grain producers. NAFTA and the Uruguay Round Agreement of GATT would have important implications for the policy issues to be addressed in the 1995 farm bill debates.

The Uruguay Round Agreement of GATT

No major changes in world coarse grain markets are anticipated as a result of the Uruguay Round Agreement of GATT. The most important effect is expected to be increased global income. This will support increased demand for meat and livestock products and import demand for feed grains. Latin America (including Mexico), Asia, and North Africa are all expected to increase imports significantly as incomes rise. Although these market developments are likely to take place regardless of the Uruguay Round Agreement, the Agreement will likely reinforce the increase in potential coarse grain imports by these countries.

NAFTA

The North American Free Trade Agreement (NAFTA), signed by the United States, Canada, and Mexico at the end of 1992 and ratified by the U.S. Congress in late 1993, is expected to have a significant effect on U.S. feed grain (especially corn) exports to Mexico, U.S. agriculture's third largest export market. According to a recent USDA study, at the end of the 15-year transition period, annual U.S. corn exports to Mexico are expected to increase by 60 percent from the level that would have been expected had there been no NAFTA, reaching 6 million metric tons. This export level would double the (average) 2.9 million tons of U.S. corn exports during 1989-91. An early assessment of NAFTA indicated that the value of U.S. grain and feed (mostly feed grain) exports to Mexico in January-July 1994 was up 10 percent from the same period in 1993 (ERS-USDA).

Corn exports to Mexico are expected to grow under NAFTA as corn tariffs decline and the quota increases, and as Mexican meat consumption rises with stronger income growth. NAFTA assures the United States a 2.5-million-metric-ton duty-free access for corn in calendar year 1994 that will increase by 3 percent each year. Mexico's 215-percent over-quota tariff for corn will be reduced by 24 percent in the first 6 years, then phased out in the following 9 years. Tariffs on other coarse grains will be phased out at more rapid rates and imports will expand accordingly.

The composition of Mexican coarse grain imports will depend on the relative prices of U.S. coarse grains and, at least initially, may cause some substitution of sorghum with corn. After an initial drop, U.S. exports of grain sorghum are also expected to grow as a result of greater Mexican demand for livestock feed, fueled by income growth and lower grain prices in Mexico. A weaker peso and a troubled Mexican economy, however, could slow growth in imports, at least in the short run.

Policy Options

Planting Flexibility

The planting flexibility provision of 1990 farm legislation achieved the switch of an average of 4.0 million acres from feed grain flex acres to plantings of alternative crops during 1991-94. This amounted to 16 percent of maximum flex acres that potentially could be planted to alternative crops.

An option to cut program costs while permitting planting flexibility is to expand the normal flex acreage from the current 15 percent to a higher level, but leave the additional 10-percent optional flex acreage intact. Thus, producers would be allowed greater planting flexibility without worrying about losing their crop base acreage. This option would provide producers with more flexibility and could be an effective means of alleviating restrictions placed by conservation plans for highly erodible land on changes in year-to-year cropping patterns. In addition, this option would also achieve savings in Government costs, as payment acres would be reduced further.

Critics of this option, however, argue that increasing the percentage of normal flex acreage may not actually make much difference in plantings of corn flex acres to soybeans, minor oilseeds, and other nonprogram crops. They contend that adding more NFA will mainly increase program crop planting on flex acres. OFA planted to alternative crops will remain limited as long as the corn program is in place and the soybeans-to-corn expected price ratio in March-April is below the 2.4-2.6 to 1 breakeven price ratio, or the ARP is set at a higher level.

An alternative to the first option is to combine all crop acreage bases into a farm program base and allow complete planting flexibility within the base. No restriction is imposed on planting to any single program crop. Farm program benefits would be extended to a specific percentage of the new program base. An obvious advantage of this alternative is that it allows producers complete planting flexibility in choosing crops to be planted on their program base acreage. This flexibility would be of special significance if soybeans are also included, since soybeans are the major competing crop in the Corn Belt. Producers are free to select crops to be planted on the program base acreage by growing crops that would provide them with the highest net returns (market receipts plus Government payments minus variable costs of production). Opponents to this alternative, however, contend that the program base acreage offers flexibility at the expense of controlling supply and demand imbalances

for specific commodities. The acreage reduction program (ARP), which is commodity-specific, would be replaced by a set-aside concept that is not commodity-specific. Cotton producers are especially concerned over how much sorghum and wheat land could be planted to cotton, because expanded cotton acreage would depress cotton prices. Also, corn acres planted to alternative crops may not increase because there is no acreage base for soybeans.

A third alternative is to implement a normal crop acreage (NCA) concept, such as the one under the 1977 farm legislation, where the planting restriction required that planted acres plus the acreage set aside for specific program crops could not exceed the farm's NCA. Thus, acres planted to a program crop depended not only on that program crop's set-aside requirement, but also on acres planted to other program crops and their set-aside requirements. No restriction is imposed on planting of a single program crop. This alternative offers planting flexibility without losing control of supply and demand balances for specific commodity crops. Set-asides for individual program crops can still be set according to the stocks-to-use ratio, the same as in the current farm legislation.

Acreage Idling

The pressure of curtailing farm program costs tends to raise the annual set-aside level as a means of reducing the payment acreage and lowering the payment rate. However, some critics contend that a higher set-aside raises costs of production and weakens U.S. competitiveness on the international market. Prospects of hindering U.S. competitiveness on the world market are of special concern to the U.S. feed grain industry in light of expected growth of U.S. corn and feed grain exports.

An option is to minimize the annual set-aside requirement and to reduce the extent of Government payment under the now 0/85-92 provision, or simply eliminate the 50/92 or 0/85-92 programs. The mechanism of set-aside will still be in place and the level will continue to be linked to the stocks-to-use ratio, but the minimum ARP will be set at a lower level than specified in the 1990 farm legislation. This option will minimize any undesirable effects on U.S. competitiveness in the world market due to a high set-aside level. However, this option could significantly increase feed grain program costs and thus increase taxpayers' burden in financing feed grain programs, compared with current programs. Similarly, reducing the extent of Government payment under the current 0/85-92 provision, such as reducing the percentage of payment from the current 85-92 percent to an even lower percentage, would alleviate concerns over the undesirable consequence of the program when supply is tight. A more drastic option is to eliminate the 50/92 or 0/85-92 program entirely. A drawback of these alternatives is that excess production, if it occurrs, cannot be brought under control faster in the absence of the 50/92 or 0/85-92 program. Also, eliminating the 50/92 or 0/85-92 program would remove some major benefits perceived by producers, including (1) the support of market prices received by producers, (2) protection of base acreage by devoting all or a portion of permitted acreage to conserving uses and receiving 85-92 percent of projected deficiency payments, and (3) payments to high-cost producers who devote all of permitted acreage to conserving uses.

CRP promises to be one of the core issues in the 1995 farm bill debates. On August 24, 1994, former Secretary Espy announced that producers having CRP contracts expiring on September 30, 1995, would have the option to extend those contracts for 1 year at the same rental rates. However, cropland in these CRP contracts expiring in 1995 amounts to only slightly more than 2 million acres; the bulk of the CRP contracts do not expire until 1996-99. Also, the extension is temporary. On December 14, 1994, the Secretary announced further extensions and adjustments to the program. Among the provisions are the option for early termination of contracts or reductions in the amount of acreage in the CRP. New opportunities for enrollment will also be available but under stricter environmental and conservation criteria. All participants will also be given the opportunity to modify and extend their contracts upon maturity starting in 1996, for another 10 years for contracts entered into prior to November 28, 1990, and for 5 years for contracts entered after this date.

This essentially would reauthorize the current CRP program for another 10-15 years, but under more critical criteria. The program will continue to retire a large number of acres from production at high costs, but it attempts to shift much of the cropland in CRP to the most environmentally sensitive land. This approach would be less costly than a simple extension of the CRP with no modifications. It may be more effective in protecting erodible cropland against soil and wind erosion, and preserving water quality and other environmental benefits. Direct Government costs of this modified CRP program are expected to be lower than the current program.

At the other extreme would be terminating the program altogether so that expiring contracts are not renewed. Consideration of this approach provides a

useful alternative scenario for analysis. This would result in raising crop acreage, although not all of the nearly 11 million acres of feed grain acres would return to production, and even less to field crop production. It would raise production, and thus reduce prices. The implications of this option would include higher deficiency payment outlays and the potential for higher ARP's, while there would also be savings in CRP expenditures. It would likely mean lower feed grain prices for domestic users and importers. However, there would also be harmful environmental effects to the degree marginal and environmentally sensitive cropland returns to production.

Malting Barley Assessment

As noted earlier, the legislative intent of the malting barley assessment was to partially offset higher program costs associated with using the feed barley price to determine the barley deficiency payment. Higher program costs are a result of using both malt and feed values of barley in determining barley's target price relative to corn, but only the feed value in determining the first 5-month market prices. Thus, the malting barley assessment is a means of offsetting higher program costs caused by this seemingly inconsistent calculation for determining barley deficiency payments.

An alternative to the current barley assessment is to eliminate the up-to-5-percent assessment of the malting barley price received by producers during the first 5 months of the marketing year, but then factor in both malt and feed values of barley in determining the first 5-month market prices or the loan rate. Under this option, all the concerns about barley assessment would disappear, no additional paperwork would be required, and no administrative complexity will be added. Finally, barley program costs will be lower as a result of using a consistent approach in determining barley deficiency payments and the first 5-month market prices. However, this would imply lower payments for producers.

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Appendix Tables

Appendix table 1--Acreage, yield, and production of corn, 1965-94

Crop year	Planted	Harvested	Diverted[1]	Yield	Production
	Million acres			*Bu./acre*	*Mil. bu.*
1965	65.2	55.4	24.0	74.1	4,103
1966	66.3	57.0	23.7	73.1	4,168
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	2.1	113.2	8,235
1983	60.2	51.5	32.2	81.1	4,174
1984	80.5	71.9	3.9	106.7	7,672
1985	83.4	75.2	5.4	118.0	8,875
1986	76.6	68.9	14.5	119.4	8,226
1987	66.2	59.5	25.4	119.8	7,131
1988	67.7	58.3	23.3	84.6	4,929
1989	72.2	64.7	14.2	116.3	7,532
1990	74.2	67.0	14.5	118.5	7,934
1991	76.0	68.8	11.3	108.6	7,475
1992	79.3	72.1	9.4	131.5	9,477
1993	73.2	62.9	15.2	100.7	6,336
1994[2]	79.2	72.9	6.7	138.6	10,103

-- = Not applicable (aspect of programs not in effect).
[1] Includes acres diverted under ARP, PLD, PIK, 50/92, 0/85-92, and CRP.
[2] Projection as of Jan. 12, 1995.

Source: *Feed Situation and Outlook Report.* U.S. Dept. Agr., Econ. Res. Serv., various issues.
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Appendix table 2--Use and ending stocks for corn, 1965-94

Crop year	Feed and residual	Food, seed, and industrial	Exports	Total use[1]	Ending stocks	Stocks-to-use ratio
	Million bushels					*Percent*
1965	3,362	360	659	4,409	842	19.0
1966	3,333	364	478	4,184	826	20.0
1967	3,524	362	612	4,519	1,168	26.0
1968	3,607	359	524	4,501	1,118	25.0
1969	3,825	365	612	4,801	1,005	21.0
1970	3,593	385	506	4,495	666	15.0
1971	3,982	409	782	5,187	1,127	22.0
1972	4,292	450	1,242	6,000	708	12.0
1973	4,181	472	1,230	5,896	484	8.0
1974	3,180	497	1,149	4,826	361	7.0
1975	3,582	521	1,664	5,767	633	11.0
1976	3,602	542	1,645	5,789	1,136	20.0
1977	3,730	582	1,896	6,207	1,436	23.1
1978	4,274	609	2,113	6,995	1,710	24.4
1979	4,563	640	2,402	7,604	2,034	26.8
1980	4,232	659	2,391	7,282	1,392	19.1
1981	4,245	733	1,997	6,975	2,537	36.4
1982	4,573	855	1,821	7,249	3,523	48.6
1983	3,876	930	1,886	6,693	1,006	15.0
1984	4,115	1,067	1,850	7,032	1,648	23.4
1985	4,114	1,153	1,227	6,494	4,040	62.2
1986	4,669	1,224	1,493	7,385	4,882	66.1
1987	4,798	1,243	1,716	7,757	4,259	54.9
1988	3,941	1,293	2,026	7,260	1,930	26.6
1989	4,396	1,356	2,368	8,120	1,344	16.6
1990	4,663	1,373	1,725	7,761	1,521	19.6
1991	4,877	1,454	1,584	7,915	1,100	13.9
1992	5,296	1,511	1,663	8,471	2,113	24.9
1993	4,704	1,588	1,328	7,620	850	11.1
1994[2]	5,650	1,700	1,950	9,300	1,658	17.8

Note: Crop year begins Sept. 1 for 1976-94, and Oct. 1 for 1965-75.
[1]Total may not add due to rounding.
[2]Projection as of Jan. 12, 1995.
Source: *Feed Situation and Outlook Yearbook.* U.S. Dept. Agr., Econ. Res. Serv., FDS-330, Oct. 1994.
World Agricultural Supply and Demand Estimates. U.S. Dept. Agr., WASDE-298, Jan. 12, 1995.

Appendix table 3--Prices and ending stocks for corn, 1965-94

Crop year	Ending stocks				Price received	Loan rate	Target price	Direct payment
	CCC	FOR[1]	Free	Total[2]				
	Million bushels				*Dollars per bushel*			
1965	249	280	313	842	1.16	1.05	1.25	0.20
1966	139	176	511	826	1.24	1.00	1.30	.30
1967	182	296	690	1,168	1.03	1.05	1.35	.30
1968	295	350	473	1,118	1.08	1.05	1.35	.30
1969	255	293	457	1,005	1.16	1.05	1.35	.30
1970	30	203	433	666	1.33	1.05	1.35	.30
1971	47	515	565	1,127	1.08	1.05	1.35	.32
1972	40	48	620	708	1.57	1.05	1.41	.40
1973	4	--	480	484	2.55	1.05	1.64	.32
1974	3	--	358	361	3.02	1.10	1.38	0
1975	0	--	633	633	2.54	1.10	1.38	0
1976	0	--	1,136	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	2,035	2.48	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	202	447	359	1,006	3.21	2.65	2.86	0
1984	225	389	1,034	1,648	2.63	2.55	3.03	.43
1985	546	711	2,783	4,040	2.23	2.55	3.03	.48
1986	1,443	1,498	1,941	4,882	1.50	1.92[4]	3.03	1.11
1987	835	1,127	2,297	4,259	1.94	1.82	3.03	1.09
1988	362	724	844	1,930	2.54	1.77	2.93	.36
1989	233	387	724	1,344	2.36	1.65	2.84	.58
1990	371	3	1,147	1,521	2.28	1.57	2.75	.51
1991	113	0	987	1,100	2.37	1.62	2.75	.41
1992	56	13	2,044	2,113	2.07	1.72	2.75	.73
1993	45	119	686	850	2.50	1.72	2.75	.28
1994[3]	43	150	1,465	1,658	2.00-2.40	1.89	2.75	.57

Note: Crop year begins Sept. 1 for 1976-94, and Oct. 1 for 1965-75.
[1]Grains stored under the Reseal Program for years 1965-72.
[2]Total may not add due to rounding.
[3]Projection as of Jan. 12, 1995.
[4]Actual loan rate; loan rate after Gramm-Rudman reduction is $1.84 per bushel.
Source: Consolidated Farm Service Agency (CFSA), U.S. Dept. Agr.
World Agricultural Supply and Demand Estimates. U.S. Dept. Agr., WASDE-298, Jan. 12, 1995.

Appendix table 4--Program costs for corn, 1965-93

Crop or fiscal year[1]	Direct or deficiency	Diversion	Disaster	Storage	CCC operations		
					Outlays	Redemption	Net expenditure
			Million dollars				
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	1,135	389	1,097
1971	893	0	0	0	1,358	510	848
1972	1,144	325	0	0	1,911	489	1,422
1973	910	0	0	0	1,852	826	1,026
1974	0	0	244	0	1,051	607	444
1975	0	0	90	0	311	161	150
1976	0	0	181	0	251	139	112
1977	0	0	281	50	661	261	400
1978	88	558	37	173	2,778	1,081	1,697
1979	0	111	16	236	2,060	1,193	867
1980	0	0	280	-72	2,072	816	1,256
1981	0	0	92	347	2,315	2,982	-667[3]
1982	291	0	1	684	5,378	1,169	4,209
1983[2]	0	905	0	-22	6,533	813	5,720
1984[2]	1,653	0	0	79	2,872	1,938	-934[3]
1985	2,480	0	0	205	5,525	1,122	4,403
1986	6,195	133	0	519	10,994	470	10,524
1987	5,910	1,468	0	480	12,635	289	12,346
1988	2,163	562	997	275	10,459	2,232	8,227
1989	3,504	0	223	155	4,521	1,658	2,863
1990	3,014	0	32	-2	3,992	1,557	2,435
1991	2,080	0	108	0	3,964	1,577	2,387
1992	3,625	0	156	0	3,696	1,591	2,105
1993	1,502	0	973	8	7,096	1,953	5,143

[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 expenditures imply loan redeemed in that year exceeded CCC outlays.

Source: Consolidated Farm Service Agency (CFSA), U.S. Dept. Agr.

Appendix table 5--Value comparisons for corn, 1965-94

Crop year	Loan value/acre		Market value/acre		Gross value of production		GNP deflator
	Nominal[1]	$1987[2]	Nominal[1]	$1987[2]	Nominal[3]	$1987[2]	(1987=100)
	Dollars				*Billion dollars*		*Percent*
1965	77.8	275.9	86.0	304.8	4.8	16.9	28.2
1966	73.1	250.3	90.6	310.4	5.2	17.7	29.2
1967	84.1	280.4	82.5	275.0	5.0	16.7	30.0
1968	83.5	265.0	85.9	272.6	4.8	15.3	31.5
1969	90.2	271.7	99.6	300.1	5.4	16.4	33.2
1970	76.0	216.6	96.3	274.3	5.5	15.7	35.1
1971	92.5	249.3	95.2	256.5	6.1	16.4	37.1
1972	101.9	262.5	152.3	392.5	8.8	22.6	38.8
1973	95.9	232.1	232.8	563.7	14.5	35.0	41.3
1974	79.1	175.4	217.1	481.5	14.2	31.5	45.1
1975	95.0	192.0	219.5	443.4	14.8	30.0	49.5
1976	132.0	250.5	189.2	359.0	13.5	25.7	52.7
1977	181.6	323.1	183.4	326.4	13.1	23.4	56.2
1978	202.0	335.0	227.3	376.9	16.4	21.8	60.3
1979	230.0	350.5	271.6	414.0	19.7	30.0	65.6
1980	204.8	286.0	283.9	396.5	20.7	28.9	71.6
1981	261.4	333.8	269.0	343.5	20.1	25.6	78.3
1982	288.7	345.7	288.7	345.7	21.0	25.1	83.5
1983	214.9	247.3	260.3	299.6	13.4	15.4	86.9
1984	272.1	299.3	280.6	308.7	20.2	22.2	90.9
1985	300.9	263.1	263.1	278.8	19.8	21.0	94.4
1986	229.3	236.3	179.1	184.6	12.3	12.7	97.0
1987	218.0	218.0	232.4	232.4	13.8	13.8	100.0
1988	149.7	144.4	214.9	207.2	12.5	12.1	103.7
1989	191.9	176.5	274.5	252.5	17.8	16.3	108.7
1990	186.1	164.1	270.2	238.3	18.1	16.0	113.4
1991	175.9	150.2	257.4	219.8	17.7	15.1	117.1
1992	226.0	185.7	272.0	223.5	19.6	16.1	121.7
1993	173.2	139.2	251.8	202.4	15.9	12.7	124.4
1994[4]	262.0	205.3	304.9	239.0	22.2	17.4	127.6

Note: Crop year begins Sept. 1 for 1976-94, and Oct. 1 for 1965-75.
[1]Loan rate or average farm price times yield per harvested acre.
[2]GNP implicit price deflator (1987 = 100) was used.
[3]Production times average farm price.
[4]Projection as of Jan. 12, 1995.

Source: Consolidated Farm Service Agency, U.S. Dept. Agr.

Appendix table 6--World production, consumption, exports, and ending stocks for corn, 1965-94

Crop year[1]	Production	Consumption	Exports[2]	Ending stocks	Stocks-to use ratio
	Million metric tons				*Percent*
1965	225.5	234.9	27.3	33.7	14.4
1966	250.1	244.7	26.0	39.1	16.0
1967	262.2	254.1	28.6	47.1	18.5
1968	252.5	255.9	28.1	43.7	17.1
1969	270.0	272.7	29.2	41.1	15.1
1970	268.1	273.0	30.1	36.1	13.2
1971	308.5	295.6	34.5	49.0	16.6
1972	301.4	312.5	43.0	38.0	12.2
1973	330.5	329.8	51.9	38.7	11.7
1974	299.8	292.1	49.1	46.4	15.9
1975	339.2	332.7	57.2	53.0	15.9
1976	356.1	340.8	53.7	68.3	20.0
1977	365.4	356.5	60.9	77.3	21.7
1978	392.1	384.0	65.6	85.4	22.2
1979	425.3	412.4	73.9	98.4	23.9
1980	408.5	421.9	78.2	85.5	20.3
1981	441.4	417.8	67.3	109.1	26.1
1982	439.8	419.4	63.3	129.4	30.9
1983	347.8	411.0	61.1	66.3	16.1
1984	458.3	434.2	66.6	90.4	20.8
1985	478.5	424.0	54.5	144.9	34.2
1986	475.3	457.4	56.6	162.8	35.6
1987	450.5	467.2	56.7	148.5	31.8
1988	400.6	459.8	65.5	89.3	19.4
1989	460.6	477.3	74.4	72.7	15.2
1990	477.9	470.6	59.1	80.0	17.0
1991	486.9	486.0	62.6	80.9	16.7
1992	533.2	509.0	62.0	105.1	20.7
1993	467.5	503.8	55.5	68.9	13.7
1994[3]	555.9	536.2	64.1	88.6	16.5

[1]Based on aggregate of differing local marketing years.
[2]Includes intra-EC trade during 1965-75, but excludes intra-EC trade during 1976-94.
[3]Forecast as of Jan. 12, 1995.

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

Appendix table 7--U.S. and world production, trade, and ending stocks of corn, 1970-94

Crop year[1]	Production			Exports			Ending stocks		
	World	United States	U.S. share	World[2]	United States	U.S. share	World	United States	U.S. share
	Million bushels		*Percent*	*Million bushels*		*Percent*	*Million bushels*		*Percent*
1970	10,554	4,152	39.3	1,266	506	40.0	1,423	663	46.6
1971	12,145	5,646	46.5	1,411	782	55.4	1,930	1,126	58.3
1972	11,867	5,580	47.0	1,768	1,242	70.2	1,497	708	47.3
1973	13,012	5,671	43.6	2,132	1,230	57.7	1,524	484	31.8
1974	11,802	4,701	39.8	1,847	1,149	62.2	1,828	558	30.5
1975	13,354	5,841	43.7	2,362	1,664	71.0	2,085	633	30.4
1976	14,020	6,289	44.9	2,114	1,645	78.8	2,690	1,136	42.2
1977	14,387	6,505	45.3	2,398	1,896	74.1	3,043	1,436	47.2
1978	15,438	7,268	47.1	2,583	2,113	82.2	3,362	1,710	50.9
1979	16,744	7,928	47.4	2,909	2,402	83.2	3,872	2,034	52.5
1980	16,084	6,639	41.3	3,079	2,391	77.7	3,366	1,392	41.4
1981	17,377	8,119	46.7	2,650	1,997	75.4	4,293	2,537	59.1
1982	17,313	8,235	47.6	2,492	1,821	73.1	5,095	3,523	69.1
1983	13,694	4,174	30.5	2,405	1,886	78.4	2,610	1,006	38.5
1984	18,041	7,672	42.5	2,622	1,850	70.6	3,558	1,648	46.3
1985	18,839	8,875	47.1	2,146	1,227	57.2	5,706	4,040	70.8
1986	18,710	8,226	44.0	2,228	1,492	67.0	6,410	4,882	76.2
1987	17,735	7,131	40.2	2,232	1,716	76.9	5,848	4,259	72.8
1988	15,769	4,929	31.3	2,579	2,026	78.6	3,516	1,930	54.9
1989	18,135	7,532	41.5	2,929	2,368	80.9	2,861	1,344	47.0
1990	18,814	7,934	42.2	2,327	1,725	74.1	3,149	1,521	48.3
1991	19,168	7,475	39.0	2,464	1,584	64.3	3,185	1,100	34.5
1992	20,991	9,477	45.2	2,752	1,663	60.4	4,138	2,113	51.1
1993	18,405	6,336	34.4	2,402	1,328	55.3	2,713	850	31.3
1994[3]	21,885	10,103	46.2	2,697	1,950	72.3	3,488	1,658	47.5

[1]Based on aggregate of differing local marketing years.
[2]Includes intra-EC trade during 1970-75, but excludes intra-EC trade during 1976-94.
[3]Forecast as of Jan. 12, 1995.

Appendix table 8--Selected ratios: World corn trade, stocks, and consumption, 1965-94

Crop year[1]	World trade to world consumption[2]	World stocks to world consumption	U.S. exports to foreign consumption
		Percent	
1965	12.1	14.3	12.2
1966	11.1	16.0	8.1
1967	11.6	18.5	10.1
1968	10.5	17.1	8.5
1969	11.6	15.1	9.5
1970	11.9	13.2	7.6
1971	12.2	16.6	11.0
1972	14.5	12.2	16.6
1973	16.5	11.7	15.0
1974	16.1	15.9	14.3
1975	18.1	15.9	18.8
1976	15.9	20.1	18.1
1977	17.2	21.7	19.8
1978	17.1	22.2	20.8
1979	17.9	23.9	21.8
1980	18.8	20.3	21.0
1981	16.0	26.1	17.3
1982	14.9	30.9	16.1
1983	15.0	16.1	16.9
1984	15.3	20.8	15.6
1985	12.8	34.2	10.8
1986	12.3	35.6	12.4
1987	12.2	31.8	14.3
1988	14.3	19.4	15.5
1989	15.6	15.2	18.0
1990	12.6	17.0	14.0
1991	12.9	16.6	12.5
1992	13.7	20.6	12.6
1993	13.1	13.7	9.8
1994[3]	12.5	16.5	14.2

[1]Based on aggregate of differing local marketing years.
[2]Includes intra-EC trade during 1965-75, but excludes intra-EC trade during 1976-94.
[3]Forecast as of Jan. 12, 1995.

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

Appendix table 9--Corn production and exports, major foreign exporters and total foreign, 1970-94

Crop year	Argentina		South Africa		Thailand		China		Total foreign	
	Production	Exports[1]	Production	Exports[1]	Production	Exports[1]	Production	Exports[1]	Production	Exports[2]
	Million bushels									
1970	391	254	339	101	76	66	1,300	1	6,411	760
1971	231	100	374	140	91	83	1,411	12	6,508	629
1972	354	185	164	6	52	41	1,264	8	6,302	527
1973	390	225	437	127	93	84	1,521	6	7,349	902
1974	303	137	358	126	98	78	1,690	9	7,110	698
1975	231	128	288	58	113	94	1,859	9	7,525	685
1976	327	206	383	99	105	83	1,896	5	7,722	719
1977	382	233	396	119	66	48	1,944	3	7,868	675
1978	354	235	328	92	110	82	2,202	2	8,158	675
1979	252	135	424	136	130	85	2,363	3	8,806	659
1980	508	358	577	195	126	84	2,464	5	9,444	949
1981	378	227	329	149	171	128	2,331	4	9,251	874
1982	354	238	161	9	136	84	2,384	2	9,068	761
1983	374	215	173	0	156	112	2,685	13	9,506	761
1984	469	281	320	20	171	125	2,890	206	10,386	1,008
1985	488	290	318	114	211	145	2,513	252	10,012	1,207
1986	364	159	282	57	170	115	2,789	150	10,514	936
1987	354	171	280	24	108	32	3,120	176	10,574	885
1988	197	71	488	157	165	61	3,045	158	10,893	911
1989	205	110	350	39	161	46	3,107	121	10,629	785
1990	299	157	327	35	150	47	3,812	271	10,877	856
1991	417	239	122	0	142	23	3,888	393	11,692	1,106
1992	402	187	393	47	134	6	3,755	497	11,514	1,087
1993	394	177	507	187	114	5	4,043	453	12,069	1,270
1994[3]	413	195	315	39	150	8	4,094	197	11,782	746

[1]Based on local marketing year.
[2]Includes intra-EU trade.
[3]Forecast as of Jan. 12, 1995.
Source: For. Agr. Serv., U.S. Dept. Agr.

Appendix table 10--Production, use and ending stocks for sorghum, 1965-94

Crop year	Production	Feed and residual	Food, seed, and industrial	Exports	Total use[1]	Ending stocks	Stocks-to-use ratio
	Million bushels						*Percent*
1965	673	568	13	266	847	391	46.2
1966	715	601	13	248	862	244	28.3
1967	755	531	13	166	710	289	40.7
1968	731	614	13	106	733	287	39.2
1969	730	638	9	126	773	244	31.6
1970	683	680	12	144	836	91	10.9
1971	868	681	13	123	817	142	17.4
1972	801	648	10	212	870	73	8.4
1973	923	690	11	234	935	61	6.5
1974	623	425	12	212	649	35	5.4
1975	754	498	11	229	738	82	11.1
1976	711	411	11	254	676	117	17.3
1977	781	448	11	223	682	216	31.7
1978	731	538	12	190	740	208	28.1
1979	807	495	12	330	837	178	21.3
1980	579	323	11	293	627	130	20.8
1981	876	417	11	260	688	319	46.3
1982	835	495	10	210	715	439	61.4
1983	488	385	10	245	639	288	45.0
1984	866	539	17	297	854	300	35.2
1985	1,120	664	28	178	870	551	63.4
1986	939	536	12	198	747	743	99.6
1987	731	555	25	232	811	663	81.7
1988	577	466	22	311	800	440	55.0
1989	615	517	15	303	835	220	26.3
1990	573	410	8	232	651	143	21.9
1991	585	374	9	292	674	53	7.9
1992	875	469	8	277	753	175	23.2
1993	534	453	8	202	662	48	7.3
1994[2]	655	400	8	220	628	75	11.9

Note: Crop year begins Sept. 1 for 1976-94, and Oct. 1 for 1965-75.
[1]Total may not add due to rounding.
[2]Projection as of Jan. 12, 1995.
Source: *Feed Situation and Outlook Report.* U.S. Dept. Agr., Econ. Res. Serv., various issues.

Appendix table 11--Prices and ending stocks for sorghum, 1965-94

Crop year	Ending stocks				Price received	Loan rate	Target price	Direct payment[4]
	CCC	FOR[1]	Free	Total[2]				
	Million bushels				*Dollars per bushel*			
1965	383	0	8	391	.99	.92	1.12	0.35
1966	193	0	51	244	1.02	.85	1.15	.53
1967	192	0	97	289	.99	.90	1.20	.53
1968	198	0	89	287	.95	.90	1.20	.53
1969	156	0	88	244	1.07	.90	1.20	.53
1970	65	0	26	91	1.14	.90	1.20	.53
1971	45	0	97	142	1.04	.97	1.24	.52
1972	5	0	68	73	1.37	1.00	1.34	.68
1973	0	0	61	61	2.14	1.00	1.46	.54
1974	0	0	35	35	2.77	1.05	1.31	--
1975	0	0	82	82	2.36	1.05	1.31	--
1976	5	0	112	117	2.03	1.43	1.49	--
1977	5	32	179	216	1.82	1.90	2.28	--
1978	44	51	113	208	2.01	1.90	2.28	.33
1979	46	18	114	178	2.35	2.00	2.34	.13
1980	41	0	89	130	2.91	2.14	2.50	--
1981	42	229	48	319	2.25	2.28	2.55	.27
1982	171	313	-45	439	2.47	2.42	2.60	.18
1983	103	179	6	288	2.74	2.52	2.72	--
1984	112	130	58	300	2.32	2.42	2.88	.46
1985	207	75	269	551	1.93	2.42	2.88	.46
1986	409	93	241	743	1.37	1.82[5]	2.88	1.06
1987	464	70	149	663	1.70	1.74	2.88	1.14
1988	341	28	72	440	2.27	1.68	2.78	.48
1989	163	12	45	220	2.10	1.57	2.70	.66
1990	65	0	78	143	2.12	1.49	2.61	.56
1991	8	0	45	53	2.25	1.54	2.61	.37
1992	4	1	170	175	1.89	1.63	2.61	.72
1993	1	4	43	48	2.31	1.63	2.61	.25
1994[3]	1	10	64	75	1.85-2.25	1.80	2.61	.59

Note: Crop year begins Sept. 1 for 1976-94, and Oct. 1 for 1965-75.
[1]Grains stored under the Reseal Program for years 1965-72.
[2]Total may not add due to rounding.
[3]Projection as of Jan. 12, 1995.
[4]Price support 1965-71; set aside 1972-73; deficiency payment 1974-94.
[5]Actual loan rate; loan rate after Gramm-Rudman reduction is $1.74 per bushel.
Source: Consolidated Farm Service Agency (CFSA), U.S. Dept. Agr.

Appendix table 12--Program costs for sorghum, 1965-93

Crop or fiscal year[1]	Direct or deficiency	Diversion	Disaster	Storage	CCC operations		
					Outlays	Redemption	Net expenditure
			Million dollars				
1965	80	145	0	--	382	180	202
1966	116	104	0	--	401	289	113
1967	114	23	0	--	344	401	-57[3]
1968	114	89	0	--	198	33	166
1969	119	114	0	--	316	43	273
1970	129	108	0	--	197	44	153
1971	167	0	0	--	166	52	115
1972	220	69	0	--	285	70	216
1973	183	0	0	--	273	107	166
1974	0	0	68	--	168	23	144
1975	0	0	20	--	66	8	59
1976	0	0	34	--	28	7	22
1977	138	0	30	12	156	17	139
1978	181	25	37	14	572	184	388
1979	63	23	13	12	407	217	190
1980	0	0	101	-6	235	167	68
1981	233	0	30	74	218	114	104
1982	64	0	3	112	1,073	85	989
1983[2]	0	110	0	59	862	48	814
1984[2]	158	0	0	35	176	101	76
1985	226	0	0	21	530	67	463
1986	556	13	0	32	1,215	30	1,185
1987	576	133	0	28	1,208	5	1,203
1988	262	59	30	11	899	135	764
1989	390	0	53	5	551	84	467
1990	317	0	10	0	386	36	349
1991	175	0	16	0	273	30	243
1992	328	0	6	0	216	26	190
1993	150	0	46	0	464	54	410

[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 expenditures imply loan redeemed in that year exceeded CCC outlays.

Source: Consolidated Farm Service Agency (CFSA), U.S. Dept. Agr.

Appendix table 13--U.S. and world production, consumption, trade, and ending stocks of sorghum, 1970-94

Crop year[1]	Production			Consumption	Exports[2]			Ending stocks		World stocks-to-use ratio
	World	United States	U.S. share	World	World	United States	U.S. share	World	U.S. share	
	Million metric tons		*Percent*	*Million metric tons*			*Percent*	*Million metric tons*		*Percent*
1970	55.1	17.4	31	59.2	7.4	4.2	57	8.0	28	13.6
1971	57.7	22.0	38	56.5	5.5	2.6	48	9.3	39	16.4
1972	54.0	20.4	38	56.0	7.3	4.9	67	7.3	25	13.0
1973	65.9	23.5	36	65.5	10.8	6.2	58	7.7	20	11.7
1974	60.3	15.8	26	59.0	9.3	4.9	52	9.0	18	15.2
1975	63.8	19.2	30	63.5	11.0	6.0	55	9.3	22	14.7
1976	62.2	18.1	29	61.3	12.9	6.2	48	10.1	29	16.6
1977	64.4	19.8	31	61.7	10.9	5.4	50	12.9	43	20.9
1978	63.6	18.6	29	63.8	10.9	5.3	48	12.7	42	19.8
1979	61.5	20.5	33	62.7	11.7	8.3	71	11.5	39	18.3
1980	59.3	14.7	25	59.3	14.1	7.6	54	11.5	29	19.4
1981	70.4	22.2	32	66.4	13.7	6.3	46	15.6	52	23.5
1982	65.1	21.2	33	63.3	11.6	5.4	47	17.4	64	27.5
1983	58.5	12.4	21	62.0	13.0	6.2	48	13.9	53	22.4
1984	65.8	22.0	33	66.0	13.1	7.5	58	13.7	56	20.8
1985	70.1	28.5	41	64.8	8.7	4.1	47	19.0	74	29.4
1986	64.3	23.8	37	60.2	8.0	5.1	64	23.2	81	38.5
1987	56.4	18.6	33	59.7	8.6	6.1	71	19.8	85	33.2
1988	54.5	14.6	27	58.4	10.8	8.1	75	15.9	70	27.3
1989	55.2	15.6	28	60.9	9.0	7.2	81	10.2	54	16.8
1990	53.0	14.6	27	55.6	7.8	5.8	75	7.6	48	13.7
1991	51.7	14.9	29	53.3	9.4	7.5	80	5.9	23	11.1
1992	64.3	22.2	35	60.8	8.7	6.6	77	9.5	47	15.6
1993	52.2	13.6	26	58.0	6.7	5.3	80	3.7	33	6.3
1994[3]	57.0	16.6	29	57.2	6.4	5.6	88	3.6	53	6.3

[1]Based on aggregate of differing local marketing years.
[2]Includes intra-EC trade during 1970-88, but excludes intra-EC trade during 1989-94.
[3]Forecast as of Jan. 12, 1995.

Appendix table 14--Production, use and ending stocks for barley, 1965-94

Crop year	Production	Feed and residual	Food, seed, and industrial	Exports	Total use[1]	Ending stocks	Stocks-to-use ratio
	Million bushels						*Percent*
1965	393	201	122	78	401	133	33.0
1966	392	209	127	48	384	148	39.0
1967	374	205	129	36	370	161	44.0
1968	426	226	134	12	372	225	60.0
1969	427	247	139	10	396	269	68.0
1970	416	288	138	84	510	184	36.0
1971	462	270	140	41	451	208	46.0
1972	422	243	142	70	455	192	42.0
1973	417	236	143	93	472	146	31.0
1974	299	184	147	42	373	92	25.0
1975	379	186	146	23	355	128	36.0
1976	383	174	155	65	394	126	32.0
1977	428	177	156	55	388	173	45.0
1978	455	215	168	25	407	228	56.0
1979	383	202	172	53	426	192	45.0
1980	361	168	178	76	422	137	33.0
1981	474	198	174	98	470	148	32.0
1982	516	237	174	44	455	217	48.0
1983	508	278	175	89	541	189	35.0
1984	598	301	174	72	547	247	45.0
1985	590	319	177	20	517	327	63.0
1986	609	298	175	134	606	336	56.0
1987	521	253	174	121	548	321	59.0
1988	290	171	175	79	425	196	46.0
1989	404	193	175	84	453	161	36.0
1990	422	205	176	81	461	135	29.0
1991	464	225	176	94	496	129	26.0
1992	455	192	171	80	444	151	34.0
1993	398	241	175	66	482	139	29.0
1994[2]	375	225	175	60	460	114	25.0

Note: Crop year begins June 1.
[1]Total may not add due to rounding.
[2]Projection as of Jan. 12, 1995.
Source: *Feed Situation and Outlook Report.* U.S. Dept. Agr., Econ. Res. Serv., various issues.

Appendix table 15--Prices and ending stocks for barley, 1965-94

Crop year	Ending stocks				Price received	Loan rate	Target price	Direct payment[4]
	CCC	FOR[1]	Free	Total[2]				
	Million bushels				*Dollars per bushel*			
1965	11	0	122	133	1.02	.80	0.96	0.16
1966	6	0	142	148	1.06	.80	1.00	.20
1967	6	0	155	161	1.01	.90	--	--
1968	8	0	217	225	.92	.90	--	--
1969	47	0	221	269	.88	.83	1.03	.20
1970	24	0	160	184	.97	.83	1.03	.20
1971	37	0	171	208	.99	.81	--	--
1972	2	0	189	192	1.21	.86	1.15	.32
1973	1	0	146	146	2.14	.86	1.27	.26/.12
1974	0	0	92	92	2.81	.90	1.13	0
1975	0	0	128	128	2.42	.90	1.13	0
1976	0	0	126	126	2.25	1.22	1.28	0
1977	0	24	149	173	1.78	1.63	2.15	.50
1978	3	40	184	228	1.92	1.63	2.25	.35
1979	3	23	166	192	2.27	1.71	2.40	.11
1980	3	12	122	137	2.79	1.83	2.55	0
1981	3	23	122	148	2.48	1.95	2.60	.11
1982	6	98	113	217	2.18	2.08	2.60	.40
1983	12	95	82	189	2.47	2.16	2.60	.21
1984	15	97	135	247	2.29	2.08	2.60	.26
1985	57	45	223	325	1.98	2.08	2.60	.52
1986	75	121	140	336	1.61	1.56[5]	2.60	.99
1987	50	109	162	321	1.81	1.49	2.60	.79
1988	30	42	123	196	2.80	1.44	2.51	0
1989	19	1	144	161	2.42	1.34	2.43	0
1990	8	0	127	135	2.14	1.28	2.36	.20
1991	7	0	122	129	2.10	1.32	2.36	.62
1992	5	0	146	151	2.04	1.40	2.36	.56
1993	5	7	127	139	1.99	1.40	2.36	.67
1994[3]	5	5	104	114	2.00-2.10	1.54	2.36	.52

Note: Crop year begins June 1.
[1]Grains stored under the Reseal Program for years 1965-72.
[2]Total may not add due to rounding.
[3]Projection as of Jan. 12, 1995.
[4]Price support 1965-71; set aside 1972-73; deficiency payment 1974-94.
[5]Actual loan rate; loan rate after Gramm-Rudman reduction is $1.49 per bushel.
Source: Consolidated Farm Service Agency (CFSA), U.S. Dept. Agr.

Appendix table 16--Program costs for barley, 1965-93

Crop or fiscal year[1]	Direct or deficiency	Diversion	Disaster	CAP/ Storage	CCC operations		
					Outlays	Redemption	Net expenditure
			Million dollars				
1965	17	46	0	--	75	33	42
1966	21	27	0	1	67	25	42
1967	0	0	0	1	51	17	34
1968	0	0	0	1	45	18	27
1969	24	22	0	1	121	39	83
1970	26	18	0	1	99	20	79
1971	0	0	0	1	64	40	24
1972	107	0	0	1	68	47	21
1973	78	0	0	1	134	60	75
1974	0	0	15	1	90	44	46
1975	0	0	5	1	21	9	13
1976	0	0	10	0	13	6	7
1977	91	0	30	6	94	16	78
1978	79	9	9	10	243	65	178
1979	17	0	6	-2	176	79	97
1980	0	0	31	1	80	106	-27[3]
1981	48	0	15	6	120	70	50
1982	60	0	0	27	196	67	129
1983[2]	43	29	0	25	299	31	268
1984[2]	50	0	0	25	162	73	89
1985	158	0	0	23	367	31	336
1986	345	6	0	33	502	31	471
1987	302	33	0	38	479	85	394
1988	40	22	125	8	229	173	57
1989	23	0	27	0	85	40	46
1990	59	0	5	0	-64	30	-94[3]
1991	173	0	4	0	109	38	71
1992	153	0	7	0	220	46	174
1993	204	0	16	1	230	45	186

[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 expenditures imply loan redeemed in that year exceeded CCC outlays.

Source: Consolidated Farm Service Agency (CFSA), U.S. Dept. Agr.

Appendix table 17--U.S. and world production, consumption, trade, and ending stocks of barley, 1970-94

Crop year[1]	Production			Consumption	Exports[2]			Ending stocks		World stocks-to-use ratio
	World	United States	U.S. share	World	World	United States	U.S. share	World	U.S. share	
	Million bushels		*Percent*	*Million bushels*			*Percent*	*Million bushels*		*Percent*
1970	5,787	416	7.2	5,976	522	82	15.7	864	21.3	14.5
1971	6,283	462	7.4	6,141	665	38	5.8	981	21.2	16.0
1972	6,320	422	6.7	6,357	558	66	11.8	941	20.4	14.5
1973	7,067	417	5.9	7,060	576	90	15.7	960	15.2	13.6
1974	7,211	299	4.1	7,161	521	42	8.1	1,017	9.0	14.2
1975	6,483	379	5.8	6,573	613	24	3.9	953	13.4	14.5
1976	8,031	383	4.8	7,882	637	66	10.4	1,098	11.5	13.9
1977	7,527	428	5.7	7,569	701	57	8.1	1,023	16.9	13.5
1978	8,424	455	5.4	8,139	702	26	3.7	1,235	18.5	15.2
1979	7,384	383	5.2	7,735	690	55	8.0	966	19.9	12.5
1980	7,498	361	4.8	7,514	786	77	9.8	922	14.9	12.3
1981	7,128	474	6.6	7,248	944	100	10.6	808	18.3	11.2
1982	7,663	516	6.7	7,432	801	47	5.9	1,037	20.9	14.0
1983	7,565	509	6.7	7,767	992	91	9.2	781	24.4	10.1
1984	8,027	599	7.5	7,716	1,057	77	7.3	1,106	22.4	14.3
1985	8,175	591	7.2	7,932	845	22	2.6	1,364	23.8	17.2
1986	8,377	611	7.3	8,180	850	138	16.2	1,562	21.5	19.1
1987	8,299	530	6.4	8,382	730	126	17.3	1,479	21.7	17.6
1988	7,638	291	3.8	7,799	781	85	10.9	1,318	14.9	16.9
1989	7,566	404	5.3	7,689	813	83	10.2	1,322	12.2	17.2
1990	8,178	422	5.2	8,033	851	69	8.1	1,484	9.1	18.5
1991	7,769	464	6.0	7,681	854	96	11.2	1,572	8.2	20.5
1992	7,609	455	6.0	7,463	703	74	10.5	1,718	8.0	23.0
1993	7,809	398	5.1	7,802	851	71	8.4	1,725	8.1	22.1
1994[3]	7,387	375	5.1	7,709	710	60	8.4	1,403	8.1	18.2

[1]Based on aggregate of differing local marketing years; bushels converted by dividing metric tons by 0.021772.
[2]Includes intra-EC trade during 1970-88, but excludes intra-EC trade during 1989-94.
[3]Forecast as of Jan. 12, 1995.

Appendix table 18--Barley production and exports, major foreign exporters and total foreign, 1970-94

Crop year	Australia		Canada		EU		Total Foreign	
	Production	Exports	Production	Exports	Production	Exports[1,2]	Production	Exports[1]
			Million bushels					
1970	108	52	408	176	1,518	--	5,087	--
1971	141	85	602	192	1,793	--	5,573	--
1972	79	37	518	177	1,907	--	5,664	--
1973	110	39	470	121	1,960	--	6,290	--
1974	116	93	404	123	2,055	--	6,570	--
1975	146	90	437	191	2,014	--	5,865	--
1976	131	88	483	174	1,838	--	7,249	--
1977	109	57	542	163	2,245	--	6,786	--
1978	184	92	477	179	2,420	179	7,611	505
1979	170	133	389	136	2,273	147	6,691	459
1980	123	71	517	184	2,486	211	6,857	556
1981	158	95	630	255	2,187	161	6,394	551
1982	89	28	641	279	2,329	179	6,889	565
1983	225	164	469	195	2,147	175	6,763	666
1984	255	214	472	112	2,727	349	7,228	772
1985	224	169	569	220	2,567	335	7,344	813
1986	166	103	669	277	2,345	285	7,508	717
1987	160	75	639	157	2,342	322	7,466	602
1988	152	63	474	158	2,481	383	7,188	649
1989	189	112	541	175	2,344	363	7,168	731
1990	192	123	617	205	2,335	324	7,756	782
1991	212	90	534	155	2,367	379	7,304	758
1992	251	119	502	131	1,990	255	7,153	629
1993	319	198	596	174	1,958	299	7,410	780
1994[3]	119	23	537	184	1,794	276	7,012	650

--= Not available; crop year 1970 = 1970/71.

[1]Excludes intra-EU trade. Adjusted trade data prior to 1978 not available.

[2]EU-10 for 1978-81; EU-12 from 1982. [3]Forecast.

Appendix table 19--Production, use and ending stocks for oats, 1965-94

Crop year	Production	Feed and residual	Food, seed and industrial	Exports	Total use[1]	Ending stocks	Stocks-to-use ratio
	Million bushels						*Percent*
1965	930	742	105	34	881	378	43
1966	803	749	97	22	868	317	37
1967	794	686	101	11	798	316	40
1968	951	735	101	8	844	424	50
1969	966	736	104	5	845	548	65
1970	915	778	97	19	894	571	64
1971	878	740	94	21	855	597	70
1972	691	715	93	19	827	463	56
1973	659	669	89	57	815	308	38
1974	601	580	86	19	685	224	33
1975	639	558	87	14	659	205	31
1976	540	484	88	10	582	164	28
1977	753	515	81	10	606	313	52
1978	582	530	75	10	616	280	45
1979	527	495	73	3	571	236	41
1980	459	437	74	9	519	177	34
1981	510	458	75	3	536	152	28
1982	593	442	85	1	528	220	42
1983	476	474	70	1	545	181	33
1984	474	436	72	1	508	180	35
1985	518	464	78	1	542	184	34
1986	385	385	83	1	468	133	28
1987	374	358	81	1	440	112	25
1988	217	194	100	1	294	98	33
1989	374	266	115	1	381	157	41
1990	358	286	120	1	407	171	42
1991	244	235	125	2	362	128	35
1992	294	233	125	6	364	113	31
1993	207	193	125	3	321	106	33
1994[2]	230	200	125	1	326	109	33

Note: Crop year begins June 1.
[1]Total may not add due to rounding.
[2]Projection as of Jan. 12, 1995.
Source: *Feed Situation and Outlook Report.* U.S. Dept. Agr., Econ. Res. Serv., various issues.

Appendix table 20--Prices and ending stocks for oats, 1965-94

Crop year	Ending stocks				Price received	Loan rate	Target price	Direct payment[4]
	CCC	FOR[1]	Free	Total[2]				
	Million bushels				*Dollars per bushel*			
1965	40	0	338	378	0.62	0.60	--	--
1966	43	0	274	317	.67	.60	--	--
1967	45	0	271	316	.66	.63	--	--
1968	47	0	377	424	.60	.63	--	--
1969	81	0	467	548	.58	.63	--	--
1970	143	0	428	571	.62	.63	--	--
1971	184	0	413	597	.60	.54	--	--
1972	158	0	305	463	.72	.54	--	--
1973	95	0	213	308	1.18	.54	--	--
1974	58	0	165	223	1.53	.54	--	--
1975	25	0	180	205	1.46	.54	--	--
1976	0	0	164	164	1.56	.72	--	--
1977	0	28	285	313	1.09	1.03	--	--
1978	3	39	238	280	1.20	1.03	--	--
1979	3	33	200	236	1.33	1.08	--	--
1980	2	0	175	177	1.72	1.16	--	--
1981	1	0	151	152	1.88	1.24	--	--
1982	1	5	214	220	1.49	1.31	1.50	0
1983	1	4	176	181	1.62	1.36	1.60	.11
1984	1	3	176	180	1.67	1.31	1.60	0
1985	2	3	179	184	1.23	1.31	1.60	.29
1986	3	4	126	133	1.21	.99[5]	1.60	.39
1987	3	2	107	112	1.56	.94	1.60	.20
1988	2	0	95	98	2.61	.90	1.55	0
1989	1	0	156	157	1.49	.85	1.50	0
1990	0	0	171	171	1.14	.81	1.45	.32
1991	0	0	128	128	1.21	.83	1.45	.35
1992	0	0	113	113	1.32	.88	1.45	.17
1993	0	0	106	106	1.36	.88	1.45	.11
1994[3]	0	0	109	109	1.15-1.25	.97	1.45	.19

Note: Crop year begins June 1.
[1]Grains stored under the Reseal Program for years 1965-72.
[2]Total may not add due to rounding.
[3]Projection as of Jan. 12, 1995.
[4]Price support 1965-71; set aside 1972-73; deficiency payment 1974-94.
[5]Actual loan rate; loan rate after Gramm-Rudman reduction is $0.95 per bushel.
Source: Consolidated Farm Service Agency (CFSA), U.S. Dept. Agr.

Appendix table 21--Program costs for oats, 1965-93

Crop or fiscal year[1]	Direct or deficiency	Diversion	Disaster	Reseal loan/ Storage	CCC operations		
					Outlays	Redemption	Net expenditure
			Million dollars				
1965	0	0	0	4	34	17	17
1966	0	0	0	5	37	20	18
1967	0	0	0	3	24	26	-2[3]
1968	0	0	0	3	30	15	15
1969	0	0	0	4	65	13	52
1970	0	0	0	9	117	13	104
1971	0	0	0	16	103	29	75
1972	0	0	0	18	77	22	56
1973	0	0	0	12	0	59	-59[3]
1974	0	0	0	7	-28	59	-87[3]
1975	0	0	0	0	-17	4	-21[3]
1976	0	0	0	0	-14	2	-16[3]
1977	0	0	0	0	45	3	42
1978	0	0	0	7	54	29	25
1979	0	0	0	6	23	33	-11[3]
1980	0	0	0	3	15	27	-13[3]
1981	0	0	0	-3	9	29	-20
1982	0	0	0.3	1	8	10	-2
1983[2]	5	8	0	0	15	4	11
1984[2]	0	0	0	0	13	9	4
1985	8	0	0	1	5	3	2
1986	30	2	0	1	27	1	26
1987	19	8	0	0	23	6	17
1988	4	0	50	0	5	7	-2
1989	0	0	15	0	3	2	1
1990	8	0	2	0	-4	1	-6[3]
1991	30	0	3	0	14	1	13
1992	15	0	1	0	33	1	32
1993	12	0	10	0	18	2	16

[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 expenditures imply loan redeemed in that year exceeded CCC outlays.

Source: Consolidated Farm Service Agency (CFSA), U.S. Dept. Agr.

Appendix table 22--U.S. and world production, consumption, trade, and ending stocks of oats, 1970-94

Crop year[1]	Production			Consumption	Imports[2]			Ending stocks		World stocks-to use ratio
	World	United States	U.S. share	World	World	United States	U.S. share	World	U.S. share	
	Million bushels		*Percent*	*Million bushels*			*Percent*	*Million bushels*		*Percent*
1970	3,558	915	25.7	3,530	131	2	1.5	885	64.5	25.1
1971	3,706	878	23.7	3,680	136	3	2.2	911	65.5	24.8
1972	3,281	691	21.1	3,529	114	2	1.8	663	69.8	18.8
1973	3,427	659	19.2	3,567	129	0	0	523	58.7	14.7
1974	3,216	601	18.7	3,295	76	0	0	444	50.5	13.5
1975	3,072	639	20.8	3,089	89	1	1.1	427	48.0	13.8
1976	3,153	540	17.1	3,161	106	1	0.9	419	39.1	13.3
1977	3,332	753	22.6	3,164	95	2	2.1	588	53.2	18.6
1978	3,343	582	17.4	3,355	110	1	.9	576	48.6	17.2
1979	2,931	527	18.0	3,061	100	2	2.0	446	52.9	14.6
1980	2,856	459	16.1	2,945	89	1	1.1	360	49.2	12.2
1981	2,770	510	18.4	2,787	79	2	2.5	343	44.3	12.3
1982	3,182	593	18.6	3,083	72	15	20.8	442	49.8	14.3
1983	3,000	476	15.9	3,064	114	24	21.1	377	48.0	12.3
1984	3,157	474	15.0	3,135	118	34	28.8	399	45.1	12.7
1985	3,238	518	16.0	3,266	92	26	28.3	371	49.6	11.4
1986	3,072	385	12.5	3,121	83	31	37.4	322	41.3	10.3
1987	2,800	374	13.4	2,810	93	44	47.3	334	33.5	11.9
1988	2,441	217	8.9	2,463	121	70	57.9	312	31.4	12.7
1989	2,704	374	13.8	2,629	116	63	54.3	386	40.7	14.7
1990	2,690	358	13.3	2,641	118	70	59.3	435	39.3	16.5
1991	2,259	244	10.8	2,349	99	66	66.7	345	37.1	14.7
1992	2,315	294	12.7	2,359	109	63	57.8	302	37.4	12.8
1993	2,433	207	8.5	2,431	151	112	74.2	304	34.9	12.6
1994[3]	2,291	230	10.0	2,278	109	84	77.1	317	34.5	13.9

[1]Based on aggregate of differing local marketing years.
[2]Includes intra-EC trade during 1970-88, but excludes intra-EC trade during 1989-94.
[3]Forecast as of Jan. 12, 1995.

U.S. Department of Agriculture
Economic Research Service

SUMMARY OF REPORT #AER-712

The 1995 Farm Bill

Stock Levels and Government Costs Are Key Issues for Wheat Program

April 1995

Contact: Linwood A. Hoffman, (202) 219-0833

Wheat stocks in the United States were reduced substantially under the 1990 Farm Act (officially entitled the Food, Agriculture, Conservation, and Trade Act). Whether current carryover levels are optimal will be one issue in the deliberations over new farm legislation, according to a new report from USDA's Economic Research Service. ***Wheat: Background for 1995 Farm Legislation*** is one of a series of publications produced for use in the "farm bill debates."

Factors that have helped keep stocks down include, in part, the acreage reduction program (ARP), the Conservation Reserve Program (CRP), and the Export Enhancement Program (EEP).

Exports will likely be the largest source of demand growth for U.S. wheat for the remainder of the 1990's. Global wheat trade is expected to expand steadily through the 1990's at a rate higher than the 1980's, but well below the rate experienced in the 1970's. Current projections are that the U.S. share of world trade in 2000 will about equal the 1990-94 average of 32 percent, but the share is expected to decline slightly thereafter due to increasing competition.

Wheat is the third largest U.S. field crop in terms of farm value, with annual receipts averaging more than $7 billion in recent years. This amounted to about 9 percent of total farm value of U.S. field and miscellaneous crops in crop years 1991-93. The value of wheat, flour, and wheat product exports averaged $4.4 billion in fiscal 1991-93, which was 11 percent of total U.S. farm exports. More than half of total U.S. wheat production was exported during the 1991-93 crop years.

Major wheat program issues this year include:

- What level of program cost is acceptable? What methods should be used to reduce government expenditures on the wheat program?
- How has the normal flex acres provision affected acres planted to wheat?
- Are current U.S. wheat stock levels optimal? What are the purposes of the Food Security Wheat Reserve and the Farmer-Owned Reserve?
- What is an acceptable level of wheat imports? Should the United States import wheat that is duty-free or with minimum duties when such grain is subsidized by the exporting country?
- Should the wheat program encourage reduced use of chemical inputs to protect the environment, if yields are reduced?
- Should marketing loan provisions be continued for wheat?

To Order This Report...

The information presented here is excerpted from ***Wheat: Background for 1995 Farm Legislation***, AER-712, by Linwood A. Hoffman, Sara Schwartz, and Grace V. Chomo. The cost is $9.00.

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Economic Research Service
1301 New York Avenue, NW.
Washington, DC 20005-4788