



Current Report

Cooperative Extension Service • Division of Agriculture • Oklahoma State University

A Structural Overview of the World Corn Market

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Introduction

The United States is the dominant participant in the world corn market. From 1970 to 1983, the U.S. share of world corn exports rose from 48 percent to 68 percent. The destination of world corn exports has been changing gradually over time, shifting away from the developed countries (decreasing from 70 percent in 1973 to 49 percent in 1984) toward the developing countries (increasing from 11 percent in 1973 to 28 percent in 1984). Historically, corn exports have been important for the United States, with 25 to 30 percent of annual production exported to foreign markets.

This paper presents an overview of the world corn market. It will discuss major U.S. export customers, trends in U.S. corn production and stocks, and major world corn exporters and importers.

Trends in U.S. Corn Production and Stocks

Corn yields per acre in the United States were quite variable between 1970 and 1982. Since 1970 corn yields have been increasing (with a slight decline in 1974 and 1975) reaching a peak of 113.2 bushels per acre in 1982 (see Table 1). The increase in yields is explained by increased rates of fertilization, adoption of improved hybrids, increased irrigation, higher seeding rates and better control of weeds, diseases and pests.

Total U.S. corn acreage planted increased from 66.8 million acres in 1970 to 81.9 million acres in 1982. According to USDA reports, the Corn Belt has accounted for about 50 percent of U.S. corn acreage since the 1950's. The Northern plains account for about 15 percent of

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Table 1: U.S. Corn Production, Exports, Percent of Production Exported, Acres Planted and Yield per Harvested Acre, 1970-1985

Year	Total U.S. Production (1,000 Bushels)	Total U.S. Exports (Million Bushels)	Percentage of Production Exported	Number of Acres Planted (All Purposes, 1,000 Acres)	Yield Per Harvested Acre (Bushels)
1970	4,152,243	517	12.5	66,863	72.4
1971	5,646,260	796	14.1	74,179	88.1
1972	5,579,832	1,258	22.6	67,126	97.0
1973	5,670,712	1,243	21.9	72,253	91.3
1974	4,701,402	1,149	24.4	77,935	71.9
1975	5,840,757	1,711	29.3	78,719	86.4
1976	6,289,169	1,684	26.8	84,588	88.0
1977	6,505,041	1,948	30.0	84,328	90.8
1978	7,267,927	2,133	29.4	81,675	101.0
1979	7,938,819	2,433	30.6	81,393	109.7
1980	6,644,841	2,355	35.4	84,047	91.0
1981	8,201,598	1,967	24.0	84,156	109.8
1982	8,235,101	1,870	22.7	81,857	113.2
1983*	4,166,108	1,850	44.4	60,177	81.0

Source: Agricultural Statistics, USDA, 1983

* = Preliminary

corn acreage since 1960, and the Great Lakes share of 9 percent in the 1950's has been increasing gradually. The increase in the Great Lakes share has come at the expense of the Southeast and Delta regions where acreage shares of corn production in 1983 declined to 3 and 0.2 percent, respectively. About 94 percent of the national corn acreage is accounted for by 20 states. These States include Iowa, Indiana, Illinois, Idaho, Kentucky, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Ohio, North Carolina, Mississippi, Washington, Wisconsin, Colorado, Georgia and California.

Total U.S. Corn Production rose from 4.15 billion bushels in 1970 to 8.23 billion bushels in 1982. This increase reflected the improved methods of production increasing yields and also the result of increased acreage. The percentage of corn production exported has followed an upward trend since the early 1970's, reaching 24 percent in 1981 (Table 1). Between 1976 and 1980, farmers responded to rapid increases in corn exports by expanding corn acreage to 84 million acres. Privately held stocks in 1970 were 14.48 million metric tons. After a slight decline between 1973 and 1975, privately held stocks rose to 50.14 million metric tons in 1982. As of September 30, 1970, total ending stocks of corn were

16.94 million metric tons. Since 1970, total ending stocks have been variable, reaching a peak of 79.76 million metric tons in 1982 (Table 2).

The economic theory underlying the holding of stocks is based upon the stabilization of quantity and price variations. Since the 1970's, USDA loan rates and target prices have frequently been set above world price levels resulting in a net accumulation of stocks. The government, through the Commodity Credit Corporation (CCC), buys all grain offered at the current loan rate in a given year. Several agricultural policy analysts have suggested that the level of stocks under government control are an important indication of the effectiveness of U.S. commodity programs (Paarlberg et al. 1984). Stocks play an important role in U.S. domestic and international trade policies.

Table 2: U.S. Corn Ending Stocks as of September 30, 1970-83

Year	Privately Held ¹		Government ²		Total in Millions of Metric Tons
	Millions of Metric Tons(MT)	%	Millions of Metric Tons	%	
1970	14.48	86	2.46	14	16.94
1971	24.66	86	3.96	14	28.62
1972	17.88	99	0.10	1	17.98
1973	12.29	100	0	0	12.29
1974	9.17	100	0	0	9.17
1975	10.16	100	0	0	10.16
1976	22.51	100	0	0	22.51
1977	27.89	91	0.33	1	28.22
1978	30.58	92	2.54	08	33.12
1979	34.57	84	6.50	16	41.07
1980	20.22	77	6.05	23	26.27
1981	47.76	86	7.67	14	55.43
1982	50.14	63	29.62	37	79.76
1983*	9.83	66	5.08	34	14.91

¹ Includes total government loans (original and resale).

² Uncommitted government inventory only.

Source: Agricultural Statistics, USDA 1983 and 1984.

* = Preliminary

Privately held corn stocks in 1970 were 14.48 million metric tons. After a slight decline between 1973 and 1975, privately held stocks rose to 50.14 million metric tons in 1982. High stocks coupled with a continued upward trend in yields, and variability in corn demand created market instability. This continues to be a significant policy issue in the world corn market.

Agricultural Policies and Trade

A diversity of economic, social, political, demographic and physical environments has led to the adoption of varied domestic agricultural policies around the world. These policies have varying degrees of effectiveness. Some have conflicting goals and spillover effects that were unintended. Many Less Developed Countries (LDC's) adopt food policies that favor the urban resident at the expense of agricultural producers by holding down prices of major food items such as wheat and rice. These policies discourage food production, increase income disparities between

rural and urban areas and further promote rural-urban migration, an already serious problem in LDC's. Cheap food policies increase imports and therefore strengthen world prices.

There has been a distinct upward trend in corn exports from the U.S. to the LDC's (see Table 3). In 1974, LDC's purchased 14 percent of total U.S. corn exports. By 1984, LDC imports as a percent of total corn imports from the U.S. had doubled to 28 percent. Developed Countries (DC's) accounted for 70 percent of total U.S. corn exports in 1970, but declined to 49 percent in 1979 and 1984 (with slightly higher percentages in between).

The policies adopted by the Centrally Planned Economies (CPE's) will continue to be a major source of quantity and price variability in the world corn market. Food policies, information on crop conditions and agricultural marketing policies consistently influence CPE import decisions. This is reflected in the variability of corn exports from the U.S. to CPE's, which accounted for 23 percent of total U.S. Corn exports in 1984.

Shifts in World Corn Markets

The U.S. corn market experienced major shifts between 1974 and 1984. During 1974, Japan was the most important corn importer from the U.S. with 20.1 percent of total U.S. corn exports, followed by the Netherlands, West Germany and Spain with 11.7, 9.8 and 7.5 percent respectively (Table 4). A decade later, in 1984, Japan was still the leading corn importer from the U.S. accounting for 27.8 percent of total U.S. corn exports (Table 5). However, the USSR, China (Taiwan), Mexico, the Republic of South Africa and South Korea have emerged as some of the top 10 corn importers from the U.S. accounting for 21.7, 5.9, 5.5, 5.2 and 4.9 percent, respectively, of U.S. corn exports.

The emergence of new markets is explained by understandable economic factors. China (Taiwan) and South Korea adopted policies to promote their domestic livestock industries, thus increasing demand for corn. The inability to efficiently produce feed grains and protein meal to meet domestic demands encouraged imports of corn for feed.

Soviet policies have had a large effect on world corn price variability since 1970. The emergence of the Soviet Union as a major net importer of grains in 1972 was a shock to world grain markets and triggered rapid price increases. The growth in imports of corn by the USSR was due mainly to the Soviet decision to import corn from the world market while continuing to increase domestic livestock numbers.

In 1974, the Netherlands, West Germany, Italy and the United Kingdom (all members of the European Community) accounted for 31.4 percent of U.S. corn exports collectively. By

Table 3: U.S. Corn Exports to Developed Countries, Centrally Planned Economies and Lesser Developed Countries (LDC'S), 1973-1984.

Year	Developed Countries		Centrally Planned Economies		Lesser Developed Countries		World Total	
	Quantity (Metric Tons)	%	Quantity (Metric Tons)	%	Quantity (Metric Tons)	%	Quantity (Metric Tons)	%
1973	22,999,990	70	6,398,993	19	3,744,795	11	33,143,778	100
1974	21,688,181	73	4,032,870	14	4,079,922	14	29,800,973	100
1975	24,201,795	72	4,844,542	15	4,395,268	13	33,441,605	100
1976	28,758,220	65	11,294,850	25	4,210,959	10	44,264,029	100
1977	28,739,009	71	5,368,604	13	14,500,253	16	40,415,297	100
1978	28,539,073	55	14,500,253	28	9,003,280	17	52,042,606	100
1979	28,800,566	49	20,402,511	34	9,964,061	17	59,167,138	100
1980	33,048,307	52	12,868,433	20	17,125,669	27	63,042,409	100
1981	30,198,393	55	12,016,249	22	12,531,506	23	54,746,148	100
1982	26,876,753	55	11,739,081	24	10,173,374	21	48,789,208	100
1983	24,214,677	51	5,414,996	11	17,898,870	38	47,528,543	100
1984	23,948,611	49	11,438,448	23	13,619,506	28	49,006,565	100

Source: U.S. Foreign Agricultural Trade Statistical Report, A Supplement to the Monthly Report, ERS/USDA, Various Issues.

Table 4: Top Ten U.S. Corn Export Markets; 1974.

Rank	Country	Quantity (Metric Tons)	Percent of Total U.S. Corn Exports
1	Japan	5,993,429	20.1
2	Netherlands	3,483,868	11.7
3	W. Germany	2,926,475	9.8
4	Spain	2,228,437	7.5
5	Italy	2,033,358	6.8
6	USSR	2,007,035	6.7
7	Mexico	1,386,181	4.7
8	United Kingdom	921,287	3.1
9	China (Mainland)	854,403	2.9
10	Canada	845,374	2.8

Source: A Supplement to the Monthly Foreign Agricultural Trade of the United States ERS/USDA 1974.

Note: Corn as used here excludes seed.

1984, these countries were no longer among the top ten importers of corn from the U.S. The decline in corn imports by EC member countries reflect the EC's increased imports of cereal substitutes (nonfeed grains) and increased local production of feed grains (mainly barley) and soft wheat. Various policy instruments have been adopted by EC member countries to support internal grain prices at levels well above world prices. As of June 1984, EC feed grain prices were 38 percent higher than the world market price. Since farmers are guaranteed high prices for their grain, this stimulated expanded farm investment and production increases.

Major Corn Exporters

The United States produces corn for export in highly competitive international markets. Although the United States is consistently the largest exporter in the world, other members of the top ten corn exporting nations have varied considerably between 1970 and 1983. In 1970, the top ten exporters of corn included the United States, Argentina, France, Brazil and Thailand, accounting for 48.9, 17.8, 8.3, 5.0 and 4.7 percent, respectively, of total world corn exports (Table 6). In 1975, there were significant changes as the Republic of South Africa became the world's third largest exporter of corn (accounting for 6.2 percent of world exports). Romania accounted for 0.8 percent and Korea (DPR) exported 0.4 percent of world corn exports. In 1980, Canada and

Table 5: Top Ten U.S. Corn Export Markets: 1984

Rank	Country	Quantity (Metric Tons)	Percent of Total U.S. Corn Exports
1	Japan	13,641,997	27.8
2	USSR	10,615,399	21.7
3	China (Taiwan)	2,882,795	5.9
4	Mexico	2,688,151	5.5
5	Rep. South Africa	2,528,600	5.2
6	S. Korea	2,200,106	4.9
7	Portugal	1,923,217	3.9
8	Belgium-Luxembourg	1,702,942	3.5
9	Egypt	1,537,484	3.1
10	Venezuela	966,035	2.0

Source: Foreign Agricultural Trade of the United States Calendar Year 1984 Supplement ERS/USDA.

Note: Corn as Used Here Excludes Seed.

Table 6: Top Ten World Corn Exporters: 1970, 1975, 1980 and 1983.

Year	Rank	Country	Quantity (Metric Tons)	Percent of World Total
1970	1	USA	14,401,580	48.9
	2	Argentina	5,232,847	17.8
	3	France	2,455,382	8.3
	4	Brazil	1,470,620	5.0
	5	Thailand	1,371,474	4.7
	6	Rep. South Africa	1,200,981	4.1
	7	Netherlands	547,988	1.9
	8	Belgium	479,118	1.6
	9	Romania	356,900	1.2
	10	USSR	298,900	1.0
1975	1	USA	33,502,544	64.9
	2	Argentina	4,001,437*	7.8
	3	Rep. South Africa	3,218,000*	6.2
	4	Netherlands	2,553,185	4.9
	5	France	2,551,714	4.9
	6	Thailand	2,400,000*	4.7
	7	Romania	400,000*	0.8
	8	Hungary	343,549	0.7
	9	Belgium	232,500	0.5
	10	Korea DPR	200,000*	0.4
1980	1	USA	63,152,310	79.2
	2	Argentina	3,524,660	4.4
	3	South Africa	3,317,301	4.2
	4	France	3,181,024	4.0
	5	Thailand	2,171,733	2.7
	6	Belgium-Luxembourg	1,356,923	1.7
	7	Canada	748,889	0.9
	8	Romania	500,000*	0.6
	9	Netherlands	490,368	0.6
	10	Yugoslavia	272,968	0.3
1983	1	USA	47,645,376	68.8
	2	Argentina	6,525,437	9.4
	3	France	4,454,601	6.4
	4	Thailand	2,646,448	3.8
	5	Belgium-Luxembourg	1,584,979	2.3
	6	Yugoslavia	1,330,707	1.9
	7	South Africa	1,300,000*	1.9
	8	Brazil	765,929	1.1
	9	Romania	600,000*	0.9
	10	Zimbabwe	589,927*	0.9

Source: FAO Trade Yearbook, Various Issues.

Note: * = Unofficial Figure F = FAO Estimate

Yugoslavia accounted for 0.9 and 0.3 percent, respectively, of world corn exports. In 1983, the United States was the largest world corn exporter with 68.8 percent of the market. Belgium-Luxembourg, Brazil and Zimbabwe accounted for 2.3, 1.1 and 0.9 percent, respectively, of world exports in 1983.

Several reasons explain Argentina's recent growth in the corn export market. In efforts to promote Argentina's corn exports, the Argentine government adopted several policy instruments. First, Argentina removed corn export taxes in 1977 and set floor prices for corn at world price levels. Second, Argentina attempted to reduce the over valuation of its currency by allowing the peso to depreciate against the dollar. Thus, Argentina undercut the U.S. export price as the value of the peso fell relative the dollar. Third, during the U.S. grain embargo to the Soviet Union, Argentina negotiated Soviet grain sales and captured part of the U.S. corn market share. At the same time, Thailand's open market policies for corn helped to boost exports, especially in 1983.

Major Corn Importers

A considerable variation also exists in the top ten world corn importers between 1970 and 1983. Japan is consistently the largest corn importer with 20.8 percent of world imports in 1970, 14.5 percent in 1975, 16 percent in 1980 and 21.0 percent in 1983 (Table 7). Italy, the United Kingdom, the Federal Republic of Germany and the Netherlands accounted for 14.6, 10.8, 9.0, and 8.5 percent, respectively, of world corn imports in 1970.

In 1975, the USSR became the second largest corn importer, accounting for 10.8 percent of world corn imports. Mexico and China accounted for 5.1 and 3.0 percent of world corn imports, respectively. In 1983, the Soviet Union is still the second largest corn importer, accounting for 8.4 percent of world corn imports, followed by China, Mexico and Spain with 8.0, 6.7 and 6.3 percent respectively.

Conclusion

This paper provides an overview of the world corn market. The major world exporters and importers are categorized, and the corn export market share of the United States is documented.

The United States is the dominant exporter in the world corn market. However, Argentina, South Africa, France and Thailand have potential to compete internationally on a larger scale in the future. The U.S. percentage of total world corn exports has risen from 48 percent in 1970 to 68 percent in 1983. The largest corn importers in the world are Japan, the Soviet Union, the People's Republic of China, Mexico and Spain. Historically, 25 to 30 percent of U.S. corn production is exported to foreign markets.

In the future, increased demand for meat and poultry consumption may help to maintain current levels of demand for feedgrains worldwide. However, the recent shift in the composition of demand away from red meats toward poultry will counterbalance this effect since poultry production involves a more efficient conversion of feed to meat.

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Table 7: Top Ten World Corn Importers: 1970, 1975, 1980 and 1983

Year	Rank	Country	Quantity (Metric Tons)	Percent of World Total
1970	1	Japan	6,017,853	20.8
	2	Italy	4,216,165	14.6
	3	United Kingdom	3,116,686	10.8
	4	Germany (Federal Republic)	2,600,445	9.0
	5	Netherlands	2,467,319	8.5
	6	Spain	1,971,898	6.8
	7	Belgium	1,362,959	4.7
	8	Mexico	760,901	2.6
	9	China	614,741F	2.1
	10	Canada	463,338	1.6
1975	1	Japan	7,470,132	14.5
	2	USSR	5,548,000	10.8
	3	Netherlands	5,236,268	10.2
	4	Italy	4,499,343	8.7
	5	Spain	4,181,669	8.1
	6	United Kingdom	3,028,990	5.9
	7	Germany (Federal Republic)	3,001,863	5.8
	8	Mexico	2,617,040	5.1
	9	China	1,541,445F	3.0
	10	Germany DR	1,500,000F	2.9
1980	1	Japan	12,829,902	16.0
	2	USSR	10,000,000*	12.4
	3	China	4,602,979F	5.7
	4	Spain	4,532,545	5.6
	5	Mexico	3,777,277	4.7
	6	Germany DR	3,161,000	3.9
	7	Netherlands	3,009,568	3.7
	8	Italy	2,931,163	3.6
	9	United Kingdom	2,812,558	3.5
	10	Portugal	2,624,310	3.3
1983	1	Japan	14,700,900	21.0
	2	USSR	5,850,000*	8.4
	3	China	5,568,966F	8.0
	4	Mexico	4,687,258	6.7
	5	Spain	4,420,000*	6.3
	6	Korea Rep	4,057,371	5.8
	7	Belgium-Luxembourg	3,156,290	4.5
	8	Portugal	2,299,500	3.3
	9	Netherlands	2,116,731	3.0
	10	United Kingdom	1,821,512	2.6

Source: FAO trade yearbook. Various issues.

Note: * = Unofficial Figure F = FAO estimate.

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