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THE IMPORTANCE OF THE CORN INDUSTRY since 1950 was highlighted in a recent USDA report.* According to the study, corn has become the foundation of a worldwide meat and feedgrain boom that will likely continue to grow in the 1980s. The U.S. has played a major role in the corn industry—accounting for about half of total annual world corn production and supplying about three-fourths of annual world corn exports. Corn production has expanded rapidly in the U.S. to become the nation's largest crop. Most of the corn is grown in an area which encompasses 12 states, including all of the states in the Seventh Federal Reserve District. Rising production and increased domestic and export use of corn have placed substantial demands on the U.S. grain marketing and transportation systems. International trade in corn has been the focus of recent foreign policy actions and the corn industry continues to be an integral part of farm legislation.

Corn is cultivated for grain in a number of countries and accounts for about one-fourth of total grain production. In 1981/82 (July to June), world corn production is expected to be 440 million metric tons, a 29 percent share of world grain production. The United States would account for 48 percent of world corn production and 22 percent of world grain production. However, the share provided by the U.S. declined somewhat over the last 30 years, because the area harvested for corn in other parts of the world has increased rapidly since 1950.

Corn is native to America and has been a mainstay of U.S. agricultural production. In 1981, U.S. farmers produced a record corn crop of 8.2 billion bushels, nearly triple the 2.8 billion bushels produced in 1950. Most of the increase in U.S. corn production over the 30-year span was due to higher per-acre yields. U.S. corn yields nearly tripled, rising from 38.2 bushels per acre in 1950 to a record 109.9 bushels per acre in 1981. The higher yields resulted from a number of changes in technology and farming practices, including higher yielding hybrid seeds, increased rates of fertilization, higher seeding rates, and improved weed and pest control.

The rapid rise in the area planted to corn in other parts of the world has not been as evident in the U.S. Corn acreage in the U.S. has varied considerably since 1950, depending on expected market prices for corn and competing crops, government price subsidies, and acreage reduction programs. In 1981, the area harvested for corn was 74.6 million acres, one-fifth of the area harvested for all principal crops. This was up moderately from the average in the late 1970s and substantially higher than average in the 1960s when acreage restrictions were in effect. The area harvested for corn averaged 69 million acres in the 1950s, 58 million acres in the 1960s, and 66 million acres in the 1970s. Some additional acreage is used to produce white corn, which is used as food, or harvested for silage.

Corn is harvested in 41 of the 50 states but the majority of production is concentrated in the "Corn Belt"—the region that has an ideal climate, highly productive soil, and a relatively flat topography conducive to row cropping and the use of large efficient machinery. Since 1955 the Corn Belt—Iowa, Missouri, Illinois, Indiana, and Ohio—has accounted for about 55 percent of annual U.S. production and about half of the acreage harvested for corn. Iowa is the leading corn producing state, accounting for about a sixth of harvested acreage and a fifth of production. Illinois follows in second place with about a seventh of the harvested acreage and a sixth of production. Nebraska, Indiana, and Minnesota follow in order. Surprisingly, the Lake States region comprised of Minnesota, Wisconsin, and Michigan has shown the greatest increase in acreage and production since 1950, almost doubling its share of both. Regional shares of harvested acreage and production declined in states in the South and Southeast as soybeans gained wider acceptance. Regional shares rose in Western states, in part because of increased irrigation. Iowa, Illinois, Indiana, Ohio, Michigan, Wisconsin, Minnesota, South Dakota, Nebraska, and Missouri produce over four-fifths of the corn.

U.S. Corn Industry, USDA Economic Research Service, Agricultural Economic Report No. 479.

Higher production in many areas was augmented by technological developments in harvesting. In 1956, field shelling of corn was introduced and the proportion harvested as shelled corn rose dramatically. As mechanization and larger equipment became more widespread, earlier harvesting was possible which reduced field losses. But corn harvested early has a higher moisture content and requires drying. As a result, larger investments in on-farm storage and drying equipment has accompanied the gains in quantities of corn handled. It is now estimated that about four-fifths of all the corn produced in the major states is artificially dried on the farm. In 1979, nearly 10 billion bushels of grain storage capacity was estimated to exist on farms. However, increased storage and drying capacity, in turn, reduced the seasonality of grain marketings.

The drive to increase corn production in the United States was in response to an expanding domestic demand for corn and a rapidly growing world demand for feed grains, particularly during the 1970s. Domestic utilization of corn—for food, industrial purposes, and livestock feed—nearly doubled from 2.8 billion bushels in 1950/51 (on a marketing year basis) to about 5 billion bushels the past couple of years. Domestic utilization of corn makes up about two-thirds of total annual disappearance with the bulk of the corn being used to feed livestock. Feed use has ranged from a low of 2.2 billion bushels in 1954/55 to a record high of 4.5 billion bushels in 1979/80. Fluctuations in the uptrend in feed use have occurred as the total number of animals fed has varied or as rations have been adjusted in relation to prices and availability of competing feed ingredients. Hog production requires the largest share of corn used as feed—utilizing about one-third of the corn fed in recent years. Cattle consume another fourth of the corn, while poultry utilize one-fifth of the corn fed to livestock. About six-tenths of the corn used for feed stays on the farm where it is produced.

Domestic use of corn for food and industrial purposes is small compared to the amount used for livestock feed. But from 1950 to 1981, utilization of corn for food and industrial purposes more than tripled, with much of the growth occurring in the 1970s. Most of the corn is processed by either the wet-milling or the dry-milling method. Wet milling of corn separates the kernel into germ, hull, gluten, and starch, which are sold for a number of different uses. This industry has expanded output substantially because most of the starch is converted into corn syrups and sweeteners which are increasingly being substituted for sugar in products. In contrast, growth of the dry-corn milling industry has been much slower since the products go into breakfast cereals, cornmeal, grits, and corn flour—items with more stable per capita consumption trends. In both industries considerable value is added to the raw product through processing. As a result, these industries are less responsive to changes in corn prices. Use of corn by the brewing and distilling industries remained stable, for the most part, since 1966. Distillers used less corn in recent years, but brewers used more in the form of grits and flakes. In addition, some corn was used in recent years for ethyl alcohol production. However, that use remains small. Even though the use of corn for seed rose substantially since 1950, it is only a fractional part of total annual disappearance.

District states contribute most of the exported corn*

State	Percentage of exports
Illinois	**38.2**
Indiana	**12.3**
Iowa	**16.8**
Kentucky	2.7
Michigan	**3.6**
Minnesota	6.1
Missouri	1.8
Nebraska	2.1
North Carolina	1.2
Ohio	11.1
Wisconsin	**1.4**
Other states	2.7
	100.0

*Based on a 1977 study of patterns of grain movement.

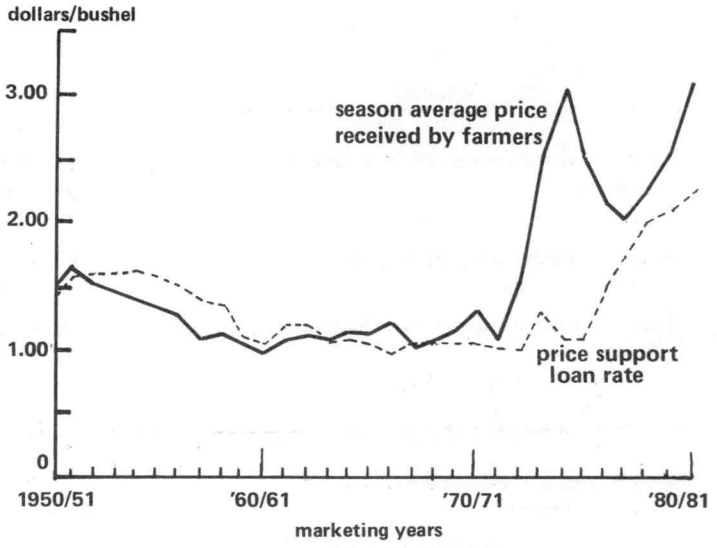
Corn exports have increased twenty-fold since 1950, becoming by far the fastest growing component of total annual disappearance of U.S. corn. Annual corn exports averaged 150 million bushels in the 1950s, 500 million bushels in the 1960s, and 1.5 billion bushels in the 1970s. World demand for feed grains increased rapidly as many nations increased livestock and poultry production. A small number of countries supply corn for world markets with the U.S., in recent years, accounting for three-fourths of the corn exported worldwide. Argentina and South Africa, the next two largest suppliers, together provide about one-tenth of corn exported. U.S. corn is shipped to nearly 100 countries. Western Europe has traditionally been the leading destination for U.S. corn, but exports to these countries have been relatively sta-

ble in recent years. Exports to Japan, Eastern Europe, Central and South America, and the USSR rose rapidly in the 1970s. But export volume to these countries has fluctuated from year to year depending on the value of the dollar relative to foreign currencies, trade policies, tariffs or import quotas, and embargoes. In the last 10 years, U.S. export volume has been affected most by changes in the level of shipments to the USSR.

Expansion of domestic and export sales of corn has led to substantial changes in the marketing system. While country elevators remain the primary outlet for corn sold from farms, more subterminal elevators—large regional assembly points—have been constructed to handle corn and other grains. Inland elevators are the primary suppliers to both the wet-corn processing and dry-corn milling industries. As exports increased, port terminal activity increased considerably. Gulf ports are the predominant outlet for corn that is exported because of their proximity to the inland waterway system and barge transportation. Over six-tenths of the exports flowed through these ports in recent years. Atlantic ports are second in importance, having drawn shipments in recent years from Great Lakes ports where shipping costs have increased greatly. Pacific ports, in recent years, showed the most dramatic rate of growth. This growth reflects the introduction of unit-train shipments from the Midwest, more favorable ocean rates to some parts of the world, and increasing congestion at Gulf ports.

Attempts have been made to gather more detailed information on the pattern of grain movements. Based on a special study in 1977, it was determined that export shipments originate from a relatively small number of states, with the concentration of shipments much greater than previous estimates indicated. (In the past, estimates of the amount of grain exported from a state were based on that state's share of production or share of the value of farm marketings.) According to the study, five states—including three of the District states—originated four-fifths of the corn received at all U.S. ports. Illinois led, supplying two-fifths of the corn received at all ports and over half of the corn moving to Gulf ports. Iowa ranked second, accounting for a sixth of the corn received at all ports and a fifth of the Gulf total. Indiana originated an eighth of the corn moving to all ports and supplied 40 percent of the corn that went to Atlantic ports. Ohio and Minnesota ranked next. District states combined originated 72 percent of the exported corn. Since most of this corn moves through Gulf ports, barges were the predominant mode of transportation, followed by rail transportation. Comparing this data to similar information collected in 1970 indicated that producers and marketing firms in the major corn producing states—the "Corn Belt"—had become increasingly dependent upon export markets as a larger share of their corn moved to port terminals.

Corn prices and loan rates



Corn prices have varied considerably since 1950. But the variation would have been greater had it not been for the government's efforts to support prices or restrict acreage. Prices were supported through loans and Commodity Credit Corporation purchases prior to 1961. During this period, the season average price received by farmers ranged from a high of $1.66 per bushel in the early 1950s to a low of $1.05 per bushel in the late 1950s. The support rate was reduced each year from 1954 to 1960 but throughout the period the loan rate exceeded the season average price as supplies exceeded demand. As a consequence, the government acquired considerable amounts of corn. From 1961 to 1981 the feed grain programs, in addition to price support loans, contained provisions for deficiency payments to program participants, disaster payments for crop failures, and diversion payments for removing part of the acreage from corn production. Season average prices received by farmers averaged $1.10 in the 1960s as support prices remained the major determinant of farm prices. After 1971, prices responded to the strong export demand and averaged, at farm level, $2.33 per bushel from 1972 to 1980.

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Selected agricultural economic developments

Subject	Unit	Latest period	Value	Percent change from Prior period	Percent change from Year ago
Index of prices received by farmers	1977=100	March	132	- 0.8	- 8
Crops	1977=100	March	119	- 3.3	-18
Livestock	1977=100	March	145	+ 2.1	+ 3
Index of prices paid by farmers	1977=100	March	155	+ 0.6	+ 4
Production items	1977=100	March	150	- 0.7	+ 2
Producer price index* *(finished goods)*	1967=100	March	277	- 0.2	+ 4
Foods	1967=100	March	257	- 0.4	+ 2
Processed foods and feeds	1967=100	March	248	- 0.1	0
Agricultural chemicals	1967=100	March	297	- 0.3	+ 8
Agricultural machinery and equipment	1967=100	March	305	+ 0.3	+ 9
Consumer price index** *(all items)*	1967=100	February	283	+ 0.3	+ 8
Food at home	1967=100	February	278	+ 1.0	+ 4
Cash prices received by farmers					
Corn	dol. per bu.	March	2.41	- 1.2	-26
Soybeans	dol. per bu.	March	5.88	- 2.7	-23
Wheat	dol. per bu.	March	3.60	- 2.7	-12
Sorghum	dol. per cwt.	March	4.03	- 1.2	-22
Oats	dol. per bu.	March	1.96	- 1.5	- 6
Steers and heifers	dol. per cwt.	March	62.50	+ 3.0	+ 2
Hogs	dol. per cwt.	March	48.60	+ 0.4	+25
Milk, all sold to plants	dol. per cwt.	March	13.70	- 0.7	- 1
Broilers	cents per lb.	March	26.9	- 0.4	- 9
Eggs	cents per doz.	March	68.2	+ 2.9	+12
Income *(seasonally adjusted annual rate)*					
Cash receipts from farm marketings	bil. dol.	4th Quarter	141	- 2.0	0
Net farm income	bil. dol.	4th Quarter	25	0	+26
Nonagricultural personal income	bil. dol.	February	2,460	+ 0.6	+ 8

*Formerly called wholesale price index.

**For all urban consumers.

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