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Determinants of Wheat Import Demand

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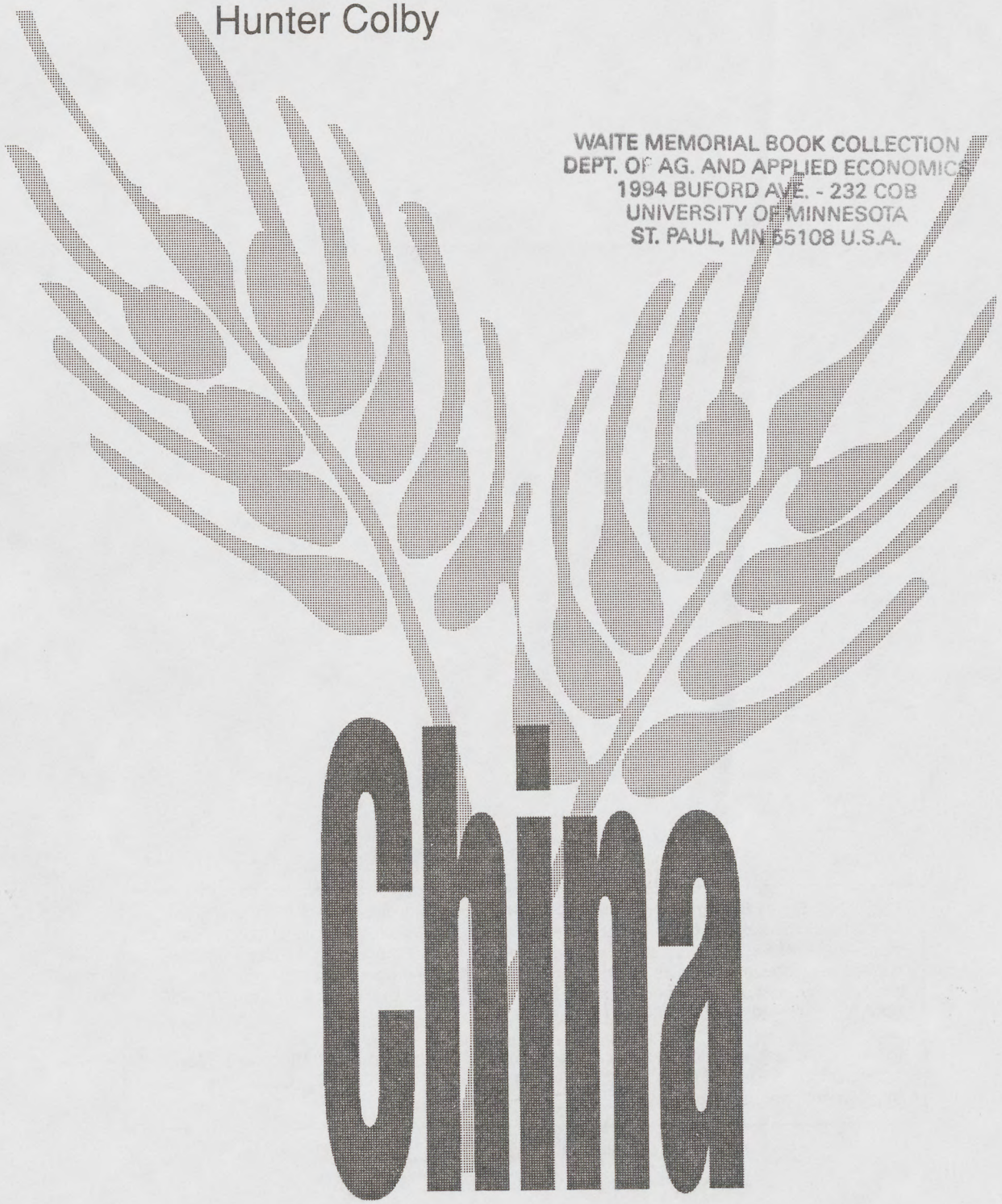

The People's Republic of China: Determinants of Wheat Import Demand. By Frederick W. Crook, William Lin, and W. Hunter Colby. Agriculture and Trade Analysis Division and Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture, Staff Report No. AGES 9329.

Abstract

China is one of the world's largest wheat producers and, at the same time, is a major importer, averaging 13 million tons over the last 5 years. In 1992, the state had great influence in the production, consumption, stock management, and domestic marketing of wheat. CEROILS, a state trading corporation, manages wheat imports. The U.S. share of China's wheat imports fell from 56 percent in 1989 to 32 percent in 1992. CEROILS claims wheat quality is an important element in purchase decisions but from its purchasing behavior, price is the most important consideration. CEROILS said it will not offer a premium for cleaner U.S. wheat but would buy more U.S. wheat if offered at the same price. Our conclusion is that the trade impact of cleaner wheat likely would be a 1-5 percent expansion of U.S. exports to China.

Keywords: China, wheat, production, consumption, imports, policy, milling, storage, grain quality, marketing, survey.

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Preface

This report is 1 of 17 reports covering 18 wheat-importing countries prepared by the Economic Research Service (ERS) in support of a comprehensive study of cleaning U.S. wheat destined for export. Similar reports are forthcoming for corn and soybeans.

The Food, Agriculture, Conservation, and Trade Act of 1990 (FACTA) required the Federal Grain Inspection Service (FGIS) to establish or amend grain grades and standards to include, "...economically and commercially practical levels of cleanliness." The legislation required FGIS to determine if the benefits of cleaning exceeded the costs. FGIS subsequently asked ERS to conduct the study. The comprehensive study on wheat included two major components: 1) economic-engineering studies of the cost of wheat cleaning in the United States and estimates of domestic benefits from cleaning and 2) a series of in-country interviews of buyers in major wheat-importing countries to determine the effects of cleaner U.S. wheat on sales in these markets.

The results of this work have been prepared in a three-volume set:

Economic Implications of Cleaning Wheat in the United States (AER-669), by B.T. Hyberg, M. Ash, W. Lin, C. Lin, L. Aldrich, and D. Pace;

The Role of Quality in Wheat Import Decisionmaking (AER-670), by Stephanie Mercier; and

The Costs and Benefits of U.S. Cleaning Wheat: Overview and Implications (AER-675), by William Lin and Mack Leath.

The 18-country case studies form the foundation for the results of the international component of the wheat-cleaning study. The 18 countries studied accounted for 58 percent of world wheat imports and 63 percent of U.S. wheat sales in 1991. Each report has two components: background on the wheat-marketing policies, institutions, and distribution system in the wheat-importing country and results of interviews of wheat traders, processors, and government officials. All the interviews were completed during April-September 1992, and all followed a similar format. Each interview team consisted of both a commodity specialist and a country specialist. They attended a series of seminars on grain quality issues, data collection, and interview procedures before doing their interviews.

All the interviews followed a specific set of guidelines. An advisory panel of government officials, private traders and trade association members helped develop the questions, which consisted of five topic areas:

- The most important factors in the choice of a supplier country;
- Quality factors most important to the importer's purchase decisions and the importer's perception of wheat purchased from their suppliers;
- Contract specifications the importer uses to communicate preferences;
- The level of dockage in the shipments the importer receives and the costs of removing it; and
- If U.S. wheat were cleaner, would the importer purchase more and/or be willing to pay more?

The background information on the wheat-importing country and the responses from the interviews provide a unique insight into the role of quality factors in the wheat purchase decisions of the major importers of U.S. wheat.

Alan J. Webb
Coordinator, Country Case Studies

Reports in the Series, "Determinants of Wheat Import Demand"

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Summary

The China National Cereal, Oils, and Foodstuffs Import/Export Corporation (CEROILS) is the sole state trading agency which purchases all China's wheat imports. With market reforms, more flour mills likely will have the flexibility to specify their quality requirements.

China's wheat production surged from 20 million tons in 1960 to an estimated 101 million in 1992. But per capita wheat consumption rose from 29 kg in 1960 to around 90 kg in 1992. Population growth also contributed to the demand for wheat as the population grew from 662 million in 1960 to 1.17 billion in 1992. CEROILS imports foreign wheat to fill the gap between domestic demand and domestic supply. In the past two decades, China imported high-protein hard wheats from Canada and Australia and blended these imports with either their own softer domestic varieties or U.S. soft wheats to produce flours for their urban consumers.

CEROILS relies on pricing more than other factors when making wheat purchase decisions. CEROILS' objective is to buy as much wheat as possible for the least amount of foreign exchange. Quality ranks a close second in the CEROILS' wheat import decisions. Important quality factors considered include quarantine objects (such as certain plant diseases and Johnson grass seed), live insects, pesticide residues, dockage, and protein quantity and quality. In the future, phytosanitary considerations and internal economic reforms will make quality a more important factor. In addition, foreign trade policy considerations also play an important role in determining import sources.

CEROILS officials and flour millers consistently indicated that Canadian and Australian wheats have quality attributes preferable to U.S. wheat, in part because China imports primarily soft red winter (SRW) wheat from the United States. CEROILS indicated that quarantine objects is China's most important quality concern, and, based on this criterion, U.S. wheat performs poorly when compared with wheat shipped from Canada, Australia, and the European Community (EC). In addition, CEROILS stated that U.S. wheat tends to contain more live insects and higher dockage levels than Canadian and Australian wheats. Nevertheless, U.S. wheat quality has improved in recent years, compared with its quality in the 1970's.

In the near term, CEROILS officials indicated that CEROILS would not offer a premium for clean U.S. wheat, but would expand the imports of U.S. wheat from 1 to 30 percent if offered at the same price. The trade impact most likely would be closer to the lower end of the spectrum (a 1-5 percent increase) than the upper end. In the longer run, however, the trade impact of the wheat cleaning issue is likely to be greater as demand for specific-purpose flour increases and as mills buy more wheat free of Johnson grass seed.

THE PEOPLE'S REPUBLIC OF CHINA

Determinants of Wheat Import Demand

Frederick W. Crook
William Lin
W. Hunter Colby

Introduction

This report identifies important determinants of wheat import demand for the People's Republic of China, assesses what effect cleaner U.S. wheat could have on U.S. wheat prices and exports to China, and evaluates how economic reforms underway in China might affect the wheat economy and wheat import demand. Wheat is an important part of China's agricultural economy. Wheat production in July/June 1991/92 reached an estimated 101 million tons, making it the world's largest wheat producer, with approximately 17 percent of world wheat production. From the late 1970's to the mid-1980's, per capita wheat consumption in China rose steadily as population and incomes grew. Domestic demand for wheat has steadily outpaced supplies, and China has been a major wheat importer since the early 1960's. Since the early 1970's, China has been a very important market for U.S. wheat. China imported 10.6 million tons of wheat in calendar 1992, of which 3.3 million tons came from the United States.

The analysis of China's wheat market is divided into two sections. The first section provides background information and analysis from published data and the second section summarizes findings from a survey of China's officials involved in wheat production, consumption, transportation, marketing, milling, and trade.

The survey was conducted by Frederick W. Crook, Agriculture and Trade Analysis Division, and William Lin, Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture. China National Cereal, Oils, and Foodstuffs Import/Export Corporation (CEROILS) officials in New York City were interviewed in March 1992, while officials in China and Hong Kong were interviewed from April 28 to May 19, 1992. Six large flour mills were visited in Beijing, Tianjin, Dalian, Shanghai, and Canton. These mills predominantly used foreign wheats and are estimated to have milled between 5-10 percent of total imported wheat in 1992. Of the 39 offices visited, 32 offices responded to the questions. The responses were recorded on survey forms and were a major source of information for this report (Wheat Survey, 1992).

Overview of Wheat Economy

China is the largest country in Asia, with a population of over 1.17 billion, but only 96 million hectares were cultivated in 1992. Although industrial output now accounts for nearly 65 percent of China's gross value of output (GVO), only 17 percent of total employment is in industry, while 60 percent is in agriculture. In 1979, China embarked on an ambitious economic reform program, gradually reducing state interference in the agricultural and industrial sectors. The reforms fostered rapid growth in agricultural production, industrial output, real per capita income, and foreign trade (table 1). The increase in real Gross National Product (GNP) growth averaged over 9 percent

between 1979 and 1990. China's foreign trade has grown at an average annual rate of about 15 percent during 1983-91 and has maintained a consistent trade surplus with the United States, its number one trading partner, since 1982.

China's agricultural output growth surged in the early 1980's as the initial rural reform programs spread throughout the country. However, output growth has slowed since the mid-1980's. Total grain production rose from 332 million tons in 1979 to 407 million in 1984. Between 1985 and 1992, growth in output climbed more slowly, reaching 442 million tons. Despite impressive gains in output, China still imports significant quantities of wheat. A third of China's wheat imports came from the United States during calendar 1990-92, averaging 3.9 million metric tons per year. Canada and Australia are the other major suppliers.

Wheat Supply and Demand Trends

Wheat plays an important role in China's overall grain economy. The crop accounts for nearly 26 percent of total area sown to grain and almost 22 percent of total output. Although wheat production in China reached a record 101 million tons in 1992/93, it nonetheless will import an estimated 7.0 million tons of wheat (figure 1). From the late 1970's to the mid-1980's, per capita wheat consumption in China rose steadily as population and incomes grew. However, per capita consumption has leveled off since 1985.

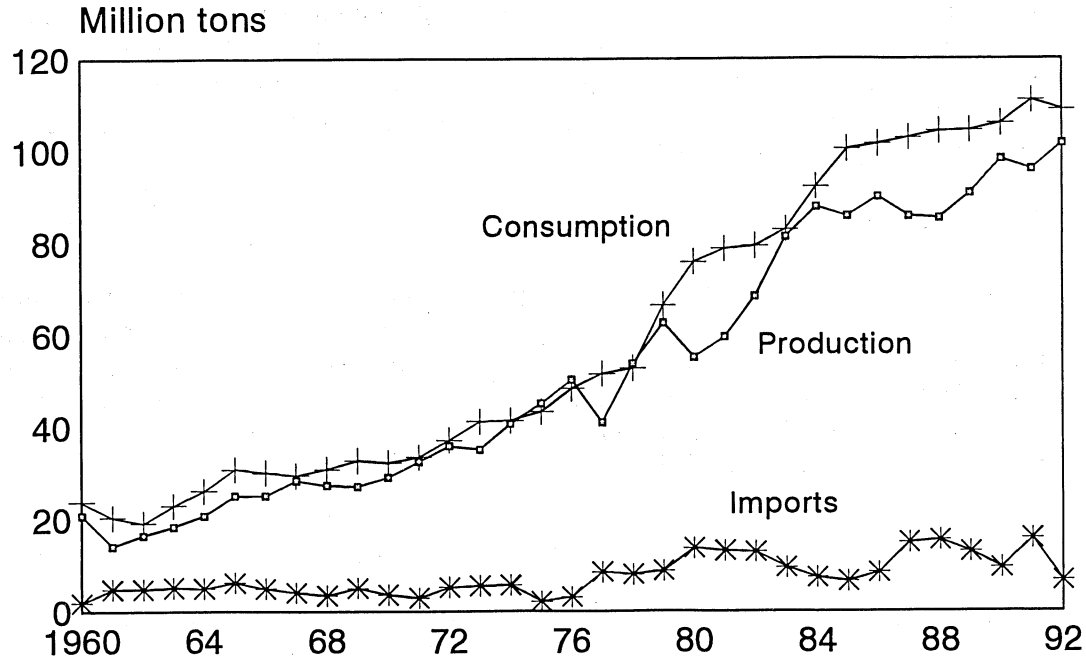
Table 1--China's economic indicators

Indicator	Unit	1985–89 average	1990	1991	1992
Gross national product:					
In current prices	Bil. yuan	1,185	1,770	1,986	2,224
In current prices	Bil. $	334	370	373	405
Per capita	$	305	324	322	345
In 1980 prices	Bil. yuan	835	962	1,034	1,197
(% change)	%	6.5	9.9	7.4	15.8
Domestic prices (1980=100):					
Wholesale price index[1]		164	222	227	243
(% change)	%	13.2	1.9	2.6	7.0
Consumer price index		145	192	198	208
(% change)	%	11.7	2.1	2.9	5.4
Consumer price index (food)		164	217	224	242
(% change)	%	14.2	0.3	3.2	7.1
Balance of payments:					
Imports (fob)	Mil. $	47,896	52,275	63,790	80,600
(% change)	%	21.0	−11.5	22.0	26.4
Exports (fob)	Mil. $	39,482	60,920	71,910	85,000
(% change)	%	15.8	15.3	18.0	18.2
Foreign debt	Mil. $	29,740	52,500	NA	69,300
Debt service ratio	%	10.5	14.4	NA	NA
Exchange rate	Yuan/$	3.52	4.78	5.32	5.49
Population	Mil.	1,093	1,143	1,158	1,173
(% change)	%	1.6	1.4	1.3	1.3

NA = Data not available.
[1]Data for 1989–92 are estimated.

Sources: *China Finance Almanac*, various issues; *China Statistical Yearbook*, various issues; and *International Financial Statistics*, International Monetary Fund, various issues.

Figure 1
China's Wheat Supply and Use



July/June marketing year.
Source: USDA/Economic Research Service.

Production

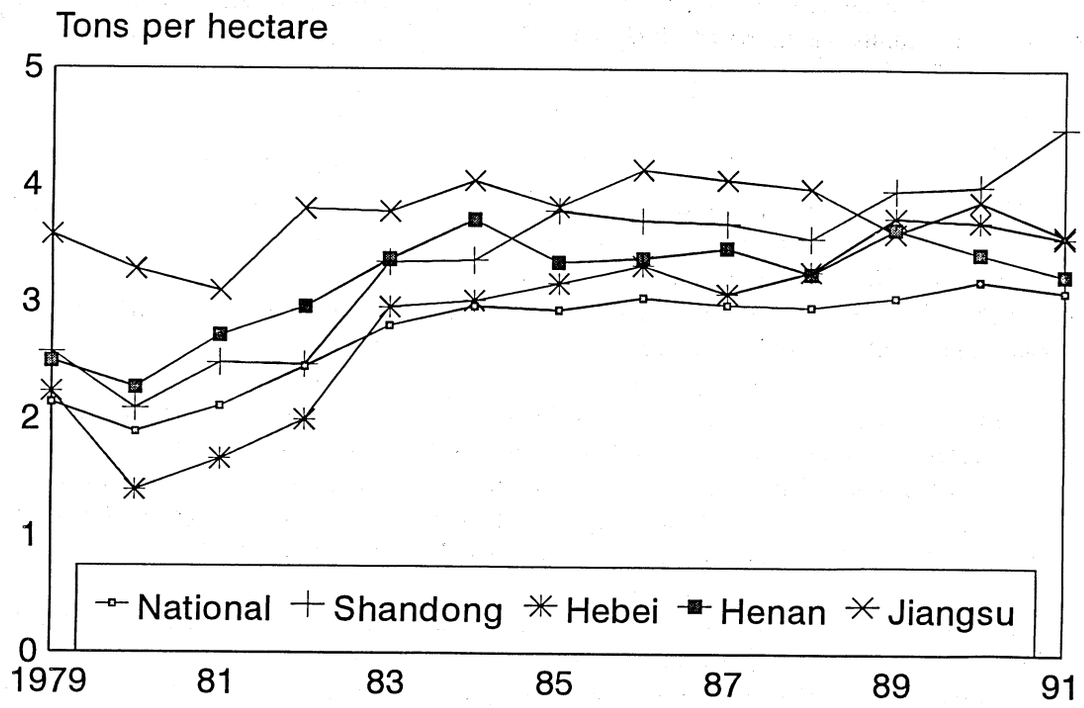
China's wheat production occurs in three different growing regions: (1) the northern winter wheat region, accounting for 60 percent of total wheat area; (2) the southern winter wheat region, comprising 20 percent of the area; and (3) the spring wheat area, accounting for the remaining 20 percent. On an output basis, winter wheat is normally about 85 percent of total production and spring wheat accounts for the remainder (Johnson, 1977; Laiyang, 1975; and Colby, 1992).

Wheat production in China grew from 63 million tons in 1979 to 101 million in 1992, an increase of 60 percent. Although wheat area expanded rapidly in the early years of the People's Republic, it has remained relatively stable since the late 1970's. Area increased slightly since economic reform began, rising from 29 million hectares in 1979 to 30.5 million in 1992. China's available cultivated land is already very intensively used, so little new land will be available for wheat cultivation. Perhaps 50,000 to 100,000 hectares of marginal land is reclaimed every year, but this does not make up for annual losses because of the construction of new roads, homes, and factories. China is expected to see a net annual loss in total cultivated land of between 100,000 and 150,000 hectares through the end of the 1990's (USDA, China: Agriculture and Trade Report, 1990, pp. 37-44). Area sown to wheat, however, should increase slightly because of the rise in demand for wheat.

Yield increases have been the driving force behind the rapid rise in China's wheat output (figure 2). Yields have climbed steadily since the mid-1960's, reaching 2.14 tons per hectare in 1979 and rising to 3.3 tons in 1992. Important reasons for the steady rise in yields include expanding irrigated area

Figure 2

Major Producer Province Wheat Yields



Source: China Statistical Yearbook, various issues.

in the North China Plain, the increased use of chemical fertilizers, improved seeds, and better management practices, particularly during the early 1980's (Crook, "China's Wheat Economy," 1989).

The major wheat-producing provinces all experienced rapid growth in yields between 1981 and 1984 in response to the change from a commune-based system of agriculture to the household land contract system and increased state wheat procurement prices. Yields rose from 1.85 tons per hectare in 1978 to 2.97 in 1984. However, yield growth slowed in the latter part of the decade, rising from 2.94 tons per hectare in 1985 to a high of 3.3 tons in 1992.

By world standards China's farmers have already achieved relatively high wheat yields--higher than those in India, Pakistan, and countries which raise large areas of dryland wheat, such as in Canada, Australia, the former USSR, and the United States. On the other hand, wheat yields in Mexico, France, Poland, and Japan are higher than those in China (Crook, "China's Wheat Economy," 1989).

Agronomists in China claim that 80 to 85 percent of the crop is now irrigated. Farmers have invested heavily in building irrigation and drainage systems over the last 20 years. During this period, irrigated area expanded from 33 million to 40 million hectares, an increase of 21 percent. The overall expansion of irrigated area has been impressive and the digging of tube wells on the North China Plain, the major winter wheat-producing region, boosted wheat yields significantly. However, the capacity of the aquifer to maintain the current level of use is now in question, and recent reports indicate the water table is falling (Crook, "China's Wheat Economy," 1989).

Given sufficient economic incentives, China's farmers can still boost wheat yields with existing resources. However, it will be difficult for China's farmers to maintain the supply of irrigation water and quite costly to continue expanding irrigated area. Based on their past experience and greater access to foreign breeding techniques and supplies of genetic materials, China's plant breeders will be able to develop higher yielding varieties. Also, higher application levels of chemical fertilizers, combined with proper amounts of water and disease control programs, should also help to boost yields. However, future yield growth likely will be slower than the rapid growth of the early 1980's (Crook, "Year 2000," June 1988).

Consumption

In 1992, 93 percent of the wheat consumed in China came from domestic production. Locally produced wheats are used to satisfy local flour requirements. Soft winter wheats are mainly used in local mills in south China to produce dumplings, biscuits, and cakes. In north China, both hard winter wheats and soft wheats are used to produce flour for a wide variety of noodles, steamed, baked, and fried breads, cookies, and cakes.

The remaining 7 percent of the wheat consumed in 1992 came from imported wheat. Most of this wheat was imported to satisfy flour requirements for urban centers, primarily along the eastern seaboard. Over the years, China has imported high-protein hard wheats from Canada and Australia. They have blended these high-protein wheats with either their own softer domestic wheats or U.S. soft wheats to produce flours for their urban consumers (Wheat Survey, 1992).

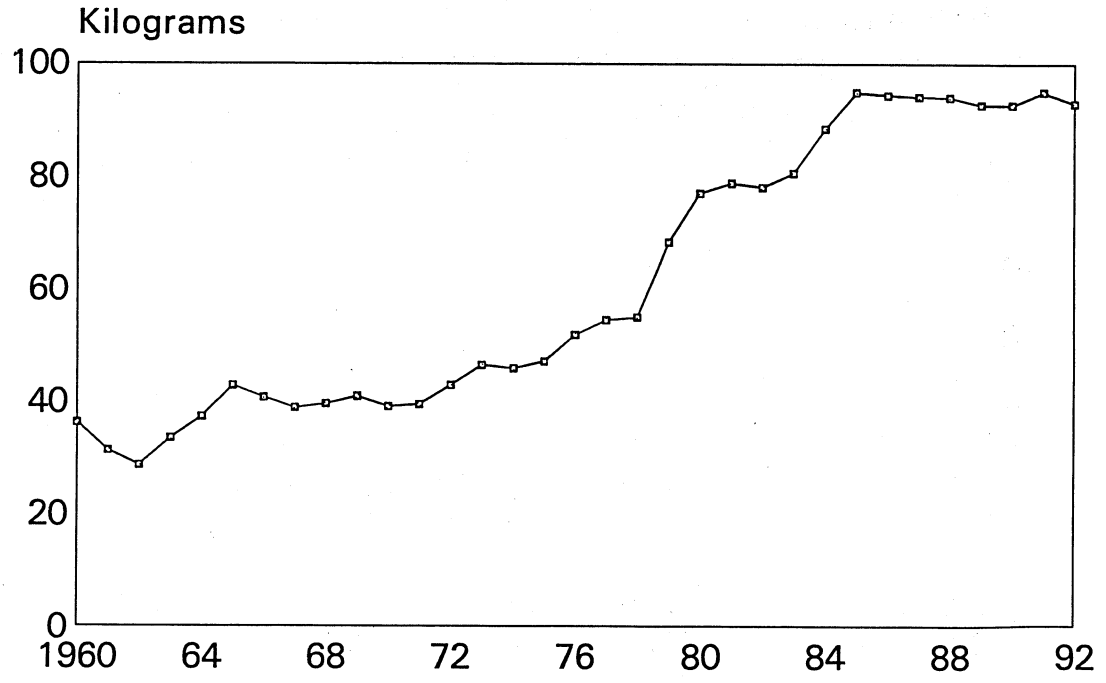
Wheat consumption has risen steadily since 1970, climbing from 32 million tons to an estimated 109 million in 1992/93. Wheat is the primary food staple in northern China, while rice is the primary staple in southern China. Per capita wheat consumption grew steadily until the mid-1980's because of wheat's role as a food staple, particularly in north China, and because of heavy Government subsidies for urban wheat consumers. Per capita urban wheat consumption grew more slowly in the late 1980's as consumers allocated a larger share of their food budgets for meat, vegetables, fruits, and processed foods (figure 3). Rural wheat demand, however, is expected to continue to climb as population and incomes grow. National per capita consumption levels are projected to maintain a slow but steady growth through the end of the century (Crook, "China's Wheat Economy," 1989).

Food Use. There is great demand for wheat for food uses. Rural survey data show that per capita grain consumption rose from 248 kg in 1978 to 259 kg in 1987, a 4.4 percent increase. Between 1981 and 1987, urban consumers reduced their grain consumption by 9 percent from 145 to 132 kg.

Rapid increases in grain output since 1978 created a surplus which permitted substantial changes in traditional consumption patterns. Other grains used for food decreased substantially, while consumption of fine grains, such as wheat and rice, rose (Crook, "China's Wheat Economy," 1989). During 1978-87, rural fine grain consumption jumped from 123 to 211 kg, a gain of 71 percent. Meanwhile, consumption of other grains such as corn, sorghum, millet, barley, oats, potatoes (which China's authorities include in their grain statistics), fell from 125 to 48 kg, a decline of 62 percent. Urban consumers continued to eat wheat and rice and reduced their consumption of other grains.

Rural citizens had about 76.6 million tons of wheat available to them in 1990, about 79.3 percent of China's wheat production. With a rural population of 841 million in 1990, per capita availability would be about 91 kg. Urban citizens consumed an estimated 20 million tons of wheat in 1990, or 19.7 percent of available wheat. The urban population is estimated to be 302 million, so that per capita availability would be about 66 kg of wheat (State Statistical Bureau, 1991). These wheat per capita availability figures for rural and urban residents differ from per capita grain consumption figures noted above because of definition differences.

Figure 3
China's Per Capita Wheat Use



Calculated using July/June marketing year data.
Source: USDA, Economic Research Service.

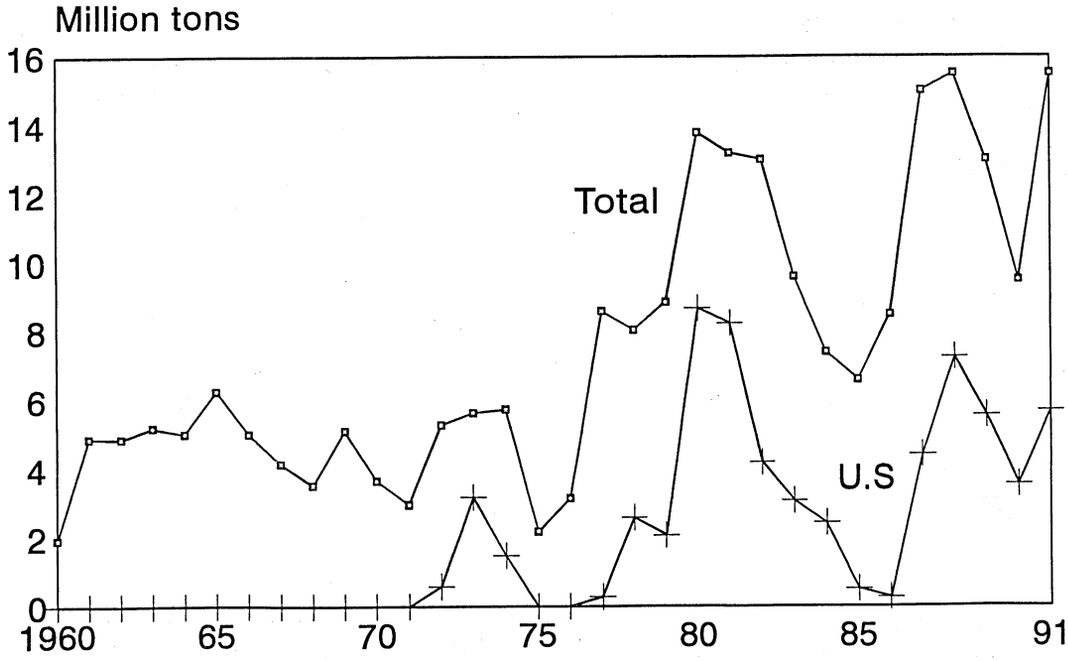
Traditional grain consumption patterns in China tended to follow local production because transporting grain was difficult and expensive. Although this has changed in recent years, surveys indicate consumers continue to eat considerable quantities of wheat in those provinces where per capita production is high. Today, most wheat consumption in China is in the form of noodles, steamed dumplings, breads, and pastries.

Urban and rural consumption of wheat flour products are dramatically different. Of total rural wheat flour consumption, 60 percent is in the form of *mantou* and dumplings, 25 in noodles, 10 in bread, and 5 in cakes, crackers, and cookies. By contrast, 20 percent of urban wheat flour consumption is in the form of *mantou*, while 40 percent is in bread. Urban noodle consumption constitutes 30 percent of the total, and cakes, crackers, and cookies account for 10 percent (Wheat Surveys, 1992).

Feed Use. Whole wheat is in great demand for food use, but there is little demand for feed wheat. National and provincial officials claim very little wheat is fed to livestock, though wheat bran from flour mills is commonly used as a feed (Crook, Sept. 1986). In this report, feed wheat is specified as whole wheat grain designated for feed use only; byproducts from flour milling are not included in this category. Wheat grain used for feed is estimated to have averaged just over 1 percent of total wheat available for consumption in the early 1960's. This percentage rose to over 2 percent by the mid-1980's as wheat production expanded (Crook, Feb. 1988).

Preferred feedstuffs include corn, sorghum, barley, oats, soybeans, and potatoes, but farmers may also feed some wheat, rice, and millet. Where local transportation systems are poorly developed,

Figure 4
Total Wheat Imports and U.S. Exports



July/June marketing year.
Source: USDA, Economic Research Service.

farmers use wheat and rice for feed, both because of the lack of handling facilities and because of the high cost of bringing in feed grains. Also, food grains damaged by insects, rodents, or mildew are sometimes used as feed.

Seed Use. Seeding rates for various growing regions were estimated as follows: northern winter wheat, 210 kg per hectare; Yangzi Valley wheat, 150 kg per hectare; south China wheat, 120 kg per hectare; and spring wheat, 225 kg per hectare (Ag Technical Handbook Editing Committee, May 1983). The sum of seed for the four regions in 1983 totaled 5.562 million tons. This total, divided by total wheat area for 1983 of 29 million hectares, yielded a figure of 191 kg per hectare.

Industrial Use. There is very little published data on China's industrial wheat use. Because wheat is in great demand as a preferred food grain, there are no large stocks of the commodity to encourage the use of wheat for industrial purposes. Small quantities of wheat and flour are believed to be used in a few areas to produce starch (laundries, textiles, pastes), ethyl alcohol, alcohol for human consumption, gluten, and industrial adhesives (Johnson, 1977). Industrial use of wheat is believed to constitute only a very small fraction of total consumption.

Waste. Recent estimates from China suggest about 15 percent of total grain production is lost after the crop is harvested (Liangshi, 1989; Tang, 1989). A 1988 survey conducted in Zhejiang province found that an average of 1 to 3 percent of grain kernels was lost during harvesting; 2 to 4 percent during threshing; 1 to 3 percent as the grain was dried on drying floors and roadbeds; 4 to 8 percent in storage bins; 1 to 2 percent during transportation; and 2 to 5 percent during processing (Tang,

Table 2--China's wheat imports by source, calendar year

Source	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992
						1,000 tons					
Argentina	94	2,946	0	875	535	810	304	1,049	858	391	0
Australia	2,113	416	2,429	1,214	2,616	4,432	397	1,677	1,386	1,365	219
Belgium	NA	NA	NA	0	0	33	0	0	0	9	0
Canada	3,458	4,659	3,071	2,370	2,538	5,699	7,532	1,761	4,136	4,504	5,670
Cuba	NA	NA	NA	0	0	0	0	14	0	0	0
EC	710	860	27	324	145	566	30	1,594	2,174	1,255	0
France	662	777	27	264	125	334	25	1,397	1,140	1,242	1,339
Germany, FR	0	11	0	NA	21	65	5	20	30	13	0
Greece	NA	NA	NA	NA	0	0	0	66	0	0	0
Japan	NA	NA	NA	NA	30	0	0	0	0	0	0
Saudi Arabia	NA	NA	NA	NA	0	88	443	33	0	219	0
Switzerland	NA	NA	NA	NA	0	32	0	0	0	0	0
Turkey	NA	NA	NA	NA	0	0	73	137	0	0	0
United Kingdom	44	26	0	NA	0	137	0	128	1,003	0	0
United States	6,870	2,458	4,067	816	226	1,564	5,768	8,293	3,919	4,587	3,334
Uruguay	NA	NA	NA	NA	0	0	0	41	0	0	0
USSR (former)	NA	NA	NA	NA	0	0	0	0	3	1	0
Zimbabwe	NA	NA	NA	NA	0	0	0	264	42	0	0
Unassigned[1]	96	48	14	60	24	10	0	0	9	38	16
Total	13,337	11,340	9,608	5,599	6,114	13,201	14,547	14,880	12,527	12,368	10,578
U.S. share (percent)	51.5	21.7	42.3	14.6	3.7	11.8	39.7	55.7	31.3	37.1	31.5

NA = Data not available.

[1] Unassigned wheat imports are either from an unlisted country or from a country with no data available.

Sources: *Summary Survey of China's Customs Statistics*; and United Nations Country Partner Trade Statistics.

1989). Total losses, therefore, ranged from 11 to 25 percent of output. Assuming that wheat losses are consisent with total grain losses of 15 percent, the total amount of wheat lost in 1991 was about 14 million tons.

Imports

China has been a net wheat importer since the early 1920's. However, China did not begin to import major quantities of wheat until the early 1960's, following the disastrous harvests and consequent starvation of millions of peasants during and after the Great Leap Forward movement.

Between 1960 and 1976, China's annual wheat imports averaged about 4.4 million tons. According to USDA July/June marketing year data, imports rose rapidly over the next 10 years, averaging 9.8 million tons annually between 1977/78 and 1986/87. Over the last 5 years, imports averaged 13.7 million tons, peaking at 15.5 million tons in 1991/92 (figure 4). China's wheat imports are expected to continue to grow throughout the 1990's, though at a more moderate pace, as domestic consumption increases due to population and income growth.

Canada, the United States, Australia, and the EC are China's major wheat suppliers (table 2). Note that wheat import data in table 2 comes from China's Customs Bureau and is on a calendar year basis while data for figure 4 is on a USDA July/June marketing year and comes from U.S. Customs sources. Argentina has also been a fairly consistent supplier, shipping as much as 15 percent of total imports in 1985, though in other years not participating at all. Since 1972, the United States has been a major supplier, sometimes accounting for over 60 percent of total imports, while in other years shipping no wheat. The EC has also participated sporadically in the market, supplying 17 percent of the market in 1990, but also shipping only small quantities or none at all in other years.

U.S. wheat exports to China fluctuated wildly in the 1980's, reaching a high of 8.7 million tons in July/June 1980/81 and a low of 270,000 tons in 1986/87 (figure 5). Over the last 5 years, U.S. exports have averaged 5.1 million tons a year.

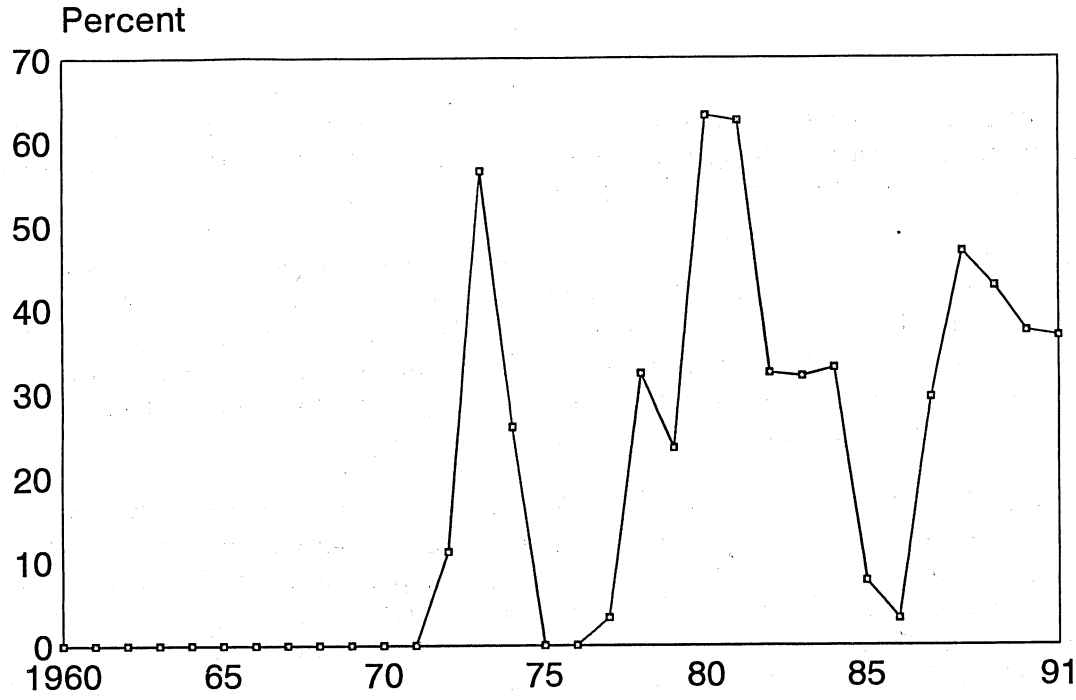
Over the last decade, China imported four classes of wheat: durum, hard spring, hard winter, and soft wheats. Of total wheat imports in 1989/90, 0.5 percent were durum, 39.2 were hard spring, 19.3 were hard winter, and 41.0 were soft varieties. This is a distinct change from the late 1970's, when hard winter accounted for about 50 percent of imports and soft for less than 20 (Hjort, 1992).

In 1989/90, Canada had 88.3 percent of the hard spring wheat market, compared with 11.7 percent from the United States. In 1989/90, 19.3 percent of total imports were hard winter wheat. Australia shipped in 40.5 percent of this class of wheat, Argentina shipped in 33.7 percent, and the United States shipped in the remaining 25.8 percent.

The United States and the EC dominate China's soft wheat import market. In 1989/90, U.S. soft red winter wheat (SRW) occupied 81.5 percent of this market, compared with EC common soft wheat shipments of 18.5 percent (Hjort, 1992).

U.S. and Competitor Programs. Beginning in early 1987, the United States has shipped 90 percent of its wheat to China under the Export Enhancement Program (EEP). Between July/June 1986/87 and 1990/91, China imported an annual average of 4 million tons under the EEP program, accounting for about 90 percent of its imports from the United States. China does not receive wheat under other

Figure 5
U.S. Wheat Market Share in China



Source: USDA, Economic Research Service.

Table 3--U.S. wheat exports to China, by program, U.S. fiscal year

Year	P.L. 480			Section 416 (wheat)	AID grants (wheat)	CCC credit (wheat)	EEP sales	Total programs
	Wheat	Flour	Total					
				1,000 tons				
1983/84	0	0	0	0	0	0	0	0
1984/85	0	0	0	0	0	0	0	0
1985/86	0	0	0	0	0	0	0	0
1986/87	0	0	0	0	0	0	1,690	1,690
1987/88	0	0	0	0	0	0	5,500	5,500
1988/89	0	0	0	0	0	0	5,370	5,370
1989/90	0	0	0	0	0	0	3,881	3,881
1990/91	0	0	0	0	0	0	5,710	5,710
1991/92	0	0	0	0	0	0	1,699	1,699

Source: USDA, Economic Research Service.

U.S. export or aid programs, such as P.L. 480, Title II, AID commodity grains, or Section 416 donations (table 3 and 4).

Table 4--U.S. EEP wheat sales and bonuses to China

Year	U.S. fiscal year[1]		Marketing year[2]	
	Sales volume (tons)	Average US$/ton bonus	Sales volume (tons)	Average US$/ton bonus
		1,000 tons		
1986/87	1,690	$36.01	1,000	$34.25
1987/88	5,500	$32.77	4,940	$37.92
1988/89	5,370	$19.62	6,350	$19.20
1989/90	3,881	$12.66	3,903	$12.05
1990/91	5,710	$42.82	4,959	$39.93
1991/92	1,699	$53.28	2,697	$52.66

[1] October/September year.
[2] July/June year.

Source: USDA, Economic Research Service.

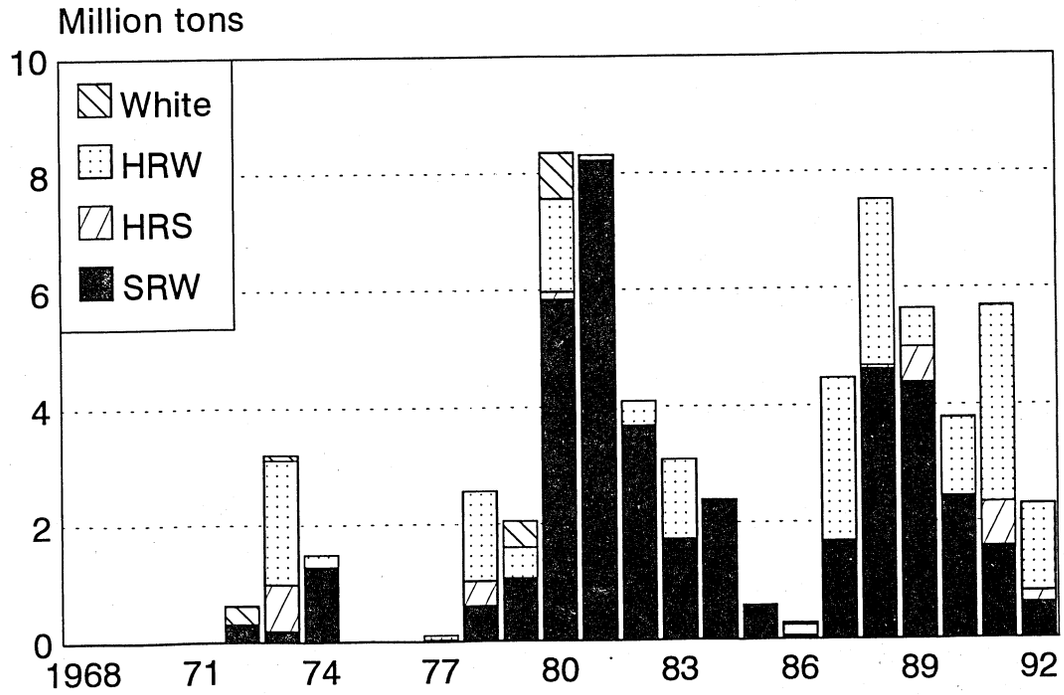
All major non-U.S. wheat imports are also conducted under concessionary terms. Canada and Australia both operate central wheat boards that function as monopolies outside normal market channels. Under these arrangements, both nations are able to utilize their position to guarantee special quality characteristics or lower prices. The EC uses the common market restitution program to reduce the price of exports to China. In 1991/92, restitutions were made on 750,000 tons of wheat for an average of US$98-100 f.o.b. (France). Aggressive price-cutting under these programs has made it difficult for the United States to compete in China. However, the price-consciousness of CEROILS, combined with the continuation of the U.S. EEP program, will enhance the presence of U.S. wheat in the market. Although purchase of U.S. wheat would likely continue if EEP were withdrawn, the quantity purchased would decline dramatically.

Trends in Market Share. Data on wheat shipments to China suggest the United States is a residual rather than a primary supplier (figure 4). Once some base amount of wheat is purchased from non-U.S. sources, China then appears to allocate a share of all additional purchases to the United States.

The idea that the United States acts as a residual wheat supplier to China is supported by the fact that China buys U.S. soft red winter wheat (SRW) primarily to blend with Canadian western red spring wheat (CWRS), which is generally more expensive and has a higher protein content than U.S. wheat. Therefore, as China increases its imports of Canadian CWRS, imports of U.S. SRW also rise.

Between July/June 1980/81 and 1989/90, Canada's share of China's hard spring wheat imports ranged from 88 to 100 percent. During this same period, the U.S. share of soft wheat (SRW) imports ranged from a high of 99 percent to a low of 8 percent (figure 6). Excluding the unusual low of 8 percent in 1986/87, the average U.S. share, however, was 85 percent over the 10-year period.

Figure 6
U.S. Wheat Exports to China, by Class



Source: USDA, Economic Research Service.

Comparing U.S exports of all classes of wheat to China with its major competitors, U.S. exports (HRW and SRW) are much more volatile than either Canadian (CWRS) or Australian (HW) exports. U.S. HRW wheat exports have fluctuated widely since July/June 1980/81 as U.S. prices have changed. Australian HW wheat exports, however, have maintained a fairly constant level of between 1.2 and 3.3 million tons. U.S. SRW wheat exports have also been volatile, though not as much as for HRW wheat. Since 1980/81, excluding the high of 8.2 million tons in 1981/82 and the low of 61,000 tons in 86/87, U.S. SRW exports have averaged just over 3.1 million tons. This tonnage is only slightly lower than Canada's average CWRS wheat shipments of 3.2 million tons (excluding the high of 7.5 in 1987/88). Despite the similar average in gross shipments over the 10 year period, U.S. shipments have been much more volatile--both in terms of the year-to-year change in quantity and the share of total soft wheat that China imports.

Outlook for Wheat Imports. With incomes rising, consumption of wheat and wheat products are expected to rise steadily in the 1990's. Given the limited potential for expanding cultivated area and the probable slowness of yield improvements, domestic supplies of wheat will not be able to meet expected demand.

Assuming a population growth rate of 1.4 percent, modest yield increases, open trade prospects, real GNP growth rates of 6 percent, and continued current agricultural, economic, and political policies, by the year 2000 imports could expand to at least 17 million tons--and could well exceed that in years when weather reduces crop yields (Crook, "Year 2000," June 1988).

Wheat Sector Policies

Government intervention in China's wheat economy was substantial from 1955 to 1990. However, in 1990 a number of reforms were initiated which greatly reduced Government influence in the wheat economy.

Producer Policy

China's wheat production policy is very complex because of wide diversity in climate, economic regions, and because wheat is raised under three different economic systems: the state; the market; and under conditions of self sufficiency (the traditional economic system). From the mid-1950's to the mid-1970's Government policy taxed wheat producers. After 1979 the Government administratively raised procurement prices which provided producers with a modest production subsidy.

The State Wheat Economy. The state wheat economy, composed of two parts, impacts on about 38 percent of total wheat production. First, there are Government-owned state farms that cultivate about 4 percent of China's total cultivated land. The State Farm Bureau (under the Ministry of Agriculture) uses state planning mechanisms to manage wheat production decisions for some 2,000 state farms.

Second, the Grain Bureau (under the Ministry of Commerce) manages the grain purchase and supply system which was established in the mid-1950's. The Grain Bureau uses numerous mechanisms to manage the grain purchase system and to control the wheat economy. Growers were forced to deliver set quantities of wheat to state grain purchase stations at relatively low state fixed prices. The Government controlled the supplies of inputs to wheat growers to make sure wheat deliveries were met (table 5). In 1990, the Government purchased 17 million tons of wheat using fixed-purchase prices, which constituted 67 percent of Government wheat purchases (Ding, 1989; Commerce Ministry, 1991).

The Government purchases the remaining 33 percent of its requirements through negotiated prices. Grain Bureau cadres sign negotiated grain purchase contracts with farmers in the spring, in which they promise to buy grain in the autumn at a specified price that is usually a little lower than the prevailing open market price (table 6).

The Market Wheat Economy. Markets managed China's wheat economy before 1949, but the Government's grain purchase and supply system implemented by the Grain Bureau took over grain marketing functions from wholesale markets after 1949. From 1953 to 1962 Government authorities restricted the functions of rural open markets. From 1962 to 1966 rural open markets were allowed to function but from 1966 to 1978 authorities closed them (Crook, China Trip Report 1990, p. 32). Open markets developed rapidly since 1978, and in 1992 provincial authorities in Jiangsu, Shandong, and Fujian reported that more than 60 percent of agricultural products sold off the farm passed through open markets (JPRS, No. 9, Feb. 9, 1993, p. 45).

In October 1990, China's Government authorities opened a national wholesale grain market in Zhengzhou, Henan province. The Zhengzhou market was organized to assist the movement of about 3 million tons of negotiated-priced wheat from one province to another. Currently there are 7 regional wholesale grain markets in China and many more provincial and regional markets.

The Traditional (Self-Sufficient) Wheat Economy. Rural income and expenditure surveys conducted in 1990 show that rural families obtained about half of their food from their own production (Crook, Nov. 1989). There are two reasons for this high degree of self-sufficiency. Many areas of China's vast space are blocked by mountain ranges and deserts, are connected by a relatively poor

Table 5--Summary of China's wheat sector policies

Policy	Description
Border measures	Price intervention is significant. The Ministry of Foreign Economic Relations and Trade maintains a monopoly on wheat imports.
Procurement policy	Price intervention has been substantial, but reforms are reducing Government purchases. Of total 1990 wheat output, the Government procured 17 percent at low, fixed prices and 9 percent at a higher negotiated price.
Urban rationing	From 1955 to 1991, the government provided price subsidies and guaranteed distribution of wheat flour to urban residents and state employees. Subsidies were reduced in 1991 and 1992 when retail wheat flour prices were raised. In May 1991, flour prices were raised 56 percent from 370 to 560 Yuan per ton. Urban rationing has been eliminated in more than half of China's 30 provinces.
Input subsidies	From 1955 to 1991, central and provincial Governments provided fertilizer, fuel, pesticide, and other inputs at low, fixed prices. Input subsidies are declining as the Government reduces its purchases of wheat at low, fixed prices.
Infrastructure	Wheat producers benefit from substantial Government investment in irrigation, water control, research, meteorology, and extension services. The Government also provides transportation, storage, and other services that add value to agricultural commodities.
Credit subsidies	From 1955 to 1991, the Government paid for a portion of the wheat purchase in advance. Agricultural banks also provided a limited quantity of low-interest loans to peasants. In the past few years most rural capital has been directed away from agricultural production and invested in rural industry.
Exchange rate	The government-set exchange rate is lower than the black market rate. Hence, the local currency is overvalued. However, significant devaluations in the late 1980's and 1990's narrowed the spread between the shadow and government-set exchange rates, reducing the implicit producer taxes and consumer subsidies. arising from this policy.

transportation and communication system which forced them to maintain self-sufficiency. Secondly, Government and Party policy stressed local self-sufficiency from the mid-1960's to 1978. Currently, there is less stress on local self-sufficiency than before.

Since the breakup of the commune system in 1984, farm families have begun to store grain. Where growing conditions are poor and the probability for crop failure is high, such as in Inner Mongolia, farm families keep 2 to 3 years of wheat in stock.

As China's transportation and marketing system improves, the need for these stocks will be reduced. Since most of these stocks are probably lower-quality wheat, a reduction of stocks likely will not end up competing with higher-quality imported foreign wheat. But farmers are likely to begin to produce varieties of wheat which command higher prices in the marketplace, and some of this wheat may compete with imported wheat.

Consumer Policy

The central purpose of the "grain supply" system established in 1955 was to ensure that industrial workers, urban residents, the military, and state workers and employees had a steady supply of cheap food grains. The party wanted to make sure that its urban constituents were well fed. Through the mid-1970's, this collection of Government policies had the net effect of taxing producers of wheat and subsidizing consumers. The consumer subsidy declined during the latter part of the 1980's as China underwent a series of sharp currency devaluations. In addition, the Government increased the price for subsidized wheat flour in 1991 and 1992. Policy statements by Government officials in 1992 and 1993 suggest that leaders eventually intend to dismantle the "grain supply" system so that urban

Table 6--China's wheat supply, use, and prices, July/June marketing year

Item	Unit	1985–89 average	1989/90	1990/91	1991/92
Price indices (1980/81=100):[1]					
General wholesale price index	Yuan	173	219	224	235
Change	Percent	12.5	8.6	2.3	4.8
General consumer price index	Yuan	153	190	195	204
Change	Percent	10.9	9.3	2.5	4.7
Wheat prices:[1]					
Procurement price[2]	Yuan/ton	560	651	614	675
Change	Percent	12.0	6.1	–5.7	9.9
Retail price (flour, ordinary)[2,3]	Yuan/ton	569	660	637	699
Change	Percent	11.1	5.5	–3.5	9.8
Retail price (flour, special)[2,3]	Yuan/ton	682	776	764	807
Change	Percent	10.2	6.0	–1.5	5.7
Wheat supply and use:					
Production	Th. tons	87,586	90,807	98,229	96,000
Change	Percent	0.8	6.3	8.2	–2.3
Consumption	Th. tons	102,730	104,500	106,029	111,000
Change	Percent	2.6	0.1	1.5	4.7
Exchange rate	Yuan/$	3.71	4.27	5.06	5.44

[1] The July/June price indices and wheat prices are estimated based on calendar year data adjusted to a marketing year basis. Wholesale price indices for 1989–92 were estimated.
[2] An average of fixed, negotiated, and free–market prices of a mix of standards, grades, and qualities. The average is for 1986–89 because 1985 data are not available.
[3] Two grades of flour are identified: (1) an ordinary grade; and (2) a special, high–quality grade. The retail prices for 1991/92 are estimated.

Sources: *China Finance Almanac,* various issues; *China Statistical Yearbook,* various issues; *International Financial Statistics,* International Monetary Fund, various issues; and USDA, Economic Research Service.

demand for flour in the future will be met through open market transactions (FBIS, No. 188, September 28, 1992, p. 39; and Crook, Trip Report, 1992).

The Grain Bureau manages the grain supply system, transporting wheat from farms, stores, mills, and distributing intermediate grain products to breweries, feed mills, and bakeries, and retailing final food products to largely urban consumers. Retail prices for urban grain rations were set in the 1960's and changed very little in three decades. Because the Grain Bureau increased the purchase price it paid to farmers during the same time period, a gap between purchase and selling price developed. At first the gap was small and the central Government budget had no difficulty handling the subsidy (Contemporary, 1988). For example, in 1978 the state subsidy for food grains and edible oil was 3.6 billion Renminbi (RMB, China's official currency). But by 1980 it had increased to 10.8 billion, and in 1990 the subsidy reached 40 billion RMB, about 10 percent of total central budget expenditures.

In an effort to reduce central budget expenditures for food subsidies, the Government in May 1991 and April 1992 announced price increases for grains rationed to urban residents. In the short term, the effect of the price increase will be to lower the demand for flour in urban areas and reduce waste. In the long run, demand for flour should rise along with increases in income.

Trade Policy

Wheat is a state controlled commodity in China. This means that all international wheat trade is controlled by CEROILS, a state trading corporation controlled by the Ministry of Foreign Economic

Relations and Trade (MOFERT). The State Council, China's highest Government policy unit, determines the annual foreign exchange allocations to be used for wheat imports based on need (determined by examining expected domestic production, stock levels, and anticipated consumption and prices), foreign exchange availability, and sometimes foreign policy considerations (giving consideration to specific country supply sources irrespective of price). Funds are earmarked and MOFERT directs CEROILS to make the requisite purchases. CEROILS buyers negotiate contracts with firms or wheat boards. It has the responsibility to specify classes of wheat, moisture content, dockage, insect, weed seed, and health requirements. CEROILS arranges for the shipping of the wheat and assigns vessels to specific ports according to a plan drawn up by the Grain Bureau (Wheat Survey, 1992).

The Grain Bureau in Beijing produces an annual national wheat distribution plan. Since the early 1960's that plan has recognized a basic wheat deficit situation. The Grain Bureau notifies its parent ministry, the Ministry of Commerce, about the requirement to import wheat to meet urban demand. The Ministry of Commerce, in turn, communicates this analysis to the State Council where it is used to determine the year's wheat import plan.

Private Imports. To date, the private sector has not been involved in China's international wheat trade. However, recent changes in domestic marketing regulations allowing private businesses to participate in the distribution and marketing of grain not committed to state procurements suggest that international trade in grain may eventually be liberalized as well. However, if international grain trade is liberalized, authority for grain trade will probably first be devolved to provincial Government institutions or trade companies. If that initial step is deemed successful, private sector grain trade might then be allowed. Private international trade in wheat is not considered likely before the mid-1990's.

Import Taxes. Whole wheat is imported free of any tariff duties. However, wheat flour imports are subject to a 9 percent *ad valorem* rate for MFN trading partner countries and a 14 percent rate for others. According to the U.S. Agricultural Attache in Beijing, China adopted the "Harmonized System of Tariff Classification" as of January 1, 1992. Tariffs are applied on a CIF basis (USDA, FAS Grain and Feed, 1992).

Phytosanitary Regulations. Imported wheat is subject to regulation by three separate Government institutions: the China Commodity Inspection Bureau (CCIB), the China Animal Plant Quarantine Bureau (CAPQ), and the Health Bureau (HB) (Wheat Survey, 1992). The Commodity Inspection Bureau has the responsibility to insure that imported wheat meets the specifications stipulated in the contract.

Before 1992, China had quarantine regulations but little in the way of enforcement mechanisms. The National People's Congress and State Council passed and published a quarantine law which reportedly has enforcement provisions. CAPQ officials currently are primarily concerned with *Tilletia Contraversa Kuhn* (TCK) and *Sorghum Halapense* (L), or Johnson grass seed, in U.S. wheat. Shipments of U.S. wheat which contain these two banned materials must receive special treatment before the wheat can be used (Wheat Survey, 1992).

Marketing and Distribution

China's central Government is still the sole player in international grain trade, though recent policy liberalization allows private traders to participate in domestic distribution and marketing. The restrictions prohibiting interprovincial grain movements by non-Government trade companies or business enterprises were also relaxed. However, the central Government, through the Grain Bureau, is still the dominant actor in the domestic grain market.

Organization and Marketing of Wheat Imports

MOFERT takes responsibility to implement decisions made by the State Council. MOFERT, in turn, assigns CEROILS the task of actually importing wheat.

Once a wheat vessel has cleared all three inspections (CCIB, CAPQ, and HB) a special office of the Grain Bureau, the Port Transportation and Storage Office, arranges for distribution of the wheat to flour mills in different cities and provinces. This is done according to the national distribution plan formulated in Beijing. From 5 to 10 percent of urban mills have been granted special authority to select the kinds of wheat they want from what is available in local storage. The wheat selected is then transported to the mills (Wheat Survey, 1992).

Tendering Procedures. In major wheat-exporting countries, CEROILS has business offices which handle tendering procedures. Public tenders specify the kind, grade, class, and price of wheat they want to import. The tender also specifies limits for protein, moisture, dockage, quarantine objects, delivery period, and ports of destination.

Port Facilities. China currently imports wheat through 15 ports, of which Dalian, Qinghuangdao, Tianjin, Shanghai, and Guangzhou are the major points of entry. The central Government, as well as coastal provincial Governments, have been actively supporting increased investment towards improving port equipment and expanding capacity. For example, port authorities in Dalian constructed automatic unloading facilities that permits them to transfer bulk wheat from large vessels to railcars. Also, the port of Qinghuangdao recently completed the addition of bulk grain handling equipment (adding berths, storage for 63,500 tons of grain, and facilities able to off-load 600 tons of grain per hour). Using funds provided by the World Bank, the port of Shanghai is upgrading its facilities, including an 80,000-ton grain silo, the largest in China. After the improvements are finished, the port at Shanghai will have an annual capacity of 6.2 million tons of grain.

Import Inspection and Grading. The Health Bureau certifies that shipments are free from items harmful to consumers, such as aflatoxin. The China Commodity Inspection Bureau (CCIB) certifies that shipments meet contract specifications with regard to weight and dockage. The China Animal and Plant Health Inspection Bureau certifies that shipments are free from noxious weed seeds, spores, and insects. According to China's CCIB inspectors, most U.S. wheat cargoes failed inspection because actual dockage exceeded limits specified in the contracts (Wheat Survey, 1992). Dockage in this report is defined as nonmillable materials, such as weed seeds, chaff, stems, and stones, that can readily be removed through cleaning because the size and weight of the materials are so different from wheat.

In some ports, local CEROILS offices were responsible for ensuring that imported wheat passed all inspections before turning the product over to the Grain Bureau. In other ports, the Grain Bureau itself took control of the wheat and worked the product through the inspection system. They only contacted CEROILS if the shipment failed inspection procedures, at which time CEROILS officers contacted the foreign suppliers to work out compensation.

Domestic Wheat Marketing System

From 1955 to 1992 the Grain Bureau determined consumer allocation of wheat. Officials assessed wheat requirements for all consumers, but were primarily concerned with the supplies for urban residents.

In the early 1980's, rural and urban open markets were re-opened and through the years they began to retail an increasing quantity of final grain products. As market demand for flour grew, mills

became increasingly interested in producing different kinds of products in response to consumer demand. In the old system, the Grain Bureau could force poor-quality flour down through its distribution channels (grain shops). But consumers can now buy flour from open markets and are much more quality-conscious. The Government-owned grain stores cannot now force low-quality goods on consumers because they have alternative sources of supply in local open markets. Low quality goods pile up in Government stores and result in financial losses. An increasing number of mills compete for consumer business but they have difficulty purchasing the kinds of wheat needed to mill quality flours.

In past years the Grain Bureau received honors if it simply delivered a quantity of domestic "wheat" to a destination on schedule. Times have changed and millers are now asking the Grain Bureau system to deliver specific kinds of wheat. But the Grain Bureau system is responding slowly to quality issues. Grades and standards for domestic wheats have only recently been established. Wheat is raised on millions of small farm plots and the Grain Bureau has an enormous problem keeping different classes and grades of wheat separate in its limited capacity grain handling system. Millers that have access to both foreign and domestic wheat prefer foreign wheat because it is much more consistent within shipments than domestic wheat. Additionally, part of the problem mills have in obtaining different classes of wheat rests on the fact that the Grain Bureau has little leverage with CEROILS to import specific classes of wheat.

Wheat Storage. Wheat storage in China occurs at many levels, including some on-farm stocks equivalent to 1 or 2 years of the family's consumption, local, prefectural, provincial, and central Government grain stocks, and finally, a 2-3 month supply is held by mills or food processors (Crook, Nov. 1989). In 1991, the Ministry of Commerce, under the direction of the State Council, initiated a new special grain reserve program to be used to dampen price fluctuations in the more liberalized grain economy. As of May 1991, the special reserve reportedly contained 28 million metric tons of wheat, rice, corn and soybeans (USDA, FAS, Grain and Feed, 1992).

The question of who pays for building grain storage facilities is the subject of some uncertainty. Beijing continues to stress the importance of keeping grain stocks, but has limited funds to devote to actual construction. Local Governments have responded by storing grain in temporary mat storage bins where waste rates can be high. Our travels in China in 1992 by rail and highway suggest that in north China at least, Government-owned Grain Stations have stored large quantities of grain in these temporary bins. At the same time we observed that workers were building new permanent grain silos in Grain Stations (Crook, China Trip Report, 1991, pp. 15-20; and Crook, China Trip Report, 1992, pp. 41-54).

In the past, wheat storage costs had little relevance in China's centrally planned economic system. But more financially conscious administrators estimate it costs about $25 to store a ton of wheat for 1 year. As reforms continue during the 1990's, wheat storage costs will become more important.

Quality Characteristics of Domestic Wheat

Farmers in China produce wheat in many different climates, using many kinds of production techniques. Generally, farmers do not plant a specific variety of wheat with special characteristics for a specific market or for a specific product. Local grain bureaus purchase wheat from farmers and mingle output from different farms. The quality characteristics of wheat from one county may be fairly uniform. But the quality characteristics of wheat from a county in the lower Yangzi River Valley will be different from that raised in a county in the Beijing area.

Through the centuries, cooks learned by trial and error how to best use local flours. A general rule of thumb is that consumers learn to eat and develop special products, using locally grown wheats.

As open markets had an increasingly important effect on wheat production, consumption, and trade, officials in the Grain Bureau in 1990 drafted provisional regulations specifying classes of wheat and prescribing grade standards. Provisional classifications include 7 classes: hard white, soft white, hard red, soft red, mixed hard, mixed soft, and unclassified wheat. There are 5 grades each for northern winter wheat, southern winter wheat, and spring wheat (PRC, 1992).

Hardness/Gluten Quality. China's Government officials note that hard white, hard red, and mixed hard wheat classes are used to produce high-gluten flours and that soft white, soft red, and mixed soft wheat classes are used to produce low-gluten flours (PRC, 1992). Millers in large urban areas like to use foreign wheats because imported wheats tended to be more consistent within grades than domestically produced and graded wheats. The implication is that, at the present time, local Grain Bureaus are not able to maintain the integrity of wheat classes and grades.

Color. China's officials classify domestically produced wheat into three color classifications: red, white, and unclassified (PRC, 1992). Millers in Guangdong prefer white wheats, which they used to make flour for biscuits, cakes, and dumplings (Wheat Survey, 1992).

Moisture. National domestic standards specify that moisture levels for all grades of northern and southern winter wheats remain below 12.5 percent. Moisture levels for northern winter wheat are rarely a problem, but moisture levels for southern winter wheat is a problem because the crop is often harvested in early summer, when rainfall is heavy and drying facilities are limited. For all grades of spring wheat, the moisture level should be below 13.5 percent. Farmers in spring wheat growing areas often have to harvest the crop before it has had a chance to dry out to avoid early frosts, snowfall, and late season rains. Government grain stations can refuse to purchase high-moisture wheat. Farmers who deliver such wheat have the option of either transporting the product back home for further drying of selling it at a discount to the grain station which bears the cost of drying the wheat.

Protein. Provisional standards require that low-gluten wheat flours (made from domestic soft wheats) contain 10 percent protein on a dry weight basis. High-gluten flours made from domestic hard wheats should contain 12.2 percent protein on a dry weight basis (PRC, 1992).

Cleanliness. The provisional standard for all classes and grades of wheat is that impurities be under 1 percent and that minerals be limited to 0.5 percent. Mills in large urban centers, which normally mill foreign wheats, noted that locally produced wheat had more impurities than imported wheat. This condition probably stems from the crude machinery used to thresh and dry domestic wheat.

Domestic Milling and Baking Industries

China's flour milling industry improved rapidly in the post-1949 period (Ding, 1989). Flour mills in urban areas expanded to handle the increased quantities of wheat the Grain Bureau purchased from rural areas and from foreign countries. The urban mills generally produce two kinds of flour: *jingbai*, a white refined flour, with an extraction rate of 70 percent (Crook, Sept. 1986, p. 39), and *biaozhun* (standard), a darker flour with an extraction rate of over 80 percent. The *Agricultural Economic Technical Handbook* suggested that in 1983 the average extraction rate was 85 percent, with the highest rate set at 91 percent (Ag Technical Handbook, May 1983, p. 304). An 0.85 extraction rate was used in this report for making any flour to wheat conversions.

Recent price increases for rationed flour have prompted even more urban consumers to shift their purchases to free-market, special grade flour. This quality consciousness on the part of the consumer is making itself felt in the milling and baking industries, where quality concerns are increasingly a major focus in securing wheat for milling (Wheat Survey, 1992).

In the 1950's farmers used native stone mills to produce flour. But in time, the native mills gave way to more modern disk and roller mills (Crook, China Trip Report, 1989, p. 14).

For decades, China's flour mills have blended imported wheats from Canada, Australia, and the United States with domestic wheat varieties to produce the required flour type.

Review of Survey Results

In May 1992, interviews were conducted with officials of the CEROILS, the Grain Bureau, the China Commodity Inspection Bureau, the China Animal and Plant Quarantine Bureau, and Government owned flour mills. The interviews focused on factors affecting choice of suppliers, supplier performance, importance of specific quality factors, contract specification for quality preferences, and trade impacts of selling cleaner U.S. wheat to China. This section summarizes the interview results.

Quality ranks a close second, after price, in the CEROILS' wheat purchase decisions. Major quality factors considered important by CEROILS officials include quarantine objects, live insects, pesticide residues, dockage, and protein quantity and quality. In 1991, nearly half of wheat shipments from the United States to China were found to be deficient in quality. Nearly 60 percent of all claims filed by CEROILS against U.S. exporters were attributed to the existence of live insects in imported U.S. wheat.

Factors Affecting Choice of Supplier

In general, CEROILS' tender procedures and factors considered for source decisions are primarily determined by CEROILS officials, although Grain Bureau officials and flour millers can suggest their quality needs. Some flour mills in coastal or Special Economic Zone cities, however, have more flexibility in specifying their quality needs to the CEROILS, which potentially could affect CEROILS' choice of supplier. Flour mills, which have permission to specify their quality needs at the present time, are the exception rather than the rule. The CEROILS still is the sole agency that determines the source of supply. If economic reform accelerates, it is expected that more mills would have this flexibility to specify their quality needs and that the CEROILS would be more responsive to the quality needs specified by the millers. Under this scenario, flour mills may be permitted to directly import wheat in the future.

Under the current import system, CEROILS officials placed price paid for imported wheat (including availability of EEP bonuses) as the most important factor in choosing their source of wheat imports (table 7). CEROILS officials are extremely astute buyers and pay close attention to bonuses under the EEP program. Over the last 5 years, about 90 percent of U.S. wheat sales to China were under the EEP program, which permitted U.S. exporters to sell wheat at the world price. Also, all wheat purchased by China is on an f.o.b. basis. CEROILS would purchase more U.S. SRW wheat if it were priced (f.o.b.) at least US$10/mt lower than Canadian CWRS wheat in part because ocean freight from the Gulf to China typically runs about US$10/mt more than from Vancouver, B.C.

Quality ranks a close second in CEROILS' wheat purchase decisions (Wheat Survey, 1992). Product quality has become the byword in contemporary China and the search for quality is pervading all sectors of China's grain economy. Major quality factors considered important by CEROILS officials include quarantine objects, live insects, pesticide residues, dockage, and protein quantity and quality.

Government trade relationships is another important factor considered by the CEROILS in deciding wheat supply source. China has maintained trade relationships in wheat imports with the United States as well as with Canada, Australia, EC, and Argentina. Its wheat imports are guided by

Table 7--Summary of factors affecting China's choice of supplier

Factor	Explanation
Wheat price	CEROILS would purchase more U.S. wheat if it were (f.o.b.) at least US$10.00/ton less than Canadian wheat. In contrast, China would buy more Canadian wheat if the price differential were less than US$2.00.
Wheat quality:	
Quarantine objects	Due to the pivotal concern over food security and the significance of domestic wheat output, CEROIL officials place quarantine objects (TCK and Johnson grass seed) as the most important quality criterion considered in making purchase decisions.
Live insects	Live insects is the most important quality factor that was cited by CEROILS as the reason for filing claims against U.S. exporters. The existence of live insects in wheat shipments requires additional fumigation and may delay the shipment schedule.
Pesticide	Pesticide residues in wheat raise concerns over food safety and the health hazard to the public.
Dockage	There is a tendency to buy away from U.S. wheat because of its high dockage (around 0.7 percent). And in the eyes of China's bureaucracies, high dockage is associated with live insects and Johnson grass seeds.
Protein	U.S. SRW wheat contains a protein content of around 10 percent, while Canadian spring wheat has 12.5 percent or above. In addition, U.S. SRW wheat has a weak protein (mainly gluten) quality. Thus, U.S. wheat can only be used for oriental noodles, dumplings, buns, rolls, or other oriental foods. For making bread, U.S. wheat must be blended with high-protein Canadian wheat.
Gov't trade relationship	China maintains a close trade relationship with the United States, Canada, and other suppliers.

Source: Wheat Survey.

China's long-term trade policy, leaving out any possible effects of short-term policy changes. Despite this guidance, China prefers to maintain flexibility in its wheat import decisionmaking by not being restricted by long-term bilateral trade agreements.

Flour millers indicated that most of the quality factors mentioned above are also important to them for milling purposes. These include live insects, pesticide residues, dockage, protein quantity, and quality. Unlike CEROILS, which places a pivotal emphasis on Johnson grass seed because it is a quarantine object, flour millers are more concerned with the existence of glass and metal objects in imported wheat because of safety considerations. Some flour millers indicated that trade servicing would also be a part of the criteria if they had the freedom in deciding the source of supply.

Supplier Performance

U.S. SRW wheat is normally priced (f.o.b.) lower than Canadian CWRS wheat, in part, because of bonuses awarded to U.S. exporters under the EEP program. Also, SRW wheat is generally priced lower than hard red spring (HRS) wheat due to its lower protein content.

CEROILS officials and flour millers consistently indicated that Canadian and Australian wheats have quality attributes preferable to U.S. wheat. U.S. wheat fared less well because of its higher dockage, the existence of Johnson grass seed, lower protein, weaker gluten quality, and live insects problem. However, U.S. wheat quality was seen as superior to EC and Argentine wheats (Wheat Survey, 1992).

According to CEROILS, U.S. wheat performs poorly, based on China's quarantine rules, compared with wheats from Canada, Australia, and EC. CEROILS reported that wheats shipped from Canada, Australia, and EC, unlike U.S. wheat, were free of Johnson grass seed. However, the problem of Johnson grass seed in Argentine wheat was even worse than in U.S. wheat (Wheat Survey, 1992).

CEROILS officials and China's flour millers all indicated that U.S. wheat tends to contain more live insects than competitors' wheat. The existence of live insects in U.S. wheat requires CEROILS to do more fumigation and may delay the delivery of the wheat to China's flour mills.

There is a tendency to buy away from U.S. wheat because of its high dockage--a hassle for China's bureaucracies. CEROILS officials and flour millers consistently indicated that U.S. wheat tended to contain a higher level of dockage (typically ranging from 0.4 to 0.8 percent) than that in Canadian and Australian wheats (around 0.2-0.3 percent). Thus, cleanliness in Canadian and Australian wheats comes closer to the 0.1 non-deductible maximum limit specified in the CEROILS contract. High dockage levels in U.S. wheat tend to be associated with live insects and Johnson grass seed. Also, CEROILS officials stated that variability of dockage in U.S. wheat between shipments sometimes is a problem.

In most years, China imports soft red winter (SRW) wheat from the United States, primarily to blend with high-protein Canadian CWRS wheat. Because China imports large quantities of SRW and HRW wheats from the United States, U.S. wheat is perceived by CEROILS officials and many millers as deficient in protein quantity and quality. U.S. HRW wheat contains a protein content of about 11 percent and protein in SRW wheat is around 10 percent, lower than 12.5 percent or above for Canadian spring wheat. In addition, gluten quality in U.S. wheat tends to be weaker than in Canadian CWRS wheat, making U.S. SRW wheat more suited for making oriental noodles and dumplings than for making bread.

Moisture level in U.S. wheat, although meeting the 13.5 percent maximum limit in the contract specification during 1988-91, was perceived by some millers as higher than that in competitors' wheat. A flour mill in Tianjin indicated that U.S. wheat contained a moisture level ranging from 10 percent to 13.5 percent. In contrast, moisture in competitors' wheat averaged around 10 percent. However, it is not at all clear that competitors' wheat always contained a lower level of moisture. A flour miller in Beijing indicated that Canadian wheat often contained a moisture level as high as 13 percent or more, higher than in U.S. wheat. Thus, performance of U.S. wheat in terms of moisture, vis-a-vis performance of competitors' wheat, is mixed.

China's trade surplus status with the United States pressures it to consider buying U.S. wheat. Also, China's purchases of U.S. wheat are timed to influence votes in the U.S. Congress concerning the renewal of China's most-favored-nation (MFN) trade status, permitting China's goods to enter the United States with the lowest tariffs.

Importance of Specific Quality Factors

Within the context of overall wheat quality, CEROILS officials placed wholesomeness of wheat quality as a priority concern above physical and intrinsic attributes. Specific quality factors in the area of wholesomeness are live insects, pesticide residues, and quarantine objects (table 8). These objects consist of Johnson grass seed and *Tilletia Contraversa Kuhn* (TCK), a winter wheat disease.

The Government places a pivotal emphasis on ensuring an adequate food supply for China's vast population and is unwilling to run the risk of jeopardizing domestic wheat production by importing wheat containing Johnson grass seed or TCK.

China ended its imports of U.S. white wheat from Pacific Northwest (PNW) ports since the beginning of the 1970's because of TCK. Small amounts of white wheat were imported from California in 1979 and 1980. Despite some flour millers' interest in importing U.S. white wheat, CEROILS has not made any purchases of U.S. white wheat since 1981.

Table 8--Summary of China's quality concerns

Quality concerns	Nature of concern
Live insects	Live insect contamination in imported wheat poses a threat to China's food supply and safety. In 1991, 55.7 percent of all claims filed against U.S. exports were attributed to live insects.
Johnson grass seed	Johnson grass seed, a quarantine object since 1987, is a threat to China's domestic wheat production, which accounts for nearly 90 percent of all wheat use. The Government's overriding concern with maintaining an adequate food supply, largely based on domestic output, leads to the inclusion of Johnson grass seed as a quarantine object. Johnson grass seed recently became more severe in U.S. wheat, reaching 14 percent of all wheat shipments in 1991.
Test weight	U.S. wheat was found to have a lower test weight than Canadian and Australian wheats, thereby reducing the milling yield from U.S. wheat.
Dockage	U.S. wheat was perceived to contain a higher level of dockage (typically around 0.7 percent) than Canadian and Australian wheats (around 0.3 percent).

Source: Wheat Survey.

Johnson grass seed, a quarantine object since 1987, is a special concern to CEROILS. Johnson grass, if seeded in fields, competes with wheat plants for plant nutrients, space, and sunlight. Wheat containing Johnson grass seed must be stored, treated, and cleaned separately from the rest of the shipments. The seed has to be screened and milled into fine pieces with a diameter of not longer than 1 millimeter. The treatment and cleaning of Johnson grass seed, just like dockage, would cause wheat losses. Unless the seed is treated with care, the seed can return to wheat fields after being fed to work animals. According to the Grain Bureau officials in the Ministry of Commerce, it costs about US$3.50 (or 15 to 20 yuan) per metric ton to treat and clean Johnson grass seed. CEROILS officials reported that U.S. HRW wheat tended to contain more Johnson grass seed than that in SRW wheat.

Live insects were cited by CEROILS officials as the most important quality factor that caused them to file claims against U.S. wheat exporters. Of the 63 claims filed against U.S. exporters in 1991, 35 were attributed to the presence of live insects in U.S. wheat. Pesticide residues also were an important criterion, since their presence affects food safety and public health. In addition, CEROILS officials indicated that concerns over food safety and health effects on the huge 1.17-billion population in China cause them to pay special attention to the possibility of live insects and pesticide residues in imported wheat.

Although wholesomeness is more important than physical attributes, as noted earlier, dockage is the most important physical attribute considered by CEROILS officials in making wheat purchase decisions. Ranking right behind dockage is moisture level--a very important physical attribute considered by CEROILS officials. Excessive moisture in wheat would lead to lower milling yields, because less amount of water can be added in the milling process.

Wheat protein quantity and quality (primarily gluten quality) are two of the intrinsic attributes considered by CEROILS officials as important in choosing suppliers. Wheat used to produce specific-purpose flour for bread requires a protein content around 12 percent and a gluten quality strength of 32 percent. In contrast, wheat used to produce general-purpose flour for making oriental noodles, dumplings, buns, and rolls does not require such a high protein level, and only needs a gluten strength of 26 percent.

Individual flour millers generally would also consider the above quality factors as most important or very important factors if they were able to specify their quality needs. However, it is important to note that these millers also consider other physical or intrinsic attributes as most or very important.

In the physical attributes category, these factors include: heat damage, other wheat classes, and shrunken and broken kernels. In intrinsic attributes area, all flour millers considered protein quantity and gluten quality as most important factors. However, they also regarded the following factors as very important: wheat hardness, the "falling number," kernel size, and test weight. A desirable "falling number," a measure to identify sprout damage, is at least 300 seconds. If sprout-damaged wheat is present, the number would be less than 300 seconds.

Quality Problems

In 1991, China imported about 4.5 million metric tons of U.S. wheat. Of the 110 vessel shipments, 49 were found to have quality problems, accounting for 44.5 percent of all shipments. Thus, nearly half of wheat shipments from the United States to China were found to be deficient in quality.

As a result, CEROILS filed a total of 63 claims against U.S. exporters, of which 35 were attributed to the existence of live insects in imported wheat, or 55.7 percent of all filed claims. In addition, 14 claims were attributed to Johnson grass seed, 7 to test weight, 4 to dockage, and 1 claim was attributed to the existence of a dead animal in the cargo. Johnson grass seed became more a problem in recent 2-3 years, reaching 7.3 percent in 1989, 14.6 percent in 1990, and 13.8 percent in 1991.

Nevertheless, U.S. wheat quality has improved in recent years, compared with its quality in the 1970's. The percentage of contract nonconformity in U.S. wheat shipments declined in recent years. According to the China Commodity Inspection Bureau (CCIB), 40.5 percent of U.S. wheat shipments in 1989 were found to be inconsistent with the contract specification. That percentage declined to 37.3 percent in 1990, and further down to 19.4 percent in 1991. Table 9 shows the details of CCIB inspection results for U.S. wheat at ports of Tianjin, Dalian, Shanghai, and Canton. However, variability in moisture, protein quantity, dockage, and damaged kernels between shipments remained a problem for CEROILS officials and flour millers.

Contract Specification of Quality Preferences

China purchases No. 2 or better SRW, HRW, and, at times, a small amount of HRS wheat from the United States. Thus, a set of minimum or maximum grade limits set forth by the U.S. wheat grades and standards apply to all grade-determining factors. For example, the grade-determining factor foreign material (FM) has a maximum limit of 1 percent for U.S. No. 2 wheat. The maximum limits for all of the various grade-determining factors for U.S. No. 2 wheat are listed in table 10. In addition, CEROILS officials also specify limits for nongrade-determining factors, including dockage, protein, and moisture (table 11). CEROILS specifies in the contract a 0.1 percent dockage being nondeductible (that is, the dockage level may not be deducted from the gross weight); with any amount in excess of 0.1 percent being fully deductible. However, a penalty is assessed if the dockage

Table 9--China Commodity Inspection Bureau results for U.S. wheat

Port	Time period	Ships inspected	Percent failing	Primary reasons for shipment failure
Tianjin	1988-91	86	13	Dockage
Dalian	1973-91	467	27	Dockage, defects, damaged kernels
Shanghai	1990	10	27	Dockage, under weight
	1991	14	5	Dockage
Guangdong	1990	12	50	Dockage, heat damage
	1991	16	19	Not available

Source: Wheat Survey.

level exceeds 0.8 percent. Details of how the penalty would be assessed are not specified in the contract.

CEROILS also specifies a minimum protein content of 12.5 percent for HRS wheat and 11.0 percent for HRW wheat. No protein quantity is specified for SRW wheat, although flour millers in China frequently indicated that a protein content around 10.0 percent would be preferred. Also, even though CEROILS does not include gluten quality strength in the contract specification, flour millers indicated that a 32 percent gluten strength is desired for wheat used to make specific-purpose flour and a 26 percent gluten strength for wheat used to make general-purpose flour.

Moisture level is specified by CEROILS not to exceed 13.5 percent in the contract. This is a threshold level beyond which storage of wheat becomes problematic. However, some flour millers indicated that a preferred level of moisture is not to exceed 10-11 percent.

Importance of Dockage

As noted above, China specifies a rather strict requirement in its contract: the level of dockage that exceeds 0.1 percent is fully deductible. In addition, a penalty is assessed if the dockage exceeds 0.8 percent. This specification stems from several concerns about dockage. First, high-dockage wheat gives rise to an unfavorable appearance when wheat is unloaded at the dock point. Second, less-clean wheat reduces milling yields and thus raises price paid on a millable material basis. Third, high-dockage wheat is a hassle for Government bureaucracies because it tends to be associated with problems of live insects and Johnson grass seed. CEROILS officials have to spend time and energy to resolve fumigation and cleaning issues and they have to confront foreign trade companies for claims. High-dockage wheat simply means headaches for these officials. Finally, high-dockage wheat creates ash at the mill during the milling process, thereby causing safety and health hazards.

Costs and Returns of Cleaning

China's preference for importing cleaner wheat reflects the Government's decision to avoid problems caused by dockage. In addition, consideration of costs and returns of cleaning wheat may have also contributed to China's strict requirement on dockage.

Importing high-dockage wheat incurs additional ocean freight charge and yield loss stemming from wheat cleaning. An additional US$0.16/mt ocean freight would incur to CEROILS if the dockage in imported wheat is 0.7 percent instead of 0.1 percent and the ocean freight rate is about US$27/mt. The biggest single cost item in cleaning wheat is wheat loss, which occurs because cleaning tends to remove wheat, foreign material, and broken and shrunken kernels which can only be sold as screenings--a byproduct feed. Resales of screenings would partially

Table 10--United States No. 2 wheat *grade-determining factors*

Factors	Maximum allowable *percentage*[1]
Heat-damaged kernels	0.2
Damaged kernels (total)	4
Foreign material	1
Shrunken and broken kernels	5
Defects (total)	5
Contrasting classes	2
Wheat of other classes (total)	5

[1] At a minimum test weight of 57 lb/bushel for HRS wheat and 58 lb/bushel for SRW and HRW.

Source: USDA.

Table 11--China's wheat contract specifications

Wheat type	Dockage	Protein	Moisture
		Percent	
Hard red spring (HRS)	0.1	12.5	13.5
Hard red winter (HRW)	0.1	11	13.5
Soft red winter (SRW)	0.1	--	13.5

Source: Wheat Survey.

offset the cost of wheat loss. But this is conditional on whether there is a byproduct feed market for the screenings.

A flour miller in Beijing reported that the value of screenings averaged about 0.18 yuan per kilogram, or US$33.6 per metric ton. This miller also mixed screenings with millfeed, a byproduct of flour milling, which is priced higher--0.52 yuan per kilogram, or US$97.2 per metric ton. Millfeed was priced even higher in southern China. Even with the higher market value of millfeed, when compared with US$114.5 (US$87.5/mt f.o.b. price in 1991 plus $27/mt ocean freight) per metric ton landed price for imported U.S. wheat, cleaning still results in a net cost of US$0.18/mt (US$1.15 minus US$0.97), where US$1.15 is estimated yield loss if the additional loss is about 1 percent (that is, $114.5 x 1%) and US$0.97 is the resale receipts of the screenings as millfeed.

High-dockage wheat probably would not add more operating cost to wheat cleaning for flour millers. A miller in Beijing reported a milling cost of 1,400 yuan per metric ton; however, this miller was unable to sort out the portion attributed to cleaning. All flour millers indicated they clean wheat as much as possible, at least attempting to reduce the dockage to about 0.01 percent. The cost of cleaning wheat would, therefore, remain about the same regardless of the level of dockage.

Based on costs and returns of cleaning wheat, China is better off importing clean wheat, if it is available at no extra price. Importing high-dockage wheat results in a total net cost of about US$0.34/mt, including US$0.16/mt additional ocean freight charge and US$0.18/mt net cost of cleaning (yield loss minus resale receipts of screenings as millfeed).

Trade Impacts of Selling Cleaner U.S. Wheat

At the present time, CEROILS has a lock on wheat import decisions. Our conclusion is that CEROILS would not offer a premium for cleaner U.S. wheat, but would expand wheat imports from the United States slightly--most likely 1-5 percent.

There are several reasons why CEROILS officials would be unwilling to offer a premium for cleaner U.S. wheat. First, China will consider buying wheat from Canada or Australia, which would be equally clean and yet has a superior quality, and may be priced even lower. Second, CEROILS officials believed that its tender clearly reflects the price the CEROILS is willing to pay for a set of quality attributes, including a dockage level not to exceed 0.1 percent. Even if U.S. exporters were to deliver cleaner wheat, there is no reason for CEROILS to alter the bid price in its tender. CEROILS officials contend that U.S. exporters actually would receive a higher net price by avoiding weight deduction of the dockage level from gross weight.

A small trade effect from selling cleaner U.S. wheat is more likely because there were strong indications that the CEROILS will continue to import U.S. wheat, primarily for blending with Canadian wheat. China would only expand its imports of U.S. wheat, even if it is cleaner, because of an expansion of Canadian imports. So, for blending purposes, China would then import more U.S. wheat. In addition, the current US$10 price difference between U.S. and Canadian wheats was considered too little. A small amount of saving in ocean freight and an increase in milling yields would not offset the shortfall of this price difference. Finally, though flour millers producing specific-purpose flour indicated an interest in expanding their purchases of U.S. wheat if cleaner wheat were available, these millers account for a small portion of the total flour market in China.

Implications of Policy Reforms

There are ample signals pointing to China's continuing effort to reduce Governmental intervention and pursue a market-oriented economy. If economic reforms accelerate in the 1990's and markets

dominate economic activity, then price and quality considerations will permeate all aspects of China's wheat economy. Under this scenario, Sino-U.S. trade relationships will become less a factor in influencing China's wheat purchase decisions. On the other hand, price will continue to be very important and wheat quality considerations will become much more important.

Millers in China are eager to buy the kinds of wheat that will bring profits to their mills. Some flour mills using wheat to make specific-purpose flour will continue to import U.S. wheat for blending with Canadian wheat to a prescribed specification. This market niche, which now accounts for about 10 percent of all wheat being milled, may expand as demand for these niche end-products increases. The United States has an advantage because it has many different classes and grades of wheat. However, if China's Animal and Plant Quarantine Bureau continues its strict regulation on Johnson grass seed, then selling cleaner U.S. wheat will have an advantage because the mills will not have to take expensive precautions in importing infested wheat.

Conclusions

CEROILS, China's state trading agency, is very price conscious but did indicate that quality ranks a close second, after price, in their wheat purchase decisions.

China's wheat imports would be most responsive to the following quality factors: quarantine objects (Johnson grass seed and TCK), live insects, pesticide residues, dockage, protein quantity, and gluten quality. Delivering clean U.S. wheat would indirectly enhance U.S. ability to address China's concerns over these phytosanitary conditions.

CEROILS officials indicated, at the time of the interview that they were not willing to offer a premium for cleaner U.S. wheat, but did indicate that they would purchase from 1 to 30 percent more U.S. wheat if it had less dockage. We believe this trade effect would be closer to the lower end of the spectrum (a 1-5 percent increase) than the upper end. An increase in U.S. wheat exports to China by this amount suggests that it does not pay to clean exported wheat to China because the gain from this trade increase is not large enough to compensate for the costs of additional cleaning beyond the current level.

In the longer run, however, the trade impact of selling cleaner U.S. wheat to China is likely to be greater than the shortrun 1-5 percent increase in wheat imports from the United States. This greater trade impact is attributable to two factors: (1) demand for specific purpose flour is likely to expand; and (2) mills likely will buy more wheat free of Johnson grass seed.

If an agreement in the Uruguay Round of negotiations of the General Agreement on Tariffs and Trade (GATT) materializes, a reduction in the use of export subsidies by major exporters could elevate the importance of quality in China's wheat-purchasing decisions.

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Glossary

Blending: The systematic combining of two or more lots or kinds of grains to obtain a uniform mixture to meet a desired specification.

C & f: Cost and freight to the designated delivery point, paid by the seller.

C.i.f.: Cost, insurance, and freight to the designated delivery point, paid by the seller.

Commodity Credit Corporation (CCC): An agency of the U.S. Department of Agriculture created in 1933 to carry out loan and storage operations as a means of supporting prices above the level that would have prevailed in a free market.

Cu-Sum: A set of rules established by FGIS, that exporters must follow when loading grain on ocean vessels. The rules control variability among sublots blended to meet contract grade limits.

Damaged grain: In U.S. grading standards, the term damage refers primarily to biological deterioration associated with discoloration. Physical damage (such as cut or broken kernels) is not included in U.S. grades but is included in the standards of some other countries.

Defects: Computed total amount of damaged kernels, foreign material, and shrunken and broken kernels.

Dockage: Nongrain material that can be readily removed by accepted screening devices.

Durum wheat: Very hard, high-protein wheat used in the production of semolina flour for pasta products.

Export Credit Guarantee Program (GSM-102): U.S. agricultural export promotion program that guarantees repayment of private, short-term credit for up to 3 years.

Export Enhancement Program (EEP): Program to help U.S. exporters meet competitors' prices in subsidized markets: Exporters are awarded generic certificates that are redeemable for CCC-owned commodities, enabling them to sell certain commodities to specified countries at prices below the U.S. market price.

Extraction rate: The fraction of the wheat kernel converted into flour during the milling process.

Falling number test: A test used to measure sprout damage in wheat.

F.a.s.: Free alongside ship specifies that the seller delivers goods to the port elevator or dock at a specified location and the buyer pays for loading the ship and ocean freight.

Federal Grain Inspection Service (FGIS): An agency of the U.S. Department of Agriculture that establishes grain standards and develops the technology to measure the factors contained in such standards. This agency also develops and publishes sampling and inspection procedures, evaluates and approves equipment, monitors inspection accuracy, and oversees mandatory export inspection of grain by agency or FGIS-licensed inspectors.

F.o.b.: Free on board specifies that the seller loads the ship or other conveyance at the specified delivery point with the buyer paying freight charges.

Foreign material: Nonwheat material of similar size and weight to wheat kernels after dockage is removed.

Gluten: A tenacious, elastic protein substance found especially in wheat flour that gives cohesiveness to dough.

Grade: A number or letter designation assigned to grain based on an established set of criteria.

Grade factor or grade determining factor: Those characteristics of grain used to determine the numerical grade. The grade factor is based on quantitative limits (either maximums or minimums) placed on each factor for each grade.

Grain grades and standards: Specific standards of grain quality established to maintain uniformity of grains from different lots and permit the purchase of grain without the need for visual inspection and testing by the buyer.

Hard Red Spring wheat: Spring seeded; includes the following three subclasses: dark northern, northern, or red: This wheat is high in protein and has a vitreous endosperm, is used primarily to produce bread flour and is produced in the upper Great Plains.

Hard Red Winter wheat: Fall seeded; This wheat may be either dark hard, hard, or yellow hard, medium to high in protein, a vitreous endosperm, and used primarily to produce bread flour. It is produced in the lower Great Plains.

Hard wheat: A generic term applied to wheat with a vitreous endosperm suitable for making bread flour or semolina; yields coarse, gritty flour that is free-flowing and easily sifted; and flour consists primarily of regularly shaped particles of whole endosperm.

Impurities: Any nongrain material contained within a shipment that could hinder the processing of a grain or detract from its end value.

Intrinsic value or end-use value: Characteristics critical to the end-use of grain. These are nonvisual and can only be determined by analytical tests. For example, the intrinsic quality of wheat is determined by characteristics such as protein, ash, and gluten content.

Moisture content: The amount of water in grain; measured by the weight of water as a percentage of the total weight of the grain including water (wet basis) or total weight of the dry matter excluding water (dry basis).

Nongrade determining factor: Factors that influence the quality of grain but are not taken into account in the grading of grain. These factors must be reported as information whenever an official inspection is made.

Nonmillable material: All material that is not wheat, includes shrunken and broken kernels.

Physical quality: Grain characteristics associated with the outward appearance of the grain kernel, including kernel size, shape, color, moisture, damage, and density.

Premiums: Prices that exceed the base price offered for grains with higher quality characteristics than specified. Generally calculated for factors that increase the value of the grain in market channels.

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

Sanitary quality: Grain characteristics associated with cleanliness. They include the presence of foreign material that detracts from the overall value and appearance of the grain, including the presence of dust, broken grain, rodent excreta, insects, residues, fungal infection, and nonmillable matter.

Screenings: The material removed from grain by means of mechanical sizing devices; generally include broken grain as well as nongrain material removed on the basis of density or particle size with mechanical cleaners.

Semolina: A coarse separation of endosperm extracted from Durum wheat to make pasta.

Shrunken and broken kernels: All matter that passes through a 0.064 inch by 3/8 inch oblong-hole sieve.

Soft wheat: A general term describing wheat with a chalky endosperm suitable for making pastry flour; yields a very fine flour consisting of irregularly shaped fragments of endosperm cells that adhere and sift with difficulty.

Spring wheat: A general term for wheat that is grown in the spring and harvested in the summer or fall; It has a relatively high protein content and is used in bread flours.

Test weight: Weight per unit volume as measured in pounds per bushel as defined in the United States. Determined by weighing the quantity of grain required to fill a 1-quart container. The international equivalent measure is kilograms per hectoliter (conversion factor 0.77).

Uniformity: Conformity within and between shipments for quality attributes; such as physical, milling, and baking performances.

Wheat middlings: Fine particles of the bran and the wheat kernel. Normally used for livestock feed.

White wheat: Fall or spring seeded; it includes four subclasses: hard, soft, club, western: It is soft or hard and low in protein and is used mainly for pastry flours and oriental noodles.

Winter wheat: A general category describing wheats that are sown in the fall, lie dormant in the winter, and are harvested the following spring or summer.

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