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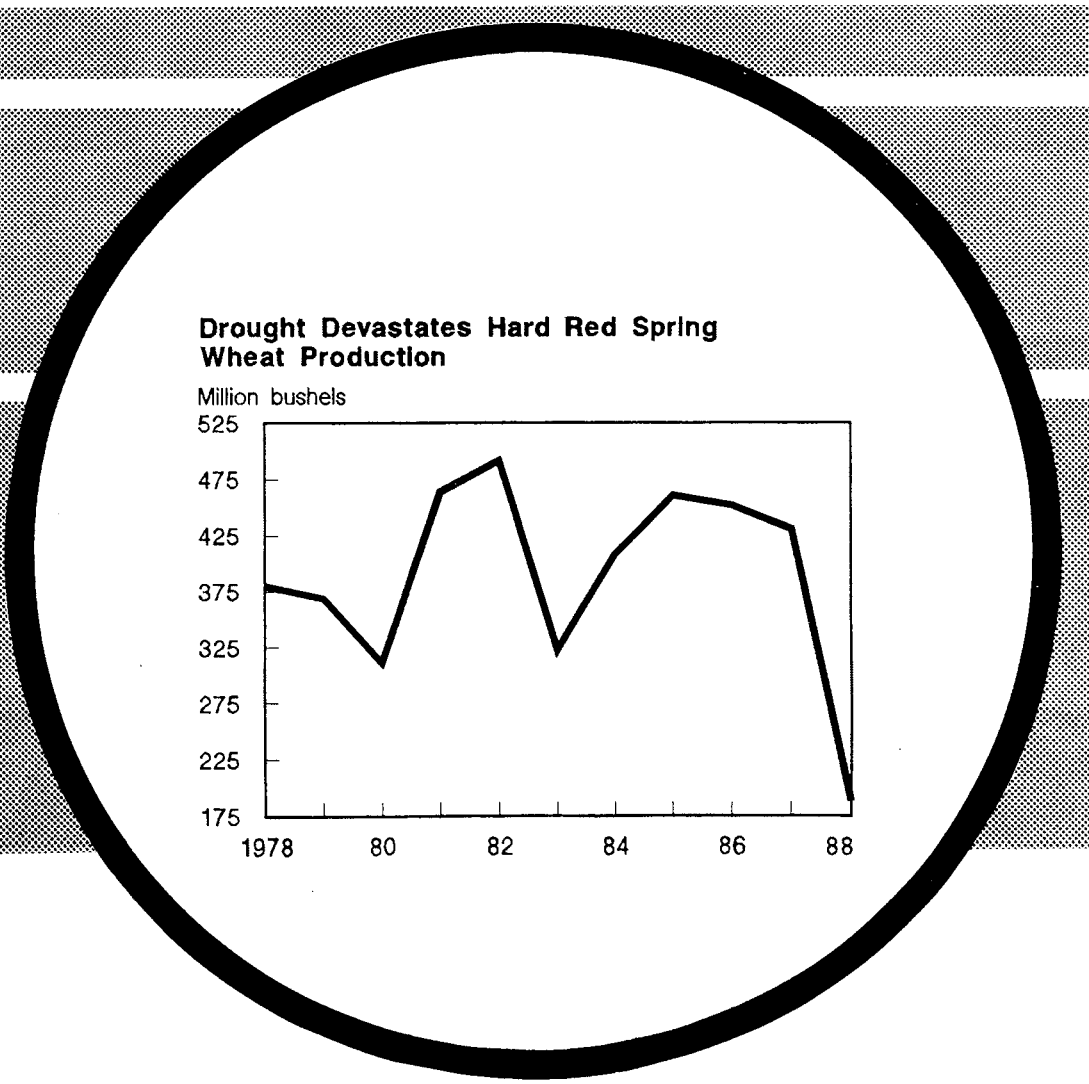
Wheat

Situation and Outlook Report



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SUMMARY

U.S. wheat supplies in 1988/89 are forecast at 3.1 billion bushels, down over 20 percent from a year earlier and the lowest since 1979/80. Production is forecast at 1.8 billion bushels, down 13 percent from a year earlier, while carryin stocks are down 30 percent. Supply will be more than sufficient to meet expected use, although the forecast ending stocks-to-use ratio is the lowest since 1973/74. However, fewer idle U.S. acres and higher world prices will likely lead to larger 1989/90 U.S. and foreign production.

Largely due to drought, *Hard Red Spring (HRS) wheat production* is forecast to decline 56 percent in 1988 to 188 million bushels. However, indications are that HRS and Durum crop quality is higher than expected, and protein content is rated high.

Hard Red Winter production in 1988 is an estimated 894 million bushels, down 12 percent from a year earlier, as area and yields are forecast lower. In contrast, Soft Red Winter (SRW) production is up 33 percent in 1988, as area and yield increased. Some farmers in SRW-growing areas do not participate in the wheat program, and had stopped planting when prices fell in the mid-1980's. However, in late 1987, wheat prices were recovering, and plantings expanded.

U.S. stocks on May 31, 1989, are forecast at about 600 million bushels, less than half June 1, 1988, stocks. Moreover, about half of those carryover stocks are forecast to be in the Farmer Owned Reserve. An additional third may be in CCC inventory. Because of lower stocks, the season average market price is forecast between $3.45-$3.95 per bushel, up from $2.57 in 1987/88.

The United States held over 22 million acres of wheat area out of production in 1987/88. With increased area and average yields in 1989/90, the United States would be able to produce 2.5 billion bushels of wheat, enough to cover likely use without a further stock decline.

Dry conditions in Canada and Argentina have cut forecast competitor production, tightened exportable supplies, and pushed export prices up. Global trade is expected to decline because of these factors and a forecast decline in Soviet imports. U.S. exports are forecast down 12 percent, but market share may be maintained at over 40 percent.

THE WHEAT SITUATION AT A GLANCE

All wheat: supply and disappearance 1/

Year beginning June 1	1985	1986	1987 Forecast	1988 Projected
		Million Bushels		
Beginning stocks	1,425	1,905	1,821	1,266
Production	2,425	2,092	2,105	1,821
Imports	16	21	15	15
Supply, total	3,866	4,018	3,941	3,102
Domestic				
Food	674	696	719	735
Seed	93	84	85	100
Feed 2/	279	413	280	270
Domestic, total	1,046	1,193	1,084	1,105
Exports	915	1,004	1,592	1,400
Disappear., total	1,961	2,197	2,676	2,505
Ending stocks	1,905	1,821	1,266	597

Wheat by classes: supply and disappearance 1/

Year beginning June 1	Hard Winter	Hard Spring	Soft	White	Durum	Total
1987/88 (Estimated)			Million Bushels			
Beginning stocks	973	490	77	185	95	1,821
Production	1,019	431	348	216	93	2,105
Supply, total 3/	1,991	927	425	404	195	3,942
Domestic disappear.	507	278	190	59	50	1,084
Exports	905	255	160	210	62	1,592
Disappear., total	1,412	533	350	269	112	2,676
Ending stocks	579	394	75	135	83	1,266
1988/89 (Projected)						
Beginning stocks	579	394	75	135	83	1,266
Production	894	188	462	222	55	1,821
Supply, total 3/	1,473	589	537	360	143	3,102
Domestic disappear.	523	186	258	82	56	1,105
Exports	685	235	250	190	40	1,400
Disappear., total	1,208	421	508	272	96	2,505
Ending stocks	265	168	29	88	47	597

1/ Includes flour and products in wheat equivalent. 2/ Residual approximates feed use. 3/ Total supply includes imports.

OUTLOOK FOR 1988/89

U.S. Wheat Supply Down Over 20 Percent

Drought and Disease Reduce Production

U.S. wheat production was estimated in August at 1.82 billion bushels for 1988/89, down 13 percent from a year earlier and the lowest since 1978/79. Winter wheat production is slightly below a year earlier and about 5 percent below the May 1 projection. While most Winter wheat entered critical growing periods before the worst of the hot, dry weather, dryness, high temperatures, and disease problems, including wheat streak mosaic, hurt yields in the southern Great Plains. Winter wheat yields averaged 2 percent less than in 1987, despite larger area in higher yielding States east of the Mississippi. Spring wheat production suffered the full impact of the drought, falling to less than half of 1987 production.

Beginning Stocks Fall Over 30 Percent

Wheat stocks on June 1, 1988, were 1,266 million bushels, 555 million below a year earlier. A large portion of those stocks (520

million) remain on farms, mostly in the Farmer Owned Reserve (FOR). Additional stocks are under the regular 9-month loan program or in Commodity Credit Corporation (CCC) stocks. Free stocks excluding 9-month loans were 301 million bushels, sharply higher than in previous years but still small compared to projected total use of 2.5 billion bushels.

Wheat stocks under Government programs or ownership will not be as readily available to the market or as large a source of supply in 1988/89 as a year earlier. On June 1, 1988, CCC inventory was 283 million bushels, down from 830 million a year earlier. The CCC maintains a Food Security Reserve of 147 million bushels and uses Government-owned wheat for various other donation programs. Unless forfeitures exceed expectations, it is unlikely that the CCC will have much more than 100 million bushels of Government stocks available to move into market channels in 1988/89, through the wheat auction or certificate redemptions.

The FOR, at 461 million bushels, could be a crucial source of supply in 1988/89. However, if farm prices for wheat stay below the target price, and farmers continue to receive storage payments, it may be generally unattractive to redeem FOR wheat. Even if prices rise above the target price, farmers may not move large quantities from the FOR since the redemption values of FOR grain are close to the target level. Wheat in the FOR is expected to fall to near the minimum level of 300 million bushels by the end of 1988/89.

Total Supply Lowest Since 1979/80

U.S. wheat supplies in 1988/89 are forecast at 3.1 billion bushels. This would be more than enough to cover the record use of 2.7 billion in 1987/88, or the 2.5-billion forecast use in 1988/89, or even enough to fulfill last year's record domestic use and record exports of 1981/82. However, the ratio between supply and forecast demand is the tightest since 1973/74.

1988/89 International Wheat Outlook

Drought in the United States and Canada, together with dry conditions in Argentina, has cut forecast 1988/89 production, tightened exportable wheat supplies, and pushed world wheat export prices up. Foreign consumption is forecast to exceed foreign production by more than 10 percent, requiring a further global stock drawdown. Trade is expected to decline because of higher export prices, an expected drop in Soviet imports, and reduced exportable supplies.

Production Equals 1987/88, But Consumption Continues To Rise

World wheat production is forecast at 505 million metric tons, about the same as in 1987/88. However, foreign production is expected to increase 2 percent to 456 million tons. The largest production increase likely will occur in the Soviet Union because of a large winter wheat crop, despite dry weather affecting the Soviet spring wheat crop. Other significant production increases are expected in Eastern Europe and Turkey.

China has been experiencing adverse weather, which likely is affecting rice more than wheat. China's 1988/89 wheat harvest is expected to equal that of 1987/88. Despite a 600,000-hectare increase in winter wheat area, dry spring weather brought down yields. In addition, China's spring wheat crop may be down due to wet weather in some major producing areas.

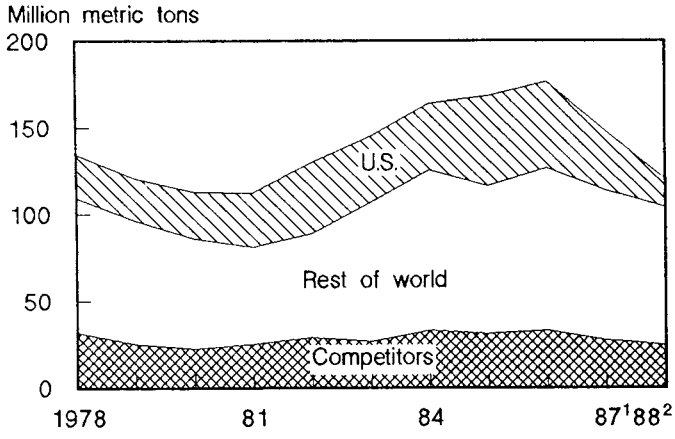
Among the major competitors, overall production is down 5 percent from 1987/88, led by declines in Canada and Argentina. Canada's drought-reduced crop may be down a third from a year ago to 18 million tons. Argentina's plans for a sharp increase in wheat production in response to higher world prices has been sidetracked by an extended period of dry weather at planting time. As a result, production may fall 15 percent to 8.5 million tons. However, output is forecast up 5 percent in the EC and 9 percent in Australia.

Foreign wheat consumption is expected to nearly equal that of 1987/88. Foreign consumption will exceed foreign production by more than 10 percent. However, stocks are sufficient to meet the expected demand for wheat.

Global Stocks Adequate To Meet Demand

Wheat stocks reached record highs in the mid-1980s. The large surpluses began to decline in 1987/88 because of a combination of efforts to reduce surpluses, price signals that

World Wheat Stocks, 1978/79 to 1988/89



1/ Estimated.
2/ Forecast.

discouraged production, U.S. acreage constraints, and adverse weather in some major producing countries, such as India.

In 1987/88, global carryin stocks were at a record high. By the end of 1987/88, world stocks were still large, estimated at 148 million tons, and the stocks-to-use ratio was almost 28 percent. Led by a decline in U.S. stocks, world wheat ending stocks in 1988/89 are forecast down 19 percent from a year earlier to 120 million tons. The stocks-to-use ratio will fall below 23 percent, or less than a 3-month supply. This would be the lowest world stock level since 1981/82 and the lowest stocks-to use ratio since 1972/73. However, in 1972/73 world stocks dropped because of an unexpected surge in world demand. This year's expected large decline is because of weather-related production declines in the United States and Canada. The United States has already announced a reduction in acres required to be idled for the 1989 crop. This, plus higher prices will likely lead to expanded wheat production in the United States and several other countries in 1989/90.

Competitor stocks are also down from a year ago, but not as sharply as those of the United States. Total foreign stocks are forecast to register a much more modest decline. Foreign ending stocks are expected to fall 9 percent from 1987/88, but the forecast 103-million-ton stock level is only 2 percent below the average for the last 10 years.

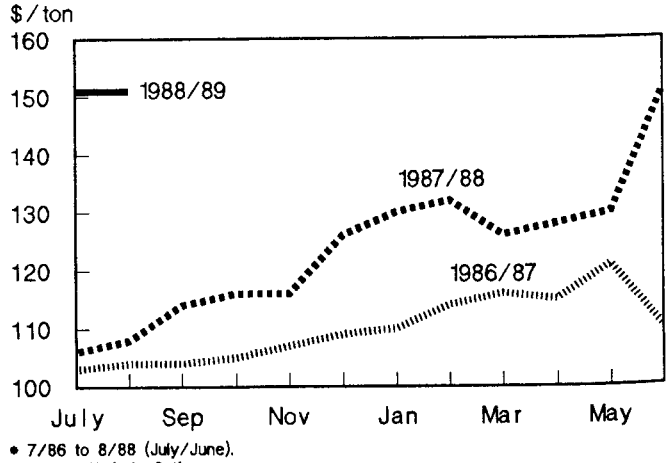
Export Prices Up In Response to Tighter Supplies; World Trade Expected To Decline

Tighter supplies, particularly in exporting countries, are pushing up export prices from the low levels of 1987/88. For example, the average July 1988 U.S. f.o.b. Gulf price for No. 2 Hard Red Winter (HRW) wheat was $151 per ton, 42 percent higher than the average for July 1987. While $151 per ton is high compared to a year ago, it is only 6 percent higher than the average price in July for the last 10 years. Recently, both cash and futures prices have leveled off.

Total 1988/89 trade is forecast to decline 8 percent to 96 million tons. While higher prices and reduced export supplies of some types of wheat may constrain trade somewhat, other factors are also influencing the turndown. The most important factor is the decline in Soviet import requirements. The Soviet Union accounted for more than 20 percent of global wheat trade in 1987/88. The Soviets are expected to import only 14 million tons of wheat in 1988/89, 7.5 million tons less than in 1987/88.

Other countries will continue to import large volumes of wheat, despite the higher price, basing their import decisions largely on domestic supply. For example, East Asian imports are expected to remain largely unchanged from 1987/88. Further, India and Pakistan are forecast to increase imports due to poor 1987/88 grain harvests. Countries that depend on food aid and credit may not be able

U.S. Wheat Export Prices*



* 7/86 to 8/88 (July/June).
No. 2 HRW, f.o.b. Gulf.

to buy as much wheat in 1988/89 as they did a year earlier because of the higher prices. China imported 15 million tons in 1987/88, but may purchase only 13.5 million tons of wheat in 1988/89. Despite a growing population and rising incomes, China's imports may be reduced because of limited foreign exchange reserves and rising world wheat prices. Although China's leaders bolster urban consumers' confidence by ensuring ample supplies of grain, the Government can choose to draw down stocks in the short term rather than import wheat.

Reduced Global Trade Translates Into Fewer U.S. Exports

U.S. exports are forecast to decline 11 percent from 1987/88 to 38.5 million tons. World market share may fall from 43 percent in 1987/88 to about 40 percent. Reduced sales to the Soviet Union are expected to account for most of the decline in volume. Tighter U.S. supplies of Durum may result in some market share loss in North Africa.

While the Export Enhancement Program (EEP) slowed considerably between April and July 1988, EEP activity picked up again in August. New initiatives in the first 3 months of the 1988/89 marketing year (June 1 through August 22) were offered to India, China, and Algeria for a total of 3.8 million tons. As in 1987, EEP sales in 1988 slowed in the early summer. About 3.5 million tons were sold under the EEP between June 1 and August 22.

Bonus levels have also been declining. The weighted average bonus awarded between August 1 and August 22, 1988, was $17.80, nearly half that awarded in August 1987, and well below the weighted average of $41.65 awarded in January 1988. The rising export price for wheat and the smaller EEP bonuses imply that EEP importers are picking up a greater share of the total cost.

The EC, which is forecast to have a good crop, is expected to be the United States' major competitor in many markets. However, due to budget constraints and relatively tight wheat supplies, the EC has adopted a policy of limiting exports through September 1988, and has reduced subsidy levels.

Other major competitors will not have the supplies to compete effectively with the United States in many markets. Canada's carryin stocks are low and the drought is expected to leave Canada with only 16 million tons of exportable supplies. Canadian exports at this level would be 32 percent below the 1987/88 record and the lowest since 1979/80. Australia will harvest a larger crop, but low stocks and last year's reduced production are expected to lead to a 10-percent decline in 1988/89 exports, the lowest since 1983/84.

Despite current dry planting conditions and an expected smaller crop, Argentina may be able to export 40 percent more wheat in 1988/89 than a year earlier. There was some slippage in the 1987/88 shipping schedule, and exports are expected to be heavy immediately after harvest in early 1989. However, at 5.6 million tons, Argentine exports will remain well below the 1980/81 - 1985/86 annual average of 6.6 million tons.

Higher export prices are also expected to encourage minor exporters, such as Eastern European countries and Turkey, to boost exports, particularly of Durum wheat. Primary markets for these exporters will be North Africa, the Middle East, and the Soviet Union.

Total Use of U.S. Wheat Forecast Down 6 Percent

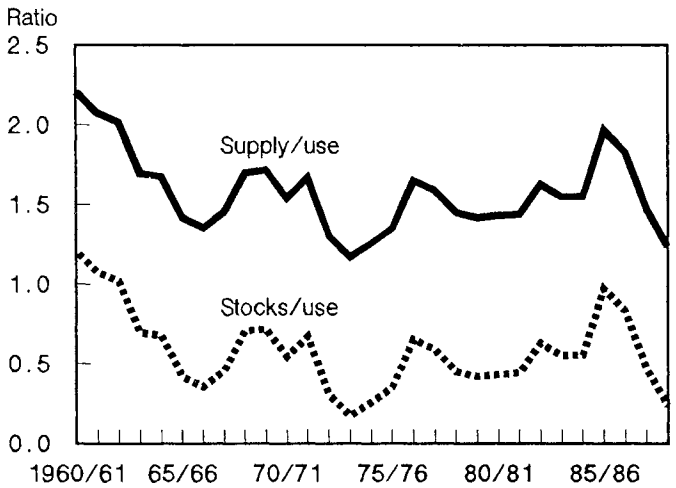
Demand for U.S. wheat remains strong despite lower supplies. However, higher prices are likely to moderate demand in 1988/89. U.S. exports are forecast at 1.4 million bushels (June/May), resulting in a decline in total use to 2.5 billion bushels, down from the record high 2.68 billion in 1987/88.

U.S. Domestic Use Expected To Expand

Wheat food use is forecast to expand over 2 percent in 1988/89 to 735 million bushels. The 2-percent growth is less than increases of over 3 percent in each of the previous 3 years, but is greater than the population growth rate, indicating continued increases in per capita wheat food use.

Wheat seed use is expected to increase to 100 million bushels in 1988/89, as planted area expands in response to the sharply reduced acreage reduction program for 1989/90 and higher prices.

Supply-to-Use and Stocks-to-Use Ratios



Feed and residual use of wheat is expected to remain near the 1987/88 estimate. Relative prices during the summer of 1988 were more favorable than a year earlier, as drought increased the price of competing feeds, especially in late June and early July. However, "residual" use is difficult to forecast because it encompasses the statistical errors in measurement of all the other parts of supply and demand. However, lower production, together with smaller stocks and exports, may lessen the potential for statistical errors.

1988/89 Ending Stocks Expected Down By Half

Stocks on May 31, 1989, are forecast at about 600 million bushels, less than half estimated stocks on June 1, 1988, at 1,266 million. This represents less than 3 months of 1988/89's forecast total use, and would be the lowest ending stocks since 1974/75. Moreover, about half of those carryover stocks are expected to be maintained in the FOR, held by farmers as a potential hedge against another poor growing season in 1989. An additional third of the stocks is likely to be in CCC inventory. This potentially leaves 100 million bushels or less for pipeline stocks and outstanding 9-month loans.

Commercial interests are likely to keep their carryover stocks to a minimum at the end of 1988/89 because they will be anticipating a larger crop and lower prices in 1989. Importers may be able to turn to other countries during the late spring of 1989, or delay their purchases of wheat until the new crop arrives. Reduced exports in May and June of 1989 could give commercial interests less need to hold stocks.

Farm Price Up Sharply in 1988/89

The season average market price (received by farmers) is forecast to average between $3.45-$3.95 per bushel, up from $2.57 in 1987/88. Price indicators, such as stocks-to-use ratio (24 percent) or the supply-to-use ratio (124 percent) were associated with higher prices in the mid-1970's. However, stocks are being marketed this year at a faster rate because the tight supply-demand relationship may not last long.

The United States held over 22 million acres of wheat area out of production in 1987/88, and most of the production shortfall was caused by an extremely unusual dry, hot, weather pattern. With increased area and average yields in 1989/90, the United States should produce 2.5 billion bushels of wheat, enough to cover likely use without a further stock decline. Above average yields in 1989/90 could significantly increase stocks. As the 1989 crop is planted and grows, weather scares are likely to send prices skyrocketing in a volatile market. Only if yields in 1989 are significantly below average are prices likely to be trending upward in the later months of 1988/89.

1989/90 GOVERNMENT PROGRAM

In July, program provisions defined under the Food Security Act of 1985 (as amended) were announced for the 1989 crop. From 1986 through 1988, acreage reduction programs of between 25 and 27.5 percent contributed to balancing supply and demand, and limited Government subsidies. Program participation increased to 87 percent, and more acreage was set aside. In 1988, slightly lower program participation contributed to a smaller but still large (22.7 million acre) set aside. However, acreage base entering the long-term Conservation Acreage Reserve Program (CRP) offset the slightly lower ARP acreage, and area planted remained stable.

For 1989, program provisions include the following:

- Forecast June 1 stocks below 1 billion bushels triggered legal provisions that call for the ARP to be less than 20 percent. Participants must limit 1989 acreage planted for harvest at no more than 90 percent of base, meaning a planting reduction of 10 percent of their wheat acreage base.

- The basic loan rate was reduced by the maximum 7 percent from $2.76 to $2.57 a bushel. Application of the maximum 20-percent "Findley" provision sets the 1989 regular loan rate at $2.06 a bushel.

- The target price for 1989 is $4.10, 3 percent lower than last year.

- Neither a paid land diversion nor a marketing loan program will be implemented.

- 0/92 provisions of the farm legislation allow producers to plant none of the farm permitted acreage to wheat and grant deficiency payments on 92 percent of permitted acres.

- Generic commodity certificates will continue to be a part of the 1989 farm program and will be issued on an as-needed basis.

Conservation Reserve Program Continues To Idle More Acres

Another important provision of the Food Security Act is the CRP. Under this program, owners and operators of highly erodible cropland agree to cease production on the land for 10 years and devote it to conservation uses. The goal is to enter 40 to 45 million acres of cropland by fiscal 1990.

Through the sixth sign-up period, (1987 crop year), 7.6 million acres of wheat base have been retired through the CRP. Additional wheat base will enter the CRP for the 1988 and 1989 crops, but how much is hard to estimate. Annual CRP payments must be limited to no more than prevailing rental rates. Higher wheat prices and higher expected returns may make enrollment in the CRP less attractive this year than in previous years.

Drought Assistance Act of 1988

Drought relief legislation, the Disaster Assistance Act of 1988, contains several provisions that may affect wheat producers, including:

- On the first 35 percent of crop loss against the farm program payment yield, the producer can keep the advance deficiency payment, a portion of which might have had to be refunded if the final deficiency payment level is below the advanced amount. For wheat, the advance deficiency payment was 61.2¢ per bushel, so no repayment will be necessary if the first 5-month average market price (received by farmers) is $3.61 per bushel or less.

- On the next 40-percent loss, compensation is 65 percent of the target price for program participants ($2.75 per bushel) and 65 percent of the county loan rate for nonparticipants (average $1.44 per bushel).

- On the last 25-percent loss, compensation is at 90 percent of the target price for program participants ($3.81 per bushel), and at the county loan rate for nonparticipants (average $1.99 per bushel).

- The producer must refund advance deficiency payments on all losses above the first 35 percent. However, the refund is not due until after July 31, 1989.

- USDA is authorized to provide emergency loans for producers whose crops were affected by disaster in 1988 whether or not the producer had previously purchased Federal crop insurance.

- Farmers Home Administration loan guarantees are extended to those producers who have borrowed from the Farm Credit System or other commmercial lenders, and cannot repay all or part of 1988 operating loans or regularly scheduled 1988 or 1989 installments on farm ownership, equipment, or structure loans.

- Producers are permitted to plant soybeans and sunflowers on no less than 10 percent

nor more than 25 percent of their wheat, feed grain, upland cotton, or rice permitted acreage in 1989 without affecting their bases. USDA must assess the effect of producers' acreage intentions on soybean prices and may prorate the offered acreage, if prices are expected to fall below 115 percent of the 1988 soybean price support level of $4.77 per bushel based on such acreage intentions. USDA is authorized to extend this program to 1990.

- Producers are permitted to plant any portion of their farm acreage base to oats in 1989 and 1990, if the ARP requirement for feed grains is 12.5 percent or less of the crop acreage base and the legislation guarantees that additional oats plantings will not alter any existing crop acreage bases.

SUMMARY OF 1987/88 EVENTS

Total U.S. wheat supplies in 1987/88 were about 4 billion bushels for the sixth year in a row. Beginning stocks were a near-record 1.8 billion bushels, and production at 2.1 billion matched that of a year earlier.

Wheat area planted fell 6.3 million acres in 1987/88, due to 87 percent participation in the Government program that required a 27.5-percent ARP. The CRP also reduced wheat area planted. Yields rebounded from the previous year, but late frost in HRW areas and early heat stress in some spring wheat areas kept the national average yield below trend.

The large supply of beginning stocks was not immediately available to the market because 830 million bushels were in CCC inventory, and an additional 632 million were in the FOR and the special producer storage loan program. However, generic certificates made those stocks available if price premiums in different locations encouraged redemptions of wheat. Beginning in November 6, 1987, USDA made CCC wheat certificate exchanges available through auctions. This increased the attractiveness of exchanging certificates for CCC wheat.

1987/88 International Wrap- Up

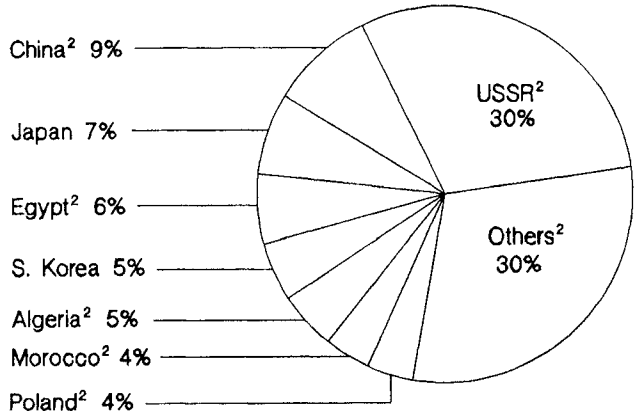
World wheat production in 1987/88 is estimated at 505 million tons, 5 percent below 1986/87. The Soviet Union alone accounted for nearly a third of the decline. Global consumption rose by 2 percent, requiring a 16-percent drawdown in global stocks, which were record high by the end of 1986/87.

World wheat exports reached over 104 million tons in 1987/88 (July/June), only 2 percent below the 1984/85 record. The Soviet Union and China together accounted for 35 percent of the total imports. Low prices allowed many countries to boost imports. The favorable price of feed wheat relative to corn also led to continued strong sales of low quality wheat to countries such as South Korea.

The United States was able to capture 42 percent of the world wheat market. Lower production in some competitor countries, the lower U.S. loan rate, and export promotion programs such as the EEP are some of the major factors behind the increase in U.S. exports. In 1987/88 (June/May), over 60 percent of exports were shipped out under the EEP. Fifty-two initiatives were offered to 35 countries in 1987/88 (including nine countries encompassed by the West Africa initiatives). The new initiatives expanded the program and established the United States as a strong competitor in many major wheat markets.

Canada also benefitted from strong Soviet and Chinese demand. Canada exported a

U.S. Wheat Exports by Destination[1]



1/ 1987/88 (June/May). Excludes wheat products.
2/ EEP recipient.

record 23.6 million tons of wheat in 1987/88, with nearly half shipped to the Soviet Union and China.

Other exporters experienced declines. The EC exported 12 percent less wheat in 1987/88 than a year earlier due to reduced supplies of quality wheat, strong U.S. competition, and budget constraints. The EC had to contend with generally lower world export prices together with the reduced value of the U.S. dollar, which boosted the cost of EC export subsidies. The added cost of exports fueled internal debate regarding EC funding and expenditures. Both Australia and Argentina saw their exports decline in response to reductions in production and low carryin stocks.

U.S. Exports by Class

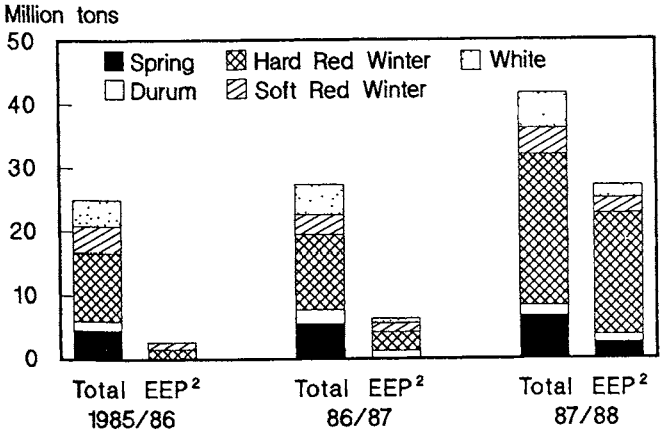
Due to strong sales to the Soviet Union, China, and others, HRW composed over half the U.S. wheat exported in 1987/88, an increase over previous years. Over 70 percent of HRW and Durum exports, and over 50 percent of the Soft Red Winter (SRW) exports were sold under the EEP. SRW wheat is generally less expensive than other wheat classes. With lower gluten than hard wheats, SRW is preferred by some for non-bread uses. China accounted for about a third of U.S. SRW exports.

The Soviet Union was the largest importer of U.S. spring wheat in 1987/88. This was the first time the Soviet Union had purchased U.S. Hard Red Spring (HRS) wheat since 1975/76. Previously, the Soviet Union had bought spring wheat from Canada and relied on the United States for the lower protein HRW. Japan and the Philippines were also large HRS importers.

North Africa accounted for over half of the U.S. Durum exports. In addition to pasta, Durum wheat is used to make couscous, a staple food in several North African countries.

U.S. White wheat is preferred by some countries due to its high extraction rate. While some White wheat is used for bread, the White wheat with relatively low protein and low gluten is excellent for noodle products. For these reasons and for its similarity to indigenous wheat, White wheat is the preferred wheat in some South Asian countries. Pakistan and India are both expected to increase wheat imports in 1988/89, with a large portion likely to be U.S. White wheat. Egypt buys White wheat for flat bread. Egypt bought nearly a third of U.S. White wheat exports in 1987/88.

U.S. Wheat Exports by Class[1]



1/ June/May.
2/ Excludes wheat products.

Total 1987/88 U.S. Wheat Use Record High

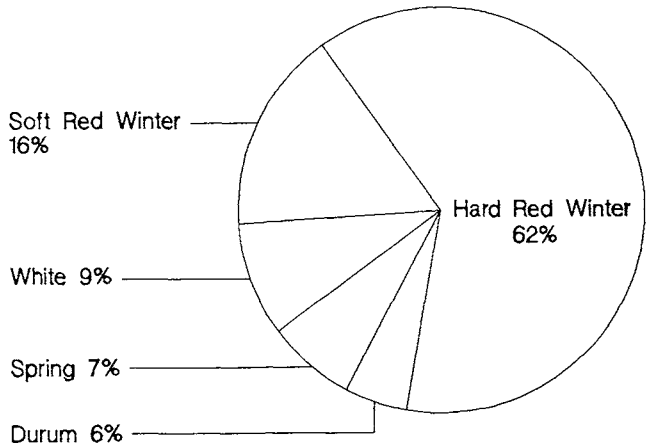
Total use reached a record 2.7 billion bushels in 1987/88. Exports, at 1.59 billion bushels, were the second highest on record, and increased 59 percent from the previous year. Domestic use, at 1.1 billion, was down only 0.1 billion from the previous year's record. While the EEP program made U.S. wheat more attractive to some foreign buyers, wheat auctions made large CCC inventories available to all users at prevailing market prices.

U.S. food use of wheat increased 3.3 percent to a record 719 million bushels. Flour mills ran at over 100 percent of rated capacity in some months. Health advocates recommending fewer fats and more fiber in diets may have contributed to increased per capita wheat consumption.

Seed use was stable at 85 million bushels, as area planted for 1988 was the same as a year earlier.

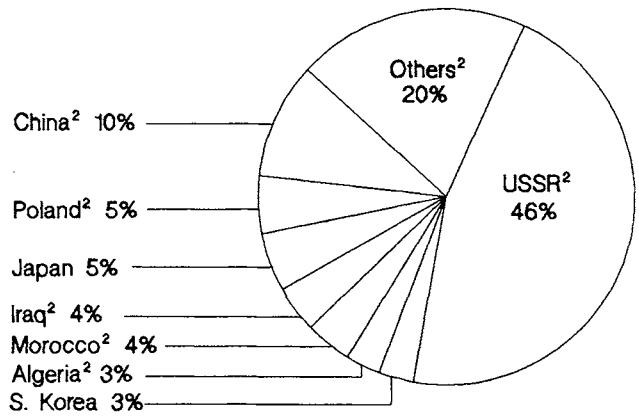
Feed and residual use of wheat was down 32 percent from the previous year, as low feed

EEP Wheat Sales by Class*



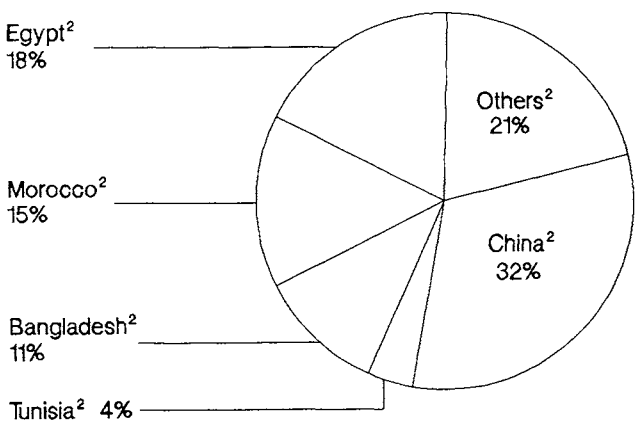
* 1985 through July 1988. Excludes wheat products.

U.S. Hard Red Winter Wheat Exports by Destination[1]



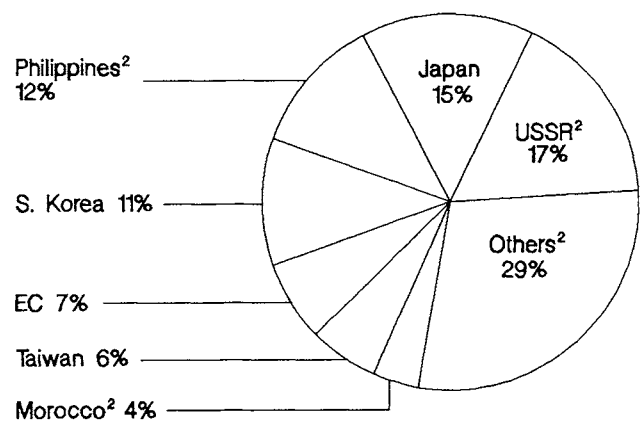
1/ 1987/88 (June/May). Excludes wheat products.
2/ EEP recipient.

U.S. Soft Red Winter Wheat Exports by Destination[1]



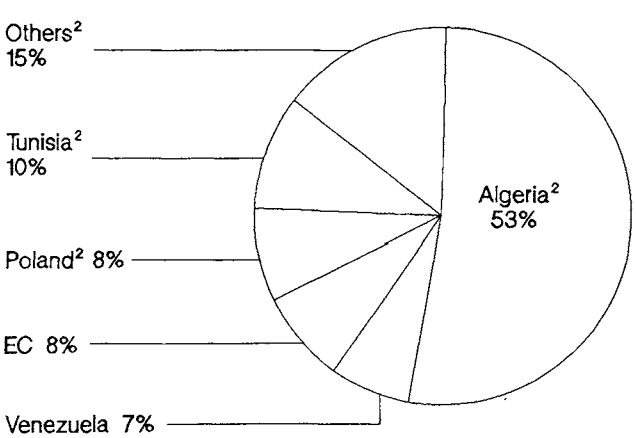
1/ 1987/88 (June/May). Excludes wheat products.
2/ EEP recipient.

U.S. Hard Red Spring Wheat Exports by Destination[1]



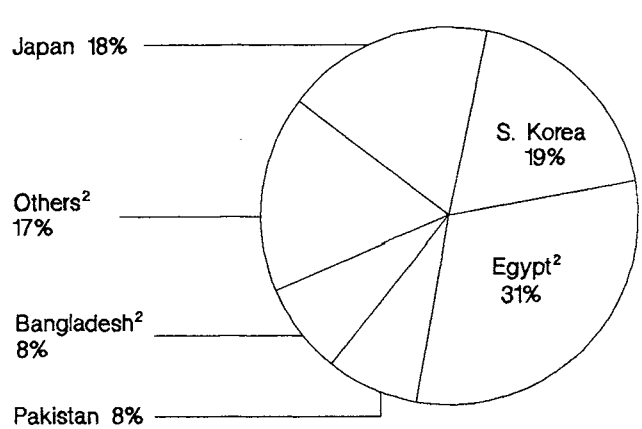
1/ 1987/88 (June/May). Excludes wheat products.
2/ EEP recipient.

U.S. Durum Wheat Exports by Destination[1]



1/ 1987/88 (June/May). Excludes wheat products.
2/ EEP recipient.

U.S. White Wheat Exports by Destination[1]



1/ 1987/88 (June/May). Excludes wheat products.
2/ EEP recipient.

grain prices made it unattractive to feed wheat. However, feed and residual use, at 280 million bushels, was larger than expected, possibly indicating a larger residual component.

Reduced Stocks Strengthen Prices

Prices received by farmers were relatively low at the beginning of 1987/88, averaging only 4 cents above the $2.28 loan rate in July. As exports picked up in the fall and prospects for declining stocks improved, prices strengthened. The possibility of production problems in 1988 supported wheat prices in the last months of 1987/88. However, the May average market price, though the highest in the 1987/88 marketing year at $2.83, was well below prices in June and July 1988 when damage to the spring wheat crop had become clear. The season average price, $2.57, was less than 30 cents above the loan rate.

WHEAT BY CLASS

Reliability of Stocks Data

The National Agricultural Statistics Service (NASS) generates wheat stocks data for all wheat and for Durum, by State, both on farm and off farm. The off-farm stocks are considered more reliable because on-farm stocks are based on a sample of farmers, while NASS covers all known off-farm storage every quarter. The major weakness of the stocks data is that wheat in transit (on barges or trains, for example) may not be included. Especially for the September 1 report, a change in the amount of grain in transit can distort the supply picture provided by the stocks estimate.

ERS breaks out the NASS wheat stocks into five classes. Historical distribution of classes by State, ASCS stocks data, trade flows, and other information are used to separate the classes.

Residual and Feed Analysis Provides Support

An important check on the wheat-by-class stocks data is the analysis of supply and demand. Production, trade, mill grind, and stocks are surveyed, and seed use is estimated. The production added to beginning stocks and imports gives total supply. Total supply minus exports, food and seed use, and ending stocks gives a residual that includes feed use but also reflects errors in the rest of the data.

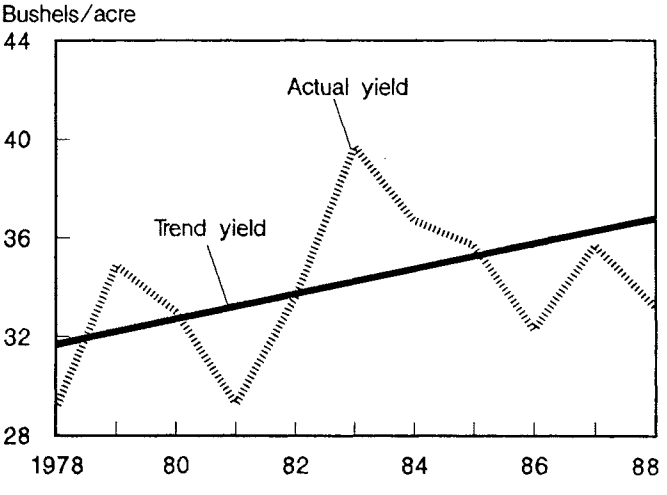
Hard Red Winter Supplies Down

HRW Production Slips 12 Percent in 1988

HRW production in 1988 is an estimated 894 million bushels, down more than 12 percent from a year earlier. Estimated area planted declined 1 percent to 34.4 million acres, as participation in the ARP remained high and additional HRW area moved into the CRP. A mild winter resulted in limited winter kill, but also facilitated the overwintering of insects. The large amount of idle area with volunteer wheat may also have encouraged the mite that carries the viral disease wheat streak mosaic. Especially prevalent this year in Kansas, mosaic generally weakens the wheat plant, leaving it more susceptible to other stresses.

Although HRW matures early, before the warmest temperatures, some HRW areas were stressed by dryness and above normal temperatures in 1988. When combined with mosaic, the stress was enough to reduce average yields in Nebraska by 5 bushels per acre to 39 bushels and in Kansas by 3 bushels per acre to 34 bushels.

Hard Red Winter Wheat: Actual Yield vs. Yield Trend, 1978-88



Income Increases with Higher Prices

HRW producers, on average, are likely to see an increase in the market value of their production. Prices received by farmers may increase 40 to 50 percent, swamping a 12-percent production decline.

The total HRW supply in 1988/89 is forecast slightly less than 1.5 billion bushels, down 26 percent from the previous year. Beginning stocks are estimated down 40 percent to 579 million bushels.

Domestic use of HRW is forecast to increase in 1988/89. Protein in the 1988 HRW crop was above average, making it more suitable for bread flour. With high protein HRS in very short supply, many millers reportedly are adjusting their blends to use more HRW and less HRS. Feed and residual use of HRW is estimated to decline modestly, despite price ratios with feed grains that would indicate an increase in wheat feeding during the first quarter of 1988/89.

HRW exports in 1988/89 are likely to decline due to reduced supplies and less voracious Soviet demand. However, forecast exports of 685 million bushels in 1988/89 would be slightly above the average for the previous 10 years. Strong import demand, limited competitor supplies of hard wheats, and the continued EEP may sustain HRW exports in 1988/89.

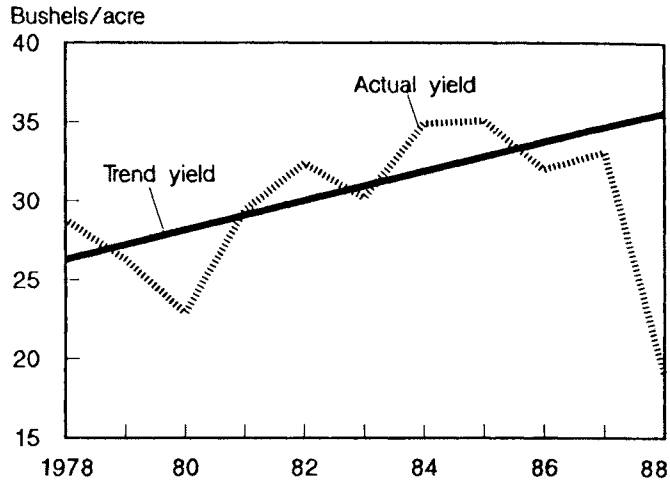
Ending stocks of HRW are forecast at 265 million bushels, the lowest since 1974/75. HRW ending stocks would represent 2.6 months of total use, or a stocks-to-use ratio of 22 percent. Any sign that the 1989 HRW crop may have below average yields would tend to drive up prices sharply at the end of 1988/89.

Drought Devastates Hard Red Spring in 1988

Record Heat and Low Subsoil Moisture

The drought hit the northern plains before spring wheat planting. Soils warmed up quickly. Some HRS areas experienced the driest April on record. By the time the crop was planted there was little subsoil moisture. HRS needed timely (above normal) rainfall to

Hard Red Spring Wheat: Actual Yield vs. Yield Trend, 1978-88



produce normal yields. Instead, early June brought searing record temperatures, above 100 degrees over much of the HRS areas. Without moisture reserves, wheat plants stopped growing, which limited stooling and centered resources in one head. In many areas the stress continued into the heading stage and limited the number of kernels per head.

In the last days of June some areas received much needed rain, but by then it was almost too late. Most of the thin wheat stands were headed, but they stood only about a foot tall. Wheat streak mosaic also contributed to weaken the crop. Some insect pests were devastated by the heat, but grasshoppers multiplied rapidly in some areas. Moreover, at harvest, much of the wheat was so short and sparse that it was difficult to swath or combine. Considering the adverse conditions it is not surprising that HRS production is forecast to have declined 56 percent in 1988 to 188 million bushels.

Based on observations made during the Spring Wheat Quality Advisory Council tour, the quality of the HRS crop may be better than expected. Average protein was high, as is common in a drought. Test weights were somewhat below the normal, but not as much as might be expected; rains at the end of June may have allowed kernels to fill out reasonably, limiting the number of shrunken and shriveled kernels. However, probably due to uneven germination, some samples had an unusually high portion of very green kernels, enough to reduce the grade.

HRS Stocks Larger than Production

June 1, 1988, stocks of HRS are estimated at 394 million bushels, about 9 months of the previous year's total use, or a stocks-to-use ratio of 74 percent. A large percentage of HRS stocks is held on farm. Farmers facing devastating crop loses may be able to market stored grain at high prices. The question is how long will HRS farmers hold onto their stocks? During drought years, prices often peak early in the season, rather than later as is common in normal years. Some HRS farmers, who do not need to liquidate stocks, may hold onto HRS in the FOR, continue to receive storage payments from the Government, and hope for even higher prices in 1989 or 1990.

HRS imports from Canada may increase marginally in 1988/89. However, the increase will be limited by the poor Canadian wheat crop and the large number of long-term supply agreements Canada has with importers, to which the Canadian Wheat Board is likely to give priority.

HRS domestic use is expected to decline in 1988/89. Millers are likely to turn to less expensive HRW, now that HRS is selling at a premium instead of the discount prevalent during the last 2 years. HRS exports may decline only modestly, as foreign buyers realize that the world supply of hard wheats is unusually low in 1988/89.

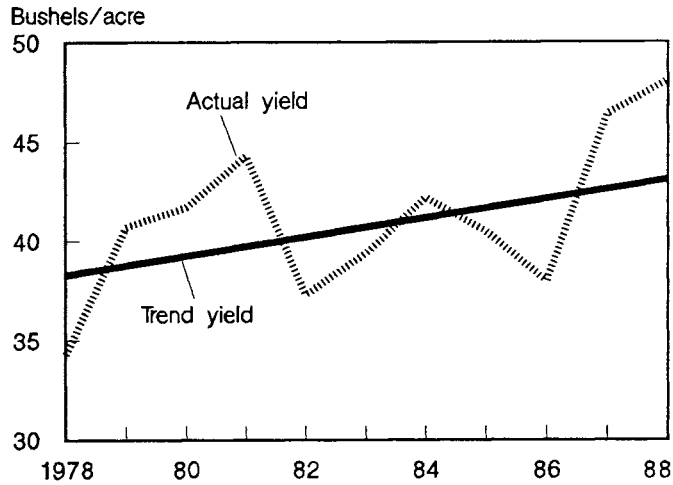
Traditional farmer holdings of HRS may maintain ending stocks in 1988/89 at 40 percent of forecast total use. However, the 168-million bushel ending-stock forecast would be the lowest since 1975/76.

Soft Red Winter Supplies Increase

Production Up 33 Percent

Planted SRW area increased an estimated 20 percent for the 1988/89 crop. Some wheat farmers in SRW growing areas do not participate in the wheat program, and had stopped planting wheat when prices fell in the mid-1980's. However, in late 1987, wheat prices were recovering somewhat, and SRW prices were commanding a premium over other wheat classes instead of the normal price discounts.

Soft Red Winter Wheat: Actual Yield vs. Yield Trend, 1978-88



In the Corn Belt States of Illinios, Ohio, and Indiana, wheat yields declined modestly due to drought (high temperatures), but in the rest of the SRW growing areas yields increased markedly, pushing SRW yields above a year earlier. Many SRW producers are enjoying that rare combination of high prices and a bumper crop. Production for 1988/89 is estimated at 462 million bushels, making SRW the second largest wheat class.

SRW beginning stocks were little changed from a year earlier and low compared to use (21 percent). Eastern farmers traditionally hold few wheat stocks, so low SRW carryover is normal. Total SRW supply in 1988/89 is estimated up 26 percent from a year earlier. With large supplies and strong demand, SRW use is forecast to increase 45 percent in 1988/89, despite sharply higher prices. Domestic use is expected to rise 36 percent as food, feed, and seed use all expand. Exports may surge a dramatic 56 percent as importers turn to the least expensive wheat as prices of all wheats move up.

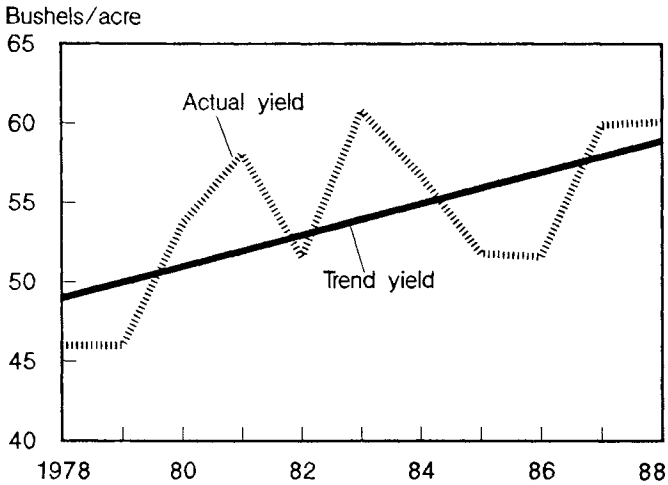
SRW ending stocks are forecast at minimum levels. Area and production are likely to increase again in 1989, and the prospect of larger supplies may limit speculative holdings of SRW.

White Wheat Supplies Down

Production and Use Forecast Stable

Despite severe dryness in the Pacific Northwest during fall 1987 and through winter

White Wheat: Actual Yield vs. Yield Trend, 1978-88



1988, White wheat production, at 222 million bushels, is forecast to slightly exceed a year earlier. Timely and persistent rains throughout the spring growing season allowed White wheat to yield well despite severely limited subsoil moisture.

Beginning stocks of White wheat for 1988/89 are estimated below year-earlier levels. Most carryover stocks are in the Pacific Northwest because eastern producers tend to market their crop quickly. Total White wheat supplies are forecast down 11 percent.

Total use of White wheat in 1988/89 may be only slightly larger than a year earlier. Domestic use may expand, but exports could slip below 200 million bushels for only the third time in 15 years. White wheat in the FOR may limit availabilities for export and keep White wheat from selling at a significant discount to other classes.

Durum Devastated by Drought

Durum production in 1988 is estimated down over 40 percent, despite an increase in planted area. Production would have been even lower, but area and yield increased in the "desert" Durum areas of Arizona and California. This irrigated area will account for nearly 20 percent of the U.S. total in 1988/89 compared to the 5-year average of 12 percent.

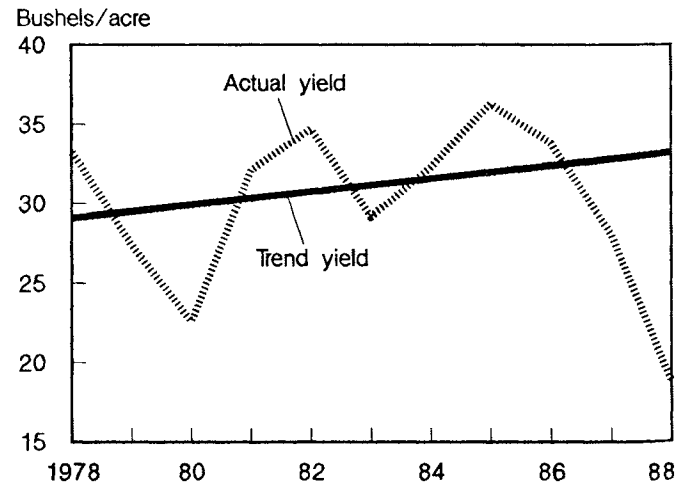
The drought caused a nearly 40-percent decline in forecast yields for North Dakota Durum and large-scale abandonment of planted area. North Dakota normally produces about 80 percent of U.S. Durum. Some north central counties of the State had yields only 10 to 20 percent below average, while southern, central, and western areas were hardest hit, with many fields abandoned. Yields varied greatly from field to field, depending on the amount of rain each field received, the soils' moisture-holding capacity, crop rotation, and other factors. Durum planted on land fallow the previous year had much better yields than if the crop had followed wheat or other small grains. Durum planted on land that had sunflowers the previous season was in very poor condition, because sunflowers absorb more moisture and dry out the soils. This pronounced variability in yield from field to field has made it especially difficult to estimate the size of the Durum crop.

Durum is a specialty wheat used for pasta, and feed use of this premium product should be minimal. Most Durum is produced and stored on farms in North Dakota. On-farm Durum stocks in North Dakota on June 1, 1988, were estimated at 48 million bushels, up slightly from a year earlier.

Sufficient Supplies for Expected Demand

Total Durum supplies in 1988/89 are forecast at 143 million bushels. Imports will be limited by short supplies in Canada. The 1988/89 supply is large enough to cover 1987/88 total use, but higher prices may reduce exports sharply. Domestic use is

Durum Wheat: Actual Yield vs. Yield Trend, 1978-88



expected to be largely unchanged. Total use is forecast down less than 15 percent. Forecast ending stocks of 47 million bushels would imply a stocks-to-use ratio of almost 50 percent, or a nearly 6-month supply of Durum.

Holding Durum for speculation is hard to rationalize, given probable production increases in 1989, except that much of the farm stocks may not be of sufficient quality to command the high prices offered for milling quality Durum.

OCEAN FREIGHT RATES FOR WHEAT

Nature of the Market

Two types of for-hire service are employed in international commerce: liner and tramp. Liner service offers fixed routes with vessels sailing on regular schedules. Only small quantities of grain, known as parcels, are moved. Tramp service, often referred to as Voyage Charters, dominates international trade in grain and other bulk commodities. Tramp ships operate with no established ports of call and normally carry an entire shipload of a single dry bulk commodity. Rates for these vessels are set through negotiations between shippers and shipowners, and fluctuate widely as near term supply and demand conditions change.

Organized trading exchanges exist in London and New York, but they impose no limitations on the terms of trade for Voyage Charters. Trading is often conducted through shipbrokers both within and without the exchanges. Such negotiations are often done on a personal but not necessarily face-to-face basis. Additionally, many international grain merchants own and/or lease ocean vessels. The leases are often in the form of 1 year or longer time charters. Neither their charges for carrying grain nor all the negotiated rates are made public.

Only those charters clearly identified with wheat and openly reported are considered here. As a result, data sufficient to permit analysis of U.S. wheat exports were available only for ships bound for North Africa. These data were weighted by the volume of each shipment to calculate weighted average rates on a quarterly basis.

Bulk Carriers Dominate International Grain Trade

Bulk Fleet Grows

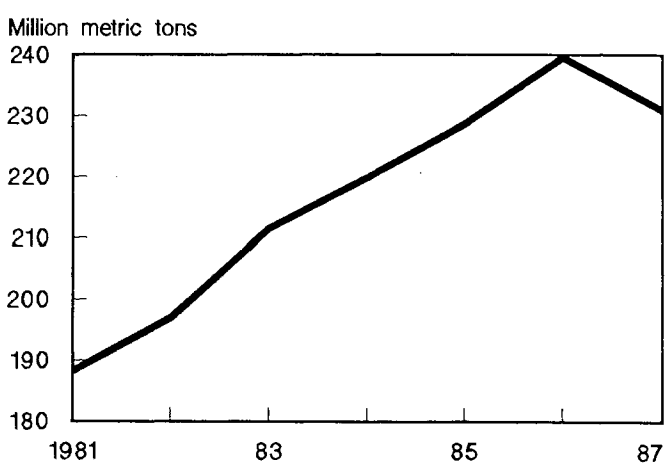
Bulk carriers on January 1, 1986, had an average carrying capacity of 42,100 metric tons, more than 4 times larger than the average general cargo ship. Some of the vessels that reported carrying wheat in 1987 sailed with cargoes of 85,000 metric tons. Although large, these vessels have low unit labor costs. On a per unit capacity basis, these ships also offer savings in fuel and construction costs so they can charge relatively low rates.

World trade did not keep pace with increases in bulk carrier capacity during most of this decade. Between 1980 and 1986, total capacity increased 27 percent to 240 million metric tons. The efficiency of these vessels and their substantial overcapacity resulted in relatively low ocean rates for wheat and other grains during this period.

Fleet Shrinks for 1987

During 1986, losses and scrapping removed 15 million metric tons of capacity from the bulk carrier fleet, but the world's shipyards added about 9.6 million metric tons. As a result, bulk carrier capacity fell 4 percent to 231 million metric tons. For shipments to North Africa, ocean rates for wheat did not increase much in 1987, and only rates from the Pacific Coast have risen significantly during 1988. Overcapacity

Capacity of Bulk Carriers, 1981-87*



* January 1st.

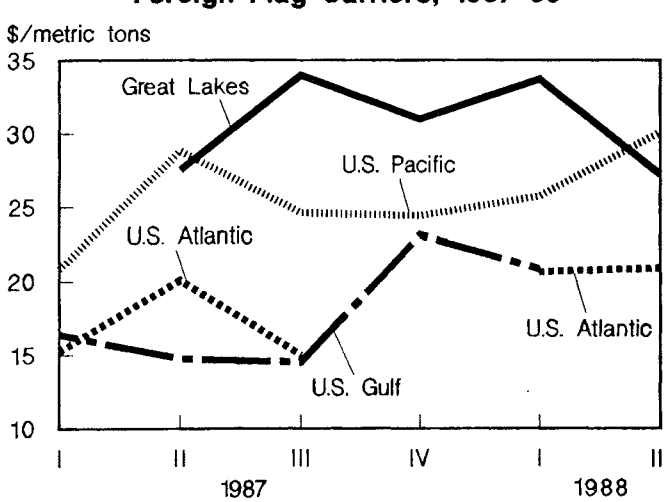
appears to have continued, and exporters should enjoy relatively stable rates during the rest of this year.

Ocean Rates Vary Widely

Ocean rates for wheat are subject to wide fluctuations over time. Rates to North Africa sometimes moved in opposite directions from different ports of origin. Rates from the U.S. Gulf ranged from a low of $14.56 per metric ton during the third quarter of 1987 to $23.13 in the last quarter of that year, a 59-percent difference. At U.S. Pacific ports, rates varied from $20.86 per metric ton in the first quarter of 1987 to $30.11 in the second quarter of 1988, a 44-percent change. Each wheat shipment to North Africa results in an ocean transportation bill of $300,000 to $900,000. Ocean freight rates result from a complex interaction of market forces: the availability of suitable ships; demand for vessels at the export port and at others; world demand for wheat, grains, and other bulk commodities; and the cost of supplying the required service.

Trip length is a major determinant of voyage time. This, in turn, determines the cost of fuel, crew wages, and the amount of vessel depreciation assigned to a given voyage. Still, voyage distance does not appear to be a major influence on ocean freight rates. Shipowners must also consider the costs of using a given port, and of steaming to that port, the availability of return cargo at the destination area, and the time spent loading and unloading at the ports involved.

Wheat: Ocean Rates to North Africa, Foreign Flag Carriers, 1987-88



U.S. Gulf ports dominate wheat exports, even though the voyage from New Orleans to Port Said, Egypt, for example, is more than 1,000 nautical miles longer than that from Baltimore, MD. In 1987, Gulf ports accounted for 60 percent of all U.S. wheat exports. Pacific ports, which handle the second largest volume, are nearly 5,000 nautical miles farther from Port Said than is Baltimore. Thus, differences in voyage distances and times among routes are not the dominant determinants of ocean rates.

Shallow Water Causes High Rates

The voyage from Chicago, Illinois, to North Africa is only 774 nautical miles longer than that from Baltimore, but this does not account for the high rates charged for shipments from the Great Lakes. Ships leaving the Great Lakes are severely restricted by draft limitations on the Welland Canal. During the first half of this year, vessels leaving the Great Lakes carried, on average, only 26,000 metric tons, in contrast to 59,000 metric tons for the U.S. Gulf and 67,000 for the Pacific ports. Unable to handle the larger vessels, Great Lakes ports cannot benefit from the operating efficiencies of such ships. So their rates are usually well above those of other ports and are often twice those for the low-cost U.S. Gulf.

Ports Tend To Specialize

Inland Rates Are a Major Factor

On December 31, 1987, an average size wheat cargo leaving Portland, Oregon, consisted of about 25.3 thousand metric tons and represented an investment of nearly $2.9 million. To minimize the cost of accumulating and holding the cargo prior to loading, exporters must consider a number of factors. Foremost among these are inland transportation costs. Since transportation rates are usually lowest for wheat grown closest to a port, groups of ports tend to specialize with regard to the variety of wheat handled. Especially at Pacific and Great Lakes ports, low inland transportation costs may overcome ocean rate disadvantages.

Rates from the U.S. Gulf to North Africa were consistently below those from other ports during all of 1987 and the first half of 1988. U.S. Gulf ports dominate shipments of

HRW and SRW wheat, accounting for about 83 percent of total exports. In the case of HRW, the Texas ports' proximity to growing areas in Texas, Oklahoma, and Kansas results in relatively low inland transportation costs.

Some SRW wheat is shipped through Mississippi River ports by barge. While barge service is not immediately available to the largest SRW producing areas, opportunities for rail-barge service have, historically, constrained rail rates from these areas to the U.S. Gulf.

The U.S. Gulf also handles significant quantities of HRS wheat and Durum, accounting for 37 and 46 percent, respectively, of exports of these varieties in 1987. Here again, both inland and overseas transportation costs favor the U.S. Gulf ports over Atlantic ports. The Atlantic ports have ready access only to SRW wheat. Despite ocean rates well below those of the Great Lakes or Pacific ports, and competitive with U.S. Gulf ports, only SRW wheat was exported through Atlantic ports in 1987.

Pacific ports in 1987 handled all of the White wheat exported and 50 percent of HRS wheat. These ports' proximity to growing areas for these varieties and subsequent lower inland transportation charges are major factors in their competitive advantage for both varieties.

While ocean rates from Great Lakes' ports are usually well above those of their competition, ready access to Durum permits them to handle substantial quantities of this variety.

Shipping patterns during the first 6 months of 1988 show only minor variations from 1986 or 1987. This demonstrates the extent to which ports tend to specialize in certain classes of wheat.

Distribution of wheat exports among ports, by class, 1986

Port range	Class						
	HRS	HRW	SRW	White	Durum	Other	Total
	- - Percent - -						
Great Lakes	16	0	4	1	54	0	8
U.S. Atlantic	0	0	18	1	0	0	3
U.S. Gulf	37	80	74	0	30	100	53
U.S. Pacific	47	20	0	97	10	0	35
Total 1/	100	100	100	100	100	100	100
Distribution of wheat exports among ports, by class, 1987							
Great Lakes	12	0	0	0	48	0	5
U.S. Atlantic	0	0	17	0	0	0	2
U.S. Gulf	37	83	83	0	46	55	60
U.S. Pacific	50	17	0	100	3	0	32
Total 1/	100	100	100	100	100	100	100
Distribution of wheat exports among ports, by class, Jan.-June, 1988							
Great Lakes	10	0	0	0	49	0	3
U.S. Atlantic	0	0	25	1	0	0	2
U.S. Gulf	48	85	75	0	44	100	65
U.S. Pacific	42	15	0	99	7	0	31
Total 1/	100	100	100	100	100	100	100

1/ Totals may not add to 100 percent due to overland exports.

SIMULATING THE EFFECT OF THE 1988 DROUGHT ON SPRING WHEAT YIELDS

by

Ken Algozin, C. Tim Osborn, Tom Hebert,
Ed Young, and Klaus Alt 1/

ABSTRACT: Effects of the 1988 drought on spring and Durum wheat yields in North Dakota are presented based upon information obtained from the Erosion-Productivity Impact Calculator simulation model. Using actual 1988 rainfall and temperature data, it is currently estimated that 1988 North Dakota spring and Durum wheat yields will be approximately 40 percent of the levels that would be expected in a year with normal rainfall and temperature levels.

KEYWORDS: Wheat yields, drought, EPIC, mathematical simulation

The 1988 drought has affected agricultural production across the United States. Beginning this spring in the Northern Plains, the drought gradually moved through the Corn Belt and into the Southeastern region, bringing above normal temperatures and below average rainfall. Across the Northern Plains, rainfall for the first 7 months of the year was between 57 and 65 percent of normal. For the same period, rainfall was approximately 75 percent of normal in the Southeast, and between 40 and 92 percent of normal in the Corn Belt. Temperatures for these three regions were at or above average during the same period. More importantly, deviations from traditional rainfall and temperature patterns were even more pronounced during the months of April, May, and June-- the primary months of crop growth for spring wheat.

Understanding the potential effects of a major drought on farmers and the U.S. agricultural economy calls for up-to-date estimates of crop yield impacts. The effects of the 1988 drought were estimated using several analytical techniques. One approach was physical crop growth simulation using the Erosion-Productivity Impact Calculator (EPIC). This paper focuses on the drought yield impacts obtained through EPIC simulation for spring and Durum wheat in North Dakota.

Methods

Using the Erosion-Productivity Impact Calculator

Developed by USDA, EPIC is a mathematical crop production model that simulates the interaction of soil-climate-plant-management processes in agricultural production (2). Among other activities, the simulation accounts for crop growth, changes in soil characteristics caused by tillage, and the effects of soil erosion on crop productivity. The EPIC model was used in the 1985 appraisal required by the Resources Conservation Act to estimate the trade-off between soil erosion and soil productivity (1). Model estimates of this tradeoff were developed for approximately 12,000 combinations of soils, crop rotations, tillage, and conservation methods nationwide. Each simulation traced the effects of 100 years of erosion so that long-term effects could be estimated.

EPIC consists of a network of submodels that simulate weather, hydrology, erosion, plant nutrient movement, plant growth, soil tillage and management, and plant environmental control. Each submodel is linked sequentially and interactively with the other submodels. EPIC operates on a daily time step and is driven by precipitation, air

1/ Algozin, Osborn, Hebert, and Alt are agricultural economists with the Resources and Technology Division, Economic Research Service. Young is an agricultural economist with the Commodity Economics Division, Economic Research Service.

temperature, and solar radiation. Each daily step is initiated by simulating a weather-day and is completed by tracing the impacts of that weather event through each of the submodels. The model then tabulates daily outputs and computes daily balances to be used as inputs to the following day. The weather component of the model allows for the use of historical data, or can generate a daily weather series using monthly averages and probabilities.

Simulating the Drought's Impact On North Dakota Wheat Production

Even though EPIC was primarily designed to provide estimates of the impact of long-term erosion on crop productivity, its structure of daily time steps makes it useful for modeling crop yields under alternative growth conditions. Given this ability, EPIC was used to simulate yield and resource impacts resulting from the 1988 drought.

The procedure used to estimate the drought's impact on wheat yields in North Dakota focused primarily on weather factors most closely associated with drought: temperature and rainfall. Several sites were selected to represent the North Dakota wheat production areas significantly affected by the drought. For each simulation site, a set of crops, soils, and tillage practices were identified that represented agronomic conditions and practices common to that area. Beginning in early June, EPIC simulations of spring and Durum wheat production were conducted using weekly updates, provided by the World Agricultural Outlook Board, of actual temperature and rainfall for each site.

To complete the weather record through the end of 1988, three hypothetical weather scenarios were investigated. An optimistic scenario assumed a return to traditional rainfall and temperature for the remainder of 1988. A pessimistic scenario assumed that current drought conditions would continue through the growing season. Finally, a long-run forecast scenario assumed that remaining 1988 weather would be equivalent to the most recent 30-90 day forecast.

Upon completion of these weekly simulations, spring and Durum wheat yields under the different weather assumptions were compared to "baseline" yields, which assumed long-term normal weather conditions. Finally, projected 1988 average yield levels for North Dakota spring and Durum wheat were expressed as a percentage of "normal" yields.

Results

Weekly simulation results for North Dakota spring and Durum wheat yields are displayed in Figures 1 and 2, respectively. Even assuming optimistic weather for the remainder of the year, both figures indicate that by late June 1988, yields for spring wheat were projected to be 69 percent of normal, while Durum wheat yields were forecast to be 65 percent of normal. Projected 1988 yields assuming the long-run forecast scenario were below those estimated using the optimistic

Figure 1
Percent Of Normal Yield-North Dakota Spring Wheat

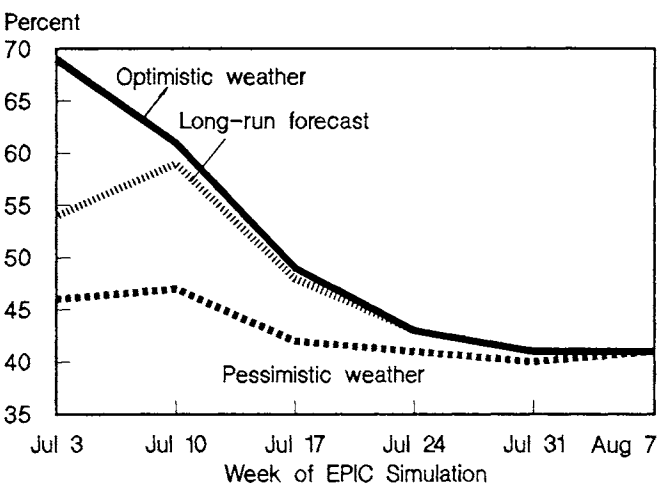
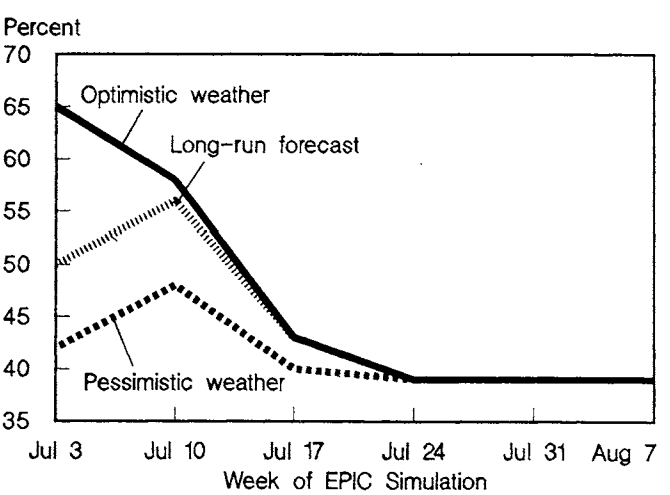


Figure 2
Percent Of Normal Yield-North Dakota Durum Wheat



scenario. As expected, projected yields associated with the pessimistic scenario were lowest of all at 46 percent of normal for spring wheat and 42 percent for Durum wheat.

As the weeks progressed through July, projected yields from all three weather scenarios declined as actual dry and hot weather was substituted for hypothesized weather, and as weather forecasts for the Northern Plains continued to predict extreme weather conditions. In addition, with each weekly simulation, projections generated under the different weather scenarios were observed to converge. This reflects the increasing similarity of each weather scenario with the continuous updating of actual weather information and the lessening influence that remaining weather could have on yield. For Durum wheat, convergence of all three weather scenario projections occurred on July 24, while convergence of the spring wheat projections did not occur until August 7.

The most recent simulations, conducted on August 7, project that 1988 North Dakota spring wheat yields will be approximately 41 percent of normal, while Durum wheat yields are expected to be 40 percent of normal. No change in these simulation results is anticipated in the coming weeks. Unlike other drought areas that received some scattered rain through July, the Northern Plains and North Dakota, in particular, had little relief. For this reason, due to the similarity between the pessimistic assumptions and the actual weather conditions in North Dakota, the latest yield projections most closely resemble the pessimistic weather scenario results developed in late June.

In addition to the estimation of crop yield impacts, EPIC simulations also allowed investigation of the drought's natural resource impacts. These simulations suggest that in the U.S. drought region, water-induced soil erosion (sheet and rill) could be approximately two and one-half times greater in 1988 as compared to a year with average weather. While this might seem peculiar in a year with less than average rainfall, one of the simulated effects of the drought was a significant reduction in crop cover. Consequently, when rainfall occurs, it erodes the soil more heavily than normal. While not simulated, it is also likely that wind erosion in the drought-affected region will also exceed average annual levels due to a reduction of crop cover.

EPIC simulations also indicate that agricultural runoff of nutrients (nitrogen and phosphorus) in the drought region may also be greater than normal in 1988. Taking into account lower water levels in lakes, streams, and rivers, which decrease dilution capacity, potential levels of agricultural byproducts in 1988 may be greater than in an average weather year.

Conclusions

While several analytical methods were employed to investigate effects of the 1988 drought, projections generated with the EPIC crop growth simulation model played a key role in assessing the drought's impact on yields of major U.S. crops. Using the most recent weather information, the model projects that 1988 North Dakota wheat yields will be approximately 40 percent of normal. Since these are average estimates, the experiences of a particular farmer in a specific location may vary greatly from these simulation results.

Even though most attention has been directed at the drought's impact on crop production this year, next year's production is of concern as well. Based on simulations for next year's spring wheat production, it is likely that below-normal rainfall during the fall will result in low soil moisture levels in the spring and have an adverse effect on the early stages of the 1989 spring wheat crop.

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PREDICTING YIELDS OF WHEAT BY CLASS

by

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Abstract: State wheat models indicate many historically influential months during which deviations from normal precipitation and temperature affect wheat yields. Optimal growing conditions for wheat include adequate precipitation from planting to harvest, and warm springs and cool summers. The models forecast a 1988 crop with generally lower yields for Hard Red Winter, Hard Red Spring and Durum wheats, and above trend yields for White and Soft Red Winter wheat.

Keywords: Yield models, wheat classes, weather

Several major wheat States are suffering from severe drought this year, and estimates of supplies point toward a tighter situation this year than last. This article focuses on the months in which monthly average temperature and total precipitation influence yields for different classes of wheat. The five major classes of wheat are Hard Red Winter, Soft Red Winter, Hard Red Winter, White, and Durum. Yield models for each State estimate the relative impact of weather variables.

Methodology

Econometric modelling was selected to evaluate yield variability. Yield and weather data for the years 1950 through 1986 were obtained for major wheat States. Monthly precipitation and temperature averages are based on data collected by the National Climatic Data Center. Monthly precipitation is the average of summed daily precipitation values from each weather station in a State, and monthly temperature is the average of daily mean temperatures, which are assumed to be the average of the high and low temperatures for each day. All weather data were divided by the historical mean for the month, so that the models reflect the relative impact of each variable on average wheat yield. There are smaller relative changes in mean monthly temperatures than in precipitation.

A stepwise regression technique was used to select the most statistically significant months throughout the growing season in which precipitation and temperature affected wheat yield. A number of functional forms were tried to determine whether any curvilinear yield response and interaction terms between precipitation and temperature exist.

In all cases, a time trend variable was included to capture the effects of technological improvements in wheat varieties, greater fertilization, and other advances in cultivation over the time period. Yield determinants such as date of planting or problems with insects and disease are not explicitly accounted for here, but their influence may be indirectly linked to certain weather conditions. The effects of short-term weather phenomena, such as frost or hail, are lost due to the aggregated nature of the data. Some States may have planted acreage as a yield component to capture the phenomenon of lower yields with more land in production. However, this relationship is not universal since in many States wheat is used as a cover crop and not harvested. The planted acreage effect for the production functions would be unclear in this event and may not be picked up in the models.

The validity of these yield models depends on whether the sample data represent the true distribution of weather patterns. Observed values that fall far outside the ranges for the 1950-86 period may cause bias in the models. Unusual weather changes for a month that substantially affect yields that year may not

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be significant in other years when that month is much closer to its historical average. Sudden and dramatic weather changes that occur may offset earlier conditions to make a particular month seem more near normal than was really the case. It is more difficult to use these models to predict yields when weather conditions are extreme, as they are this year, than under more normal conditions. The only solution is to collect more observations and reestimate the equations.

Regression Results

State-by-State production figures for wheat by class are not available. However, the National Agricultural Statistics Service (NASS) conducts a varietal acreage survey at 5-year intervals for the percentage breakdown by class for every wheat-producing State. Yield equations are presented in tables 1 and 2. The net effect of a weather variable can be calculated by adding together the coefficients for all terms, including the interaction and squared terms, and multiplying by the percentage deviation for that month.

Hard Red Winter

There are seven States that produce Hard Red Winter wheat almost exclusively: Kansas, Oklahoma, Texas, Colorado, Nebraska, Montana, and South Dakota. Together these States account for over 25 million acres or about 90 percent of Hard Red Winter production. Trend yields for 1950-86 range from 0.3 to 1 bushel per year. Due to wide differences in climate and planting dates, the only variable common to most States was high April temperatures, which have a detrimental impact on yields. Winter varieties are at a sensitive stage of reproduction during April, and moisture or temperature stress can be critical for yields.

Soft Red Winter

Half of the U.S. Soft Red Winter production comes from Illinois, Ohio, Indiana, and Missouri. The coefficient for the trend variable indicates an annual increase of between 0.5 to 0.8 bushel. Most of the States have common variables with the same signs, such as November precipitation, January precipitation and temperature, and February temperature. Temperatures 10 percent below normal in January (a decisive period for winterkill) would lower yields from 0.7 to 1.2 bushels, all other variables being equal.

White Wheat

Most White wheat is grown in the Pacific Northwest, with Washington producing the greatest amount. Wheat yields in this area are highest in the nation, excluding totally irrigated land. Warmer temperatures by 10 percent during April and May benefit yields by 2.6 and 7.6 bushels, respectively. However, by June and July the same deviation would result in 18.0- and 4.6-bushel declines, respectively.

Hard Red Spring

North Dakota, South Dakota, Minnesota, and Montana produce 90 percent of the Hard Red Spring crop. Heavy snowfall during January or February appears to have a negative influence on yields, likely due to the delay in planting. April temperatures that average 10 percent above normal result in yields 1.7, 2.5, and 5.2 bushels higher in North Dakota, South Dakota, and Minnesota, respectively. By contrast, April temperatures have the opposite effect on winter wheat yields. Further, high temperatures from June through August and harvest-delaying rains after July have adverse impacts on yields.

Durum

North Dakota grows over 80 percent of the Hard Amber Durum wheat supply. Critical months are very similar to the Hard Red Spring varieties, although Durum is generally planted a few weeks before. High June and July temperatures, which have been major factors in this summer's poor Durum crop, reduce yield by 6.2 and 8.9 bushels, respectively, when temperatures are 10 percent above normal.

Conclusion

Trend wheat yields may be influenced by many factors throughout the growing season. Adequate snowcover is needed to prevent winterkill from frigid temperatures. Soil moisture should be sufficient to attain germination but not excessive enough to delay fieldwork and planting. Temperatures should be warm enough to promote crop growth but

not high enough to stress and stunt development of kernels. A dry harvest is best for preserving crop yields and quality. Weather conditions vary by State and it is not possible to predict these conditions in advance. The 1988 forecasts implied generally lower yields for Hard Red Winter, Hard Red Spring, and Durum wheats, and above trend yields for White and Soft Red Winter wheats.

Reference Note

State precipitation and temperature records for the current crop year may be obtained from the *Weekly Weather and Crop Bulletin* published by NOAA/USDA. The simple average for all weather stations in each State of the ratio of observed to normal conditions is incorporated into the yield equations in tables 1 and 2. Forecasts for each State using conditions observed through July are presented in the middle column in tables 3-6. The first column in these tables, designated as "Trend," is the yield forecast had all weather variables been at their historical mean. The last column reports the latest NASS wheat yield forecasts from the August *Crop Production* report. Any forecast based on weather data in which precipitation is at record lows or record high average temperatures, as is the case in 1988 in many areas, should be taken with caution.

Table 1--State wheat yield models for Hard Red Spring, Durum, and Soft Red Winter wheat 1/

	ND HRS	MN HRS	SD HRS	MT HRS	ND Durum	MO SRW	IL SRW	IN SRW	OH SRW
Intercept	133.8	-5.43	345.5	661.8	243.2	-90.8	-4.88	10.71	-19.9
	(8.31)	(-0.18)	(5.47)	(5.35)	(22.7)	(-5.12)	(-0.76)	(1.43)	(-1.86)
Year	0.46	0.92	0.54		0.25	0.54	0.80	0.67	0.88
	(7.79)	(16.7)	(9.68)		(12.1)	(10.4)	(14.3)	(9.02)	(16.9)
Planted acres (1000's)	-0.00056	-0.0018	-0.0054		-0.00058	0.0022		-0.0061	
	(-1.26)	(-3.59)	(-5.15)		(-3.37)	(2.36)		(-2.12)	
September temperature						53.6			
						(4.78)			
October temperature									31.9
									(4.41)
November precipitation						-3.93	-5.27	-6.18	-5.74
						(-4.97)	(-5.22)	(-4.19)	(-6.17)
December precipitation						4.90			
						(2.39)			
December precipitation^2						-1.09			
						(-1.82)			
January precipitation	-2.44	47.4					-1.92	-11.64	-24.0
	(-3.00)	(8.08)					(-2.38)	(-3.00)	(-5.56)
January interaction		-46.5@	-2.19*		-2.51				21.2
		(-7.95)	(-2.88)		(10.85)				(4.92)
January temperature							7.17	8.95	-9.56
							(2.51)	(2.25)	(-2.19)
February precipitation		-36.1	27.1		-2.11			7.97	
		(-5.27)	(2.96)		(-6.72)			(1.48)	
February interaction	-2.79*	33.6@	-25.0*					-8.43	
	(-3.16)	(5.08)	(-2.81)					(-1.73)	
February temperature						-3.36			-12.6
						(-2.04)			(-4.38)
March precipitation		2.79	4.17	-7.44			-3.78		-2.04
		(4.77)	(6.06)	(-2.58)			(-3.30)		(-2.10)
March interaction	2.75				0.83				
	(3.39)				(3.90)				
March temperature	-3.34								
	(-1.79)								
April precipitation	10.93			-92.1				19.5	
	(1.72)			(-3.94)				(2.03)	
April interaction	-9.22			82.6	1.34			-21.8	-4.05
	(-1.38)			(3.49)	(4.94)			(-2.25)	(-3.62)
April temperature	26.6	52.3	25.5	-123.9					
	(3.32)	(3.95)	(2.68)	(-4.92)					
May precipitation		-58.2					-6.38		
		(-4.47)					(-3.85)		
May interaction		61.9			-0.44	-5.99			
		(4.78)			(-1.44)	(-3.71)			
May temperature		-109.8			12.2				
		(-7.65)			(4.85)				
June precipitation		-5.72	-132.3	-89.2	-91.6				
		(-3.80)	(-3.00)	(-1.74)	(-9.33)				
June interaction			135.0	97.0	95.3		-6.12		-4.43
			(3.04)	(1.89)	(9.70)		(-3.60)		(-3.34)
June temperature	-44.1		-164.1	-123.1	-157.5	38.7			
	(-4.29)		(-3.74)	(-2.52)	(-14.9)	(3.05)			
July precipitation	2.23	-4.67	-117.3	-206.3	5.62				
	(2.43)	(-4.91)	(-4.65)	(-3.22)	(15.8)				
July interaction			112.0	210.6			3.60		5.67
			(4.44)	(3.27)			(2.30)		(3.55)
July temperature	-113.4	-160.5	-214.4	-242.4	-88.7				
	(-9.31)	(-15.1)	(-7.34)	(-3.45)	(-22.4)				
August precipitation	-3.29	143.8		-4.43	9.26				
	(-3.35)	(4.80)		(-1.88)	(3.47)				
August interaction		-137.0			-12.5				
		(-4.69)			(-4.27)				
August temperature		190.1		-105.8					
		(6.01)		(-4.46)					
September precipitation	-3.28		-1.52		-2.32				
	(-3.43)		(-2.21)		(-7.25)				
September temperature				-29.1					
				(-2.30)					
R^2	0.96	0.99	0.97	0.90	0.99	0.89	0.92	0.89	0.96
Durbin-Watson	2.33	2.47	2.15	1.96	2.36	2.16	1.69	2.58	2.95
Standard error	1.46	1.03	1.42	2.94	0.43	2.31	2.55	3.28	2.16

1/ t-statistics in parentheses. * = March temperature interaction. @ = April temperature interaction.
** = Squared term.

Table 2--State wheat yield models for Hard Red Winter and White wheat1/

	MT HRW	CO HRW	SD HRW	NE HRW	KS HRW	OK HRW	TX HRW	WA White
Intercept	-44.5	25.3	72.3	7.78	116.7	323.8	2.87	-1818.2
	(-3.75)	(1.06)	(1.73)	(0.58)	(4.95)	(5.01)	(0.27)	(-4.33)
Year	0.29	0.34	1.00	0.50	0.57	0.80	0.53	0.76
	(4.97)	(9.37)	(5.44)	(8.44)	(10.83)	(11.1)	(14.2)	(12.5)
Planted acres (1000's)	0.002		-0.0235			-0.0017		
	(1.55)		(-5.16)			(-2.75)		
August precipitation					-1.07			
					(-2.90)			
September precipitation		1.73		1.11		-1.09**		
		(2.21)		(1.24)		(-2.89)		
September temperature			-27.3					
			(-1.93)					
October precipitation				2.90	1.70			
				(2.68)	(1.66)			
October temperature		-49.1	-46.1	-23.3		16.7**		
		(-7.71)	(-3.88)	(-2.27)		(2.54)		
November precipitation			6.20		16.5			
			(4.19		(2.62)			
November interaction					-15.7			
					(-2.50)			
November temperature		22.9						
		(4.26)						
December precipitation			3.36					
			(2.40)					
December temperature	5.63			8.07				
	(3.30)			(2.46)				
January precipitation						0.88**	-19.5	-3.84
						(2.79)	(-1.98)	(-1.91)
January interaction		3.63					21.0	11.9
		(3.74)					(2.11)	(3.61)
January temperature			5.37		-5.92	-178.1	-19.8	
			(2.82)		(-2.26)	(-3.36)	(-1.99)	
January temperature^2						105.9**		
						(3.11)		
February precipitation		4.50	-5.16				6.85	
		(5.43)	(3.33)				(7.17)	
February temperature						17.8		
						(2.89)		
March precipitation		8.07						
		(7.39)						
March temperature		27.5	18.2		-21.7	-570.8		
		(6.44)	(3.44)		(-4.40)	(-4.21)		
March temperature^2						311.2**		-21.0**
						(3.96)		(-3.19)
April precipitation	-1.08	90.9	-44.5	2.34		-1.19**		-9.0**
	(-1.39)	(5.76)	(-1.92)	(1.69)		(-2.97)		(-2.42)
April interaction		-83.1	42.5					26.6
		(-5.34)	(1.83)					(3.60)
April temperature	92.1	59.8	-55.6		-13.2	-41.6		
	(3.32)	(4.05)	(-2.45)		(-1.81)	(-4.38)		
April temperature^2	-53.1**							
	(-3.34)							
May precipitation		-150.4					91.6	
		(-5.31)					(5.34)	
May interaction		150.8	-2.08	-2.66			-98.3	
		(5.38)	(-1.39)	(-1.63)			(-5.54)	
May temperature	-12.3	-87.4	75.2		-19.3			75.7
	(-2.32)	(-3.32)	(3.13)		(-1.97)			(4.13)
June precipitation	22.6					-3.59		7.84
	(2.89)					(-3.12)		(2.19)
June precipitation^2	-8.21**							
	(-2.05)							
June interaction			16.7					-12.5
			(4.25)					(-1.53)
June temperature		-25.4	-81.3		-22.7			3554.7
		(-2.43)	(-4.70)		(-1.47)			(4.32)
June temperature^2								-1772.9**
								(-4.36)
July precipitation	2.46				-2.92			
	(2.42)				(-2.50)			
July interaction						2.72		
						(2.61)		
July temperature					-41.7			-46.6
					(-3.12)			(-2.58)
R^2	0.82	0.97	0.89	0.86	0.94	0.95	0.93	0.92
Durbin-Watson	2.04	1.99	2.07	1.83	1.80	2.63	1.86	1.79
Standard error	2.50	1.64	3.68	3.10	2.40	2.14	1.95	3.17

1/ t-statistics in parentheses. * = March temperature interaction. @ = April temperature interaction.
** = Squared term.

Table 3--Hard Red Winter yields, 1988

State	Trend	July forecast	Aug forecast (NASS)
		Bushels/acre	
Montana	33.8	27.0	19.0
South Dakota	33.8	31.0	16.0
Nebraska	39.9	41.1	39.0
Kansas	41.0	37.0	34.0
Oklahoma	41.3	41.2	36.0
Texas	31.1	31.5	28.0
Colorado	29.9	28.8	34.0
7 State average	37.7	35.5	31.8

Table 4--Soft Red Winter yields, 1988

State	Trend	July forecast	Aug forecast (NASS)
		Bushels/acre	
Missouri	43.4	45.3	50.0
Illinois	52.5	56.7	55.0
Indiana	52.9	54.3	49.0
Ohio	54.1	61.9	50.0
4 State average	49.7	53.4	51.2

Table 5--Hard Red Spring yields, 1988

State	Trend	July forecast	Aug forecast (NASS)
North Dakota	35.1	21.0	17.0
South Dakota	39.5	21.5	14.0
Minnesota	44.9	33.7	22.0
Montana	28.2	10.3	12.0
4 State average	36.7	22.1	16.9

Table 6--White wheat and Durum yields, 1988

State	Trend	July forecast	Aug forecast (NASS)
Washington White	60.1	60.4	62.0
North Dakota Durum	30.3	5.9	16.0

Table 1--Wheat: Marketing year supply, disappearance, area, and prices, 1982-88

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Item	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88 (Prel.)	1988/89 (Proj.)
				Thousand bushels			
Supply							
June 1 stocks	1,159	1,515	1,399	1,425	1,905	1,821	1,266
Production	2,765	2,420	2,595	2,425	2,092	2,105	1,821
Imports 1/	8	4	9	16	21	16	15
Total supply	3,932	3,939	4,003	3,866	4,018	3,942	3,102
Disappearance							
Food	616	643	651	674	701	719	735
Seed	97	100	98	93	84	85	100
Feed and residual 2/	195	369	405	279	408	280	270
Total domestic	908	1,112	1,154	1,046	1,193	1,084	1,105
Exports 1/	1,509	1,429	1,424	915	1,004	1,592	1,400
Total disappearance	2,417	2,540	2,578	1,961	2,197	2,676	2,505
May 31 stocks	1,515	1,399	1,425	1,905	1,821	1,266	597
				Million acres			
Area							
Planted	86.2	76.4	79.2	75.6	72.1	65.8	65.9
Harvested	77.9	61.4	66.9	64.7	60.7	55.9	52.9
Set aside and diverted	5.8	29.8	18.3	18.8	19.6	23.8	19.3
Conservation Reserve	--	--	--	--	0.6	4.1	7.6
National base acreage	90.7	90.9	94.0	94.0	92.2	91.7	91.8
				Bushels per acre			
Yield/harvested acre	35.5	39.4	38.8	37.5	34.4	37.6	34.4
				Dollars per bushel			
Prices							
Received by farmers	3.45	3.51	3.39	3.08	2.42	2.57	3.45-3.95
Loan rate	3.55	3.65	3.30	3.30	2.40	2.28	2.21
Target	4.05	4.30	4.38	4.38	4.38	4.38	4.23
				Million dollars			
Value of production	9,813	8,533	8,757	7,469	5,062	5,410	6,808

1/ Imports and exports include flour and other products expressed in wheat equivalent. 2/ Residual, approximates feed use and includes negligible quantities used for alcoholic beverages.

Wheat: Production by major States

State	1982	1983	1984	1985	1986	1987 1/	1988 2/
				Million bushels			
Colorado	85.0	122.1*	115.0	139.3	96.4	97.4	83.5
Kansas	458.5*	448.2	431.2	433.2	336.6	366.3	319.6
Minnesota	126.8	79.0	120.7	142.4*	103.7	102.6	45.8
Montana	180.3	136.9	104.7	50.2	138.5	151.2	60.4
Nebraska	101.5	98.9	81.0	89.7	76.0	85.8	78.0
N. Dakota	324.8	194.1	284.2	323.3	292.3	269.1	120.6
Oklahoma	227.7*	150.5	190.8	165.0	150.8	129.6	172.8
S. Dakota	98.5	89.7	126.0*	111.2	108.7	106.7	40.7
Texas	144.0	161.0	150.0	187.2*	120.0	100.8	86.8
Washington	138.9	172.6*	160.4	128.3	116.9	114.3	126.2

1/ Preliminary. 2/ Winter wheat only. * Record production.

Table 2--Wheat: Marketing year supply and disappearance, 1960-88*

Year beginning June 1	Supply				Disappearance						Ending stocks May 31		
	Beginning stocks	Production	Imports 1/	Total	Domestic Use				Exports 1/	Total disappearance	Govt. owned	Privately owned 3/	Total
					Food	Seed	Feed 2/	Total					
	Million bushels												
1960/61	1,384.2	1,354.7	8.1	2,747.0	496.5	64.3	30.4	591.0	653.5	1,244.5	1,224.6	277.8	1,502.4
1961/62	1,502.4	1,232.4	5.9	2,740.7	504.0	56.3	44.0	604.4	715.7	1,320.1	1,074.4	346.2	1,420.6
1962/63	1,420.6	1,092.0	5.3	2,517.9	502.7	61.4	34.7	598.8	649.4	1,248.2	1,101.8	167.9	1,269.7
1963/64	1,269.7	1,146.8	4.0	2,420.6	487.9	64.9	28.6	581.5	845.6	1,427.1	799.8	193.7	993.5
1964/65	993.5	1,283.4	1.8	2,278.7	514.4	65.5	54.9	634.9	722.7	1,357.6	634.8	286.3	921.1
1965/66	921.1	1,315.6	0.9	2,237.6	517.9	61.5	145.9	725.3	851.8	1,577.1	299.2	361.3	660.5
1966/67	660.5	1,304.9	1.7	1,967.1	505.1	77.4	100.5	683.1	771.3	1,454.3	122.0	390.8	512.8
1967/68	512.8	1,507.6	1.0	2,021.4	517.8	71.3	36.8	625.8	765.3	1,391.2	100.1	530.1	630.2
1968/69	630.2	1,556.6	1.1	2,187.9	522.4	60.8	156.5	739.7	544.2	1,283.9	139.5	764.5	904.0
1969/70	904.0	1,442.7	2.9	2,349.5	520.1	55.5	188.4	764.0	603.0	1,367.0	277.2	705.4	982.6
1970/71	982.6	1,351.6	1.4	2,335.7	517.1	62.1	193.0	772.1	740.8	1,512.9	352.6	470.2	822.8
1971/72	822.8	1,618.6	1.1	2,442.5	523.7	63.2	262.4	849.3	609.8	1,459.1	355.1	628.3	983.4
1972/73	983.4	1,546.2	1.3	2,530.9	531.8	67.4	199.5	798.7	1,135.1	1,933.8	6.3	590.8	597.1
1973/74	597.1	1,710.8	2.6	2,310.5	544.3	84.0	125.1	753.4	1,217.0	1,970.4	0.6	339.5	340.1
1974/75	340.1	1,781.9	3.4	2,125.4	545.0	92.0	34.9	671.9	1,018.5	1,690.4	--	435.0	435.0
1975/76	435.0	2,126.9	2.4	2,564.3	588.5	99.0	38.3	725.8	1,172.9	1,898.7	--	665.6	665.6
1976/77	665.6	2,148.8	2.7	2,817.1	588.0	92.0	74.3	754.4	949.5	1,703.9	--	1,113.2	1,113.2
1977/78	1,113.2	2,045.5	1.9	2,160.6	586.5	80.0	192.5	858.9	1,123.9	1,982.8	48.3	1,129.5	1,177.8
1978/79	1,177.8	1,775.5	1.9	2,955.2	592.4	87.0	157.6	837.0	1,194.1	2,031.1	51.1	873.0	924.1
1979/80	924.1	2,134.1	2.1	3,060.3	596.1	101.0	86.0	783.1	1,375.2	2,158.3	187.8	714.2	902.0
1980/81	902.0	2,380.9	2.5	3,285.4	610.5	113.0	59.0	782.5	1,513.8	2,296.3	199.7	789.4	989.1
1981/82	989.1	2,785.4	2.8	3,777.3	602.4	110.0	134.8	847.2	1,770.7	2,617.9	190.3	969.1	1,159.4
1982/83	1,159.4	2,765.0	7.6	3,932.0	616.4	97.0	194.9	908.3	1,508.6	2,416.9	192.0	1,323.1	1,515.1
1983/84	1,515.1	2,419.8	4.0	3,938.9	642.6	100.0	369.1	1,111.7	1,428.6	2,540.3	188.1	1,210.5	1,398.6
1984/85	1,398.6	2,594.8	9.4	4,002.8	651.1	98.0	404.5	1,153.5	1,424.1	2,577.6	377.6	1,047.6	1,425.2
1985/86	1,425.2	2,425.1	16.0	3,866.3	674.4	93.0	278.5	1,045.9	915.4	1,961.3	601.7	1,303.3	1,905.0
1986/87	1,905.0	2,091.6	21.1	4,017.7	696.0	84.0	413.3	1,193.3	1,003.5	2,196.8	875.0	945.9	1,820.9
1987/88 4/	1,820.9	2,105.2	16.3	3,942.4	719.0	85.0	280.1	1,084.2	1,592.1	2,676.3	283.0	983.2	1,266.2
1988/89 4/	1,266.2	1,821.0	15.0	3,102.2	735.0	100.0	270.0	1,105.0	1,400.0	2,505.0	200.0	397.2	597.2

1/ Imports and exports include flour and other products expressed in wheat equivalent. 2/ Residual; approximates feed use and includes negligible quantities used for distilled spirits. 3/ Includes outstanding and reserve loans. 4/ Projections.

* Totals may not add because of rounding.

Table 3--Wheat: Quarterly supply and disappearance, 1982-88*

Year and periods beginning June 1	Supply				Disappearance						Ending stocks		
					Domestic use								
	Beginning stocks	Production	Imports 1/	Total	Food	Seed	Feed 2/	Total	Exports 1/	Total disappearance	Govt. owned	Privately owned 3/	Total
	Million bushels												
1982/83													
June-Aug.	1,159.4	2,765.0	1.2	3,925.6	152.9	1.0	131.3	285.2	411.1	696.3	193.3	3,036.0	3,229.3
Sept.-Nov.	3,229.3	----	3.0	3,232.3	159.5	74.0	18.8	252.3	337.2	589.5	189.7	2,453.1	2,642.8
Dec.-Feb.	2,642.8	----	2.6	2,645.4	152.4	3.0	24.2	179.6	393.8	573.4	184.6	1,887.4	2,072.0
Mar.-May	2,072.0	----	0.8	2,072.8	151.6	19.0	20.5	191.1	366.6	557.7	192.0	1,323.1	1,515.1
Mkt. year	1,159.4	2,765.0	7.6	3,932.0	616.4	97.0	194.8	908.2	1,508.7	2,416.9	192.0	1,323.1	1,515.1
1983/84													
June-Aug.	1,515.1	2,419.8	1.1	3,936.0	158.7	1.0	196.5	356.2	346.7	702.9	365.0	2,868.1	3,233.1
Sept.-Nov.	3,233.1	----	0.9	3,234.0	163.1	75.0	100.5	338.6	359.7	698.3	375.8	2,159.9	2,535.7
Dec.-Feb.	2,535.7	----	1.0	2,536.7	166.8	3.0	46.4	216.2	369.0	585.2	313.8	1,637.7	1,951.5
Mar.-May	1,951.5	----	1.0	1,952.5	154.0	21.0	25.7	200.7	353.2	553.9	188.0	1,210.6	1,398.6
Mkt. year	1,515.1	2,419.8	4.0	3,938.9	642.6	100.0	369.1	1,111.7	1,428.6	2,540.3	188.0	1,210.6	1,398.6
1984/85													
June-Aug.	1,398.6	2,594.8	4.6	3,998.0	157.8	1.0	279.9	438.7	399.2	837.9	278.1	2,882.0	3,160.1
Sept.-Nov.	3,160.1	----	1.8	3,161.9	168.5	69.0	99.9	337.4	486.0	823.4	359.4	1,979.1	2,338.5
Dec.-Feb.	2,338.5	----	1.2	2,339.7	164.2	4.0	35.5	203.7	335.2	538.9	375.7	1,414.7	1,800.8
Mar.-May	1,800.8	----	1.8	1,802.6	160.5	24.0	(10.8)	173.7	203.7	377.4	377.6	1,047.6	1,425.2
Mkt. year	1,398.6	2,594.8	9.4	4,002.8	651.0	98.0	404.5	1,153.5	1,424.1	2,577.6	377.6	1,047.6	1,425.2
1985/86													
June-Aug.	1,425.2	2,425.1	3.5	3,853.8	165.8	1.0	234.4	401.2	249.1	650.3	406.7	2,796.8	3,203.5
Sept.-Nov.	3,203.5	----	5.1	3,208.6	185.6	63.0	63.7	312.3	252.9	565.2	517.1	2,126.3	2,643.4
Dec.-Feb.	2,643.4	----	2.7	2,646.1	162.2	4.0	(0.3)	165.9	224.4	390.3	526.3	1,729.5	2,255.8
Mar.-May	2,255.8	----	4.7	2,260.5	160.8	25.0	(19.3)	166.5	189.0	355.5	601.7	1,303.3	1,905.0
Mkt. year	1,425.2	2,425.1	16.0	3,866.3	674.4	93.0	278.5	1,045.9	915.4	1,961.3	601.7	1,303.3	1,905.0
1986/87													
June-Aug.	1,905.0	2,091.6	4.3	4,000.9	169.0	1.0	353.8	523.8	320.6	844.4	793.8	2,362.7	3,156.5
Sept.-Nov.	3,156.5	---	3.6	3,160.1	185.9	57.0	(19.7)	223.2	263.4	486.6	863.9	1,809.6	2,673.5
Dec.-Feb.	2,673.5	---	5.9	2,679.4	166.8	3.0	56.5	226.3	202.7	429.0	905.3	1,345.1	2,250.4
Mar.-May	2,250.4	---	7.3	2,257.7	174.3	23.0	22.7	220.0	216.8	436.8	830.1	990.8	1,820.9
Mkt. year	1,905.0	2,091.6	21.1	4,017.7	696.0	84.0	413.3	1,193.3	1,003.5	2,196.8	830.1	990.8	1,820.9
1987/88													
June-Aug.	1,820.9	2,105.2	5.1	3931.2	179.3	1.0	352.5	532.8	409.9	940.3	798.8	2,189.7	2,988.5
Sept.-Nov.	2,988.5	--	5.1	2993.5	191.1	58.0	(69.4)	179.7	308.5	487.5	755.4	1,749.9	2,505.3
Dec.-Feb.	2,505.3	--	2.7	2508.0	168.6	3.0	(0.1)	171.5	413.1	585.9	450.1	1,458.4	1,923.4
Mar.-May	1,923.4	--	3.5	1926.9	180.0	23.0	(2.9)	200.2	460.6	662.3	283.0	983.2	1,266.2
Mkt. year	1,820.9	2,105.2	16.3	3942.4	719.0	85.0	280.1	1084.2	1592.1	2676.0	283.0	983.2	1,266.2

1/ Imports and exports include flour and other products expressed in wheat equivalent. 2/ Residual; approximates feed use and includes negligible quantities used for distilled spirits. 3/ Includes outstanding and reserve loans. * Totals may not add due to rounding.

Table 4--Wheat classes: Marketing year supply and disappearance, 1982-1988 1/

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Year beginning June 1	Supply			Disappearance			Ending stocks May 31
	Beginning stocks	Production	Total 2/	Domestic use	Exports	Total	
			Million bushels				
1982/83							
Hard Winter	538	1,243	1,781	348	679	1,027	754
Hard Spring	346	492	842	195	239	434	408
Soft Red	60	590	650	251	325	576	74
White	109	294	403	53	207	260	143
Durum	106	146	256	61	59	120	136
All classes	1,159	2,765	3,932	908	1,509	2,417	1,515
1983/84							
Hard Winter	754	1,198	1,952	503	704	1,207	745
Hard Spring	408	323	732	197	221	418	314
Soft Red	74	504	578	282	222	504	74
White	143	322	465	78	220	298	167
Durum	136	73	212	51	62	113	99
All classes	1,515	2,420	3,939	1,111	1,429	2,540	1,399
1984/85							
Hard Winter	745	1,251	1,996	562	717	1,279	717
Hard Spring	314	409	728	174	183	357	371
Soft Red	74	531	605	288	253	541	64
White	167	301	469	86	210	296	173
Durum	99	103	205	44	61	105	100
All classes	1,399	2,595	4,003	1,154	1,424	2,578	1,425
1985/86							
Hard Winter	717	1,230	1,947	543	395	938	1,009
Hard Spring	371	460	841	177	166	343	498
Soft Red	64	368	432	204	149	353	79
White	173	254	429	79	152	231	198
Durum	100	113	217	43	53	96	121
All classes	1,425	2,425	3,866	1,046	915	1,961	1,905
1986/87							
Hard Winter	1,009	1,018	2,027	622	432	1,054	973
Hard Spring	498	451	956	266	200	466	490
Soft Red	79	292	371	179	115	294	77
White	198	232	437	77	175	252	185
Durum	121	98	226	49	82	131	95
All classes	1,905	2,092	4,018	1,193	1,004	2,197	1,821
1987/88 3/							
Hard Winter	973	1,019	1,991	507	905	1,412	579
Hard Spring	490	431	927	278	255	533	394
Soft Red	77	348	425	190	160	350	75
White	185	216	404	59	210	269	135
Durum	95	93	195	50	62	112	83
All classes	1,821	2,105	3,941	1,084	1,592	2,676	1,266
1988/89 3/							
Hard Winter	579	894	1,473	523	685	1,208	265
Hard Spring	394	188	589	186	235	421	168
Soft Red	75	462	537	258	250	508	29
White	135	222	360	82	190	272	88
Durum	83	55	143	56	40	96	47
All classes	1,266	1,821	3,102	1,105	1,400	2,505	597

1/ Data, except production, are approximations. Imports and exports include flour and products in wheat equivalent. 2/ Total supply includes imports. 3/ Estimated.

Table 5--Wheat: Status of price support loans on specified dates, 1980-88

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Crop year	Total stocks	Total CCC inventory	Outstanding CCC loans	Farmer Owned Reserve 1/	Free stocks
			Million bushels		
1980/81					
June 1	902.0	187.8	99.3	259.9	355.0
Sep. 1	2,714.0	202.1	96.7	211.0	2,204.2
Dec. 1	2,092.3	202.9	128.2	210.5	1,550.7
Mar. 1	1,522.8	203.2	114.3	303.8	901.5
1981/82					
June 1	989.1	199.7	54.6	359.6	375.2
Sep. 1	3,056.0	195.4	147.0	398.6	2,315.0
Dec. 1	2,338.4	190.6	195.4	459.1	1,493.3
Mar. 1	1,777.6	190.2	182.2	515.2	890.0
1982/83					
June 1	1,159.4	190.3	112.0	560.4	296.7
Sep. 1	3,229.3	193.3	77.5	763.3	2,195.2
Dec. 1	2,642.8	189.7	105.6	986.3	1,361.2
Mar. 1	2,072.0	184.6	92.5	1,117.1	677.8
1983/84					
June 1	1,515.1	192.0	65.2	1,060.6	197.3
Sep. 1	3,233.1	365.0	294.1	824.8	1,749.2
Dec. 1	2,535.7	375.8	396.0	736.6	1,027.3
Mar. 1	1,951.5	313.8	443.9	610.7	583.1
1984/85					
June 1	1,398.6	188.0	379.1	611.2	220.3
Sep. 1	3,160.1	278.1	254.9	657.9	1,969.2
Dec. 1	2,338.5	359.4	247.2	674.9	1,057.0
Mar. 1	1,800.8	375.7	218.4	673.8	532.9
1985/86					
June 1	1,425.2	377.6	175.0	657.1	215.5
Sep. 1	3,203.5	406.7	493.7	689.5	1,613.6
Dec. 1	2,643.4	517.1	734.9	653.7	737.7
Mar. 1	2,255.8	526.3	770.8	633.1	325.6
1986/87					
June 1	1,905.0	601.7	677.7	596.4	29.2
Sep. 1	3,156.5	793.8	455.8	629.9	1,277.0
Dec. 1	2,673.5	863.9	527.6	657.7	624.3
Mar. 1	2,250.4	905.3	419.8	662.6	262.7
1987/88					
June 1	1,820.9	830.1	235.6	631.8	123.4
Sep. 1	2,988.5	798.8	245.1	597.5	1,347.1
Dec. 1	2,505.3	755.4	383.1	553.4	814.0
Mar. 1	1,923.4	450.1	293.8	517.9	661.6
1988/89					
June 1	1266.2	283.0	202.7	479.6	300.9

1/ Includes any quantity in the Special Producer Storage Loan Program.

Source: Agricultural Stabilization and Conservation Service.

Table 6--U.S. wheat exports: Grain, flour, and products, by months, 1980-88

Year	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Total
						Thousand bushels*							
						Wheat (grain only)							
1980/81	96,193	123,598	141,415	137,325	116,948	112,199	132,048	129,981	124,397	128,770	127,652	78,030	1,448,558
1981/82	124,521	138,168	145,428	194,148	156,993	127,495	137,757	124,163	138,719	159,078	148,181	116,496	1,711,147
1982/83	156,914	117,914	124,336	130,992	98,520	94,638	88,457	143,141	146,594	131,134	112,451	96,235	1,441,326
1983/84	113,506	116,701	87,823	119,263	114,810	102,880	128,887	118,357	111,096	118,713	97,132	112,813	1,341,981
1984/85	105,356	133,276	146,187	242,694	137,290	97,283	131,941	106,430	85,493	57,924	67,811	56,588	1,368,272
1985/86	84,264	63,930	86,862	72,206	85,650	82,384	61,857	69,656	70,869	67,393	56,438	46,399	847,905
1986/87	79,416	104,457	114,691	98,059	84,459	59,289	51,043	65,240	67,764	65,529	65,426	64,603	919,980
1987/88	119,769	158,648	112,758	119,945	101,679	71,166	113,402	139,900	143,333	149,148	152,830	147,667	1,530,245
1988/89	121,812												
						Flour (grain equivalent) 1/							
1980/81	4,230	2,082	5,057	3,774	2,785	2,165	1,739	2,658	5,217	6,353	7,347	4,803	48,209
1981/82	5,794	2,779	3,438	2,496	668	411	902	1,767	8,068	5,775	6,955	5,983	45,036
1982/83	4,577	1,364	3,488	2,508	3,904	2,483	999	3,998	8,865	6,532	10,530	7,521	56,769
1983/84	9,611	8,198	7,849	8,801	8,473	3,504	1,245	2,301	3,337	7,438	7,311	8,149	76,217
1984/85	6,828	4,136	1,288	1,693	3,260	1,778	948	403	6,422	5,778	6,563	4,022	43,118
1985/86	3,640	3,072	1,638	3,213	1,303	2,909	8,497	3,756	5,561	5,172	6,582	2,382	47,724
1986/87	5,108	4,795	8,831	4,731	6,002	8,488	6,415	6,681	3,677	6,174	6,735	6,789	74,425
1987/88	5,450	6,816	4,749	4,085	3,418	6,722	4,316	7,269	3,460	823	2,463	5,496	55,066
1988/89	7,036												
						Wheat products (grain equivalent) 2/							
1980/81	912	1,222	711	1,849	1,284	1,005	1,230	890	1,010	1,114	4,433	1,406	17,067
1581/82	1,827	1,150	1,009	1,037	1,171	1,406	572	1,211	1,875	351	2,246	692	14,547
1982/83	971	465	1,073	984	529	2,604	472	796	492	586	630	935	10,537
1983/84	633	1,075	1,300	578	502	904	1,346	600	1,789	780	363	503	10,373
1984/85	881	670	587	1,076	429	497	824	1,831	935	916	1,956	2,164	12,765
1985/86	1,984	2,472	1,258	2,097	1,683	1,476	1,542	1,449	1,170	1,103	1,590	1,903	19,726
1986/87	1,052	1,563	685	1,149	896	370	642	670	611	447	542	463	9,091
1987/88	447	751	549	234	364	901	743	423	277	551	1,133	462	6,835
1988/89	421												
						Total wheat, flour, and products							
1980/81	101,335	126,902	147,183	142,949	121,017	115,369	135,017	133,529	130,624	136,238	139,432	84,239	1,513,834
1981/82	132,142	142,097	149,875	197,681	158,832	129,312	139,231	127,141	148,662	165,204	157,382	123,171	1,770,730
1982/83	162,462	119,743	128,897	134,485	102,952	99,726	89,928	147,935	155,950	138,252	123,611	104,691	1,508,632
1983/84	123,750	125,974	96,972	128,642	123,785	107,288	131,478	121,258	116,222	126,931	104,806	121,465	1,428,571
1984/85	113,065	138,082	148,062	245,463	140,979	99,558	133,713	108,664	92,851	64,618	76,330	62,774	1,424,159
1985/86	89,888	69,472	89,757	77,516	88,635	86,770	71,896	74,861	77,599	73,667	64,609	50,684	915,355
1986/87	85,576	110,815	124,207	103,943	91,357	68,147	58,100	72,591	72,052	72,150	72,703	71,854	1,003,496
1987/88	125,666	166,215	118,056	124,263	105,461	78,789	118,461	147,592	147,070	150,522	156,426	153,625	1,592,146
1988/89	129,269												

1/Includes meal, groats, and Durum. 2/Includes macaroni, rolled wheat, and bulgar. *Totals may not add because of independent rounding.
Source: Bureau of the Census.

Table 7--Wheat: Inspections for export by class and country of destination, June-May 1987/88

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Country	Hard Red Spring	Hard Red Winter	Soft Red Winter	White	Durum	Mixed	Total
				1,000 bushels			
Algeria	5,517	27,302	4,303	0	33,065	0	70,187
Bangladesh	0	3,504	17,071	17,343	0	0	37,918
Barbados	1,411	0	177	0	0	0	1,588
Belgium	3,799	0	0	0	1,865	0	5,664
Belize	175	241	0	0	0	0	416
Bolivia	0	7,034	0	0	0	0	7,034
Brazil	0	2,546	0	0	0	0	2,546
Bulgaria	1,886	3,781	0	0	0	0	5,667
Chile	0	191	0	0	1,414	0	1,605
China (Mainland)	1,593	91,388	51,384	0	0	0	144,365
China (Taiwan)	14,043	12,796	0	5,390	0	0	32,229
Colombia	655	12,747	1,404	0	0	0	14,806
Costa Rica	3,792	0	457	0	369	0	4,618
Dominican Republic	6,012	2,761	809	0	0	0	9,582
Ecuador	3,360	10,527	0	0	221	172	14,280
Egypt	0	0	27,830	63,820	5	0	91,655
El Salvador	3,755	0	1,430	650	224	0	6,059
Ethiopia	562	6,037	2,075	0	221	0	8,895
Finland	3,443	235	0	76	0	0	3,754
Gabon	919	79	0	0	0	0	998
Ghana	1,119	0	0	0	0	0	1,119
Guatemala	3,383	2,034	113	0	540	0	6,070
Guyana	0	1,919	0	0	0	0	1,919
Haiti	2,568	1,669	0	0	0	0	4,237
Honduras	1,796	1,539	955	0	189	0	4,479
Hong Kong	2,371	62	0	1,457	0	0	3,890
Indonesia	7,265	0	0	1,472	0	0	8,737
Iraq	0	35,347	0	0	0	0	35,347
Israel	0	15,579	1,419	25	0	0	17,023
Italy	11,264	0	0	0	2,002	0	13,266
Jamaica	1,790	0	3,829	0	0	0	5,619
Japan	38,377	42,913	0	37,936	1,178	0	120,404
Jordan	0	9,216	1,332	0	0	0	10,548
Kenya	0	4,805	0	0	0	0	4,805
Korea, Republic of	10,666	27,799	0	38,784	0	0	77,249
Malawi	0	1,668	0	0	0	0	1,668
Malaysia	2,004	0	0	292	0	0	2,296
Mexico	1,467	7,240	0	0	0	0	8,707
Morocco	10,580	33,647	24,027	1,929	0	0	70,183
Mozambique	0	2,094	0	0	0	0	2,094
Netherlands	1,780	0	0	0	86	0	1,866
Norway	0	1,010	0	0	0	0	1,010
Pakistan	0	0	0	16,308	0	0	16,308
Panama	1,737	52	719	0	342	0	2,850
Peru	0	10,111	0	0	0	0	10,111
Philippines	28,492	11	0	8,916	0	0	37,419
Poland	2,974	46,845	945	0	4,948	0	55,712
Portugal	0	0	3,532	0	551	0	4,083
Senegal	0	6	0	0	0	3,185	3,191
Singapore	1,563	0	0	324	0	0	1,887
Sri Lanka	2,866	3,035	0	9,098	0	0	14,999
Sudan	0	16,058	0	0	0	0	16,058
Thailand	2,225	729	0	1,386	0	0	4,340
Togo	1,310	0	0	0	0	0	1,310
Trinidad	2,247	0	961	0	0	0	3,208
Tunisia	4,261	5,539	5,545	0	6,281	0	21,626
Turkey	0	2,631	0	0	0	0	2,631
USSR	42,193	408,376	0	0	0	0	450,569
Venezuela	9,490	667	1,689	0	4,199	0	16,045
Yemen	0	0	0	8,466	0	0	8,466
Yugoslavia	4,294	5,119	0	0	0	0	9,413
Zaire	965	5,422	0	0	0	0	6,387
Other	4,354	4,134	981	0	545	102	10,116
United States	256,148	879,004	153,373	213,672	58,245	3,459	1,563,901

Source: Grain Market News, Agricultural Marketing Service.

Table 8--Wheat and flour price relationships at milling centers, annual and by periods, 1982-88

Year and period	At Kansas City					At Minneapolis				
	Cost of wheat to produce 100 lb. of flour 1/	Wholesale price of				Cost of wheat to produce 100 lb. of flour 1/	Wholesale price of			
		Bakery flour per 100 lb. 2/	Byprod-ucts obtained 100 lb. flour 3/	Total products			Bakery flour per 100 lb. 2/	Byprod-ucts obtained 100 lb. flour 3/	Total products	
				Actual	Over cost of wheat				Actual	Over cost of wheat
	Dollars									
1982/83										
June-Sept.	9.24	10.14	1.39	11.53	2.29	9.31	10.43	1.25	11.68	2.37
Oct.-Dec.	9.22	10.06	1.58	11.64	2.42	9.22	10.43	1.29	11.72	2.50
Jan.-Mar.	9.60	10.40	1.47	11.87	2.27	9.15	10.41	1.10	11.51	2.36
Apr.-May	9.77	10.26	1.65	11.91	2.14	10.11	10.88	1.40	12.28	2.17
Mkt. year	9.46	10.22	1.52	11.74	2.28	9.45	10.54	1.26	11.80	2.35
1983/84										
June-Sept.	9.54	10.36	1.72	12.08	2.54	9.97	11.17	1.47	12.64	2.67
Oct.-Dec.	9.48	10.00	2.16	12.16	2.68	9.76	10.79	1.90	12.69	2.93
Jan.-Mar.	9.22	9.52	1.83	11.35	2.13	9.56	10.28	1.49	11.77	2.21
Apr.-May	9.57	10.06	1.62	11.17	2.11	10.08	10.74	1.49	12.23	2.15
Mkt. year	9.45	9.99	1.83	11.69	2.37	9.80	10.75	1.59	12.34	2.54
1984/85										
June-Sept.	9.21	9.78	1.47	11.26	2.05	9.64	10.31	1.21	11.52	1.89
Oct.-Dec.	9.05	9.85	1.47	11.32	2.27	9.16	10.56	1.11	11.67	2.50
Jan.-Mar.	8.77	9.90	1.16	11.06	2.29	9.09	11.27	.83	12.11	3.01
Apr.-May	8.62	9.58	1.16	10.74	2.12	9.34	11.22	.88	12.11	2.77
Mkt. year	8.96	9.78	1.32	11.09	2.13	9.27	10.84	1.01	11.85	2.58
1985/86										
June-Sept.	7.99	8.94	1.10	10.03	2.04	8.60	10.96	.76	11.72	3.13
Oct.-Dec.	8.37	9.07	1.38	10.45	2.08	9.24	11.60	1.10	12.70	3.46
Jan.-Mar.	8.37	9.38	1.10	10.48	2.11	9.02	11.95	.83	12.78	3.76
Apr.-May	8.38	9.73	1.21	10.93	2.55	9.35	11.05	.95	12.00	2.65
Mkt. year	8.28	9.28	1.20	10.47	2.20	9.05	11.39	.91	12.30	3.25
1986/87										
June-Aug.	6.19	7.90	.79	8.69	2.50	6.86	9.70	.62	10.32	3.46
Sept.-Nov.	6.27	8.18	.85	9.03	2.76	6.78	9.52	.64	10.16	3.38
Dec.-Feb.	6.70	7.97	.99	8.96	2.26	7.03	8.55	.66	9.21	2.18
Mar.-May	7.00	8.18	.74	8.92	1.91	7.30	9.10	.58	9.68	2.39
Mkt. year	6.54	8.06	.84	8.90	2.36	6.99	9.22	.63	9.84	2.85
1987/88										
June-Aug.	6.62	7.85	.72	8.57	1.95	6.80	8.63	.51	9.14	2.34
Sept.-Nov.	7.04	7.85	1.19	9.04	2.00	7.07	8.98	.90	9.88	2.81
Dec.-Feb.	7.51	7.97	1.53	9.50	1.99	7.36	9.77	1.18	10.95	3.59
Mar -May.	7.43	8.18	1.12	9.31	1.87	7.50	10.17	0.98	11.15	3.65
Mkt. year	7.15	7.96	1.14	9.10	1.95	7.18	9.39	.89	10.28	3.10
1988/89										
June	8.94	9.70	1.67	11.37	2.43	9.85	12.95	1.55	14.50	4.65
July	8.87	9.45	1.60	11.05	2.18	9.64	10.00	1.57	11.57	1.92

1/ Based on 73-percent extraction rate, cost of 2.28 bushels, monthly average: At Kansas City, No. 1 Hard Winter, 13-percent protein; and at Minneapolis, No. 1 Dark Northern Spring, 14-percent protein. 2/ Quoted as mid-month bakers' standard patent at Kansas City and spring standard patent at Minneapolis, bulk basis. 3/ Assumed 50-50 millfeed distribution between bran and shorts or middlings, bulk basis. Source: Compiled from reports of Grain Market News and Milling and Baking News.

Table 9--Wheat farm prices for leading classes and major feed grains in U.S. regions, 1984-88 1/

Commodity and year	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Average	Loan rate
						All prices for 60 pounds								
						Central and So. Plains (Hard Winter)								
Wheat: 2/														
1984/85	3.46	3.30	3.42	3.45	3.43	3.41	3.36	3.34	3.34	3.34	3.39	3.25	3.37	3.23
1985/86	3.06	2.90	2.85	3.00	3.07	3.21	3.24	3.16	3.10	3.21	3.33	2.92	3.09	3.23
1986/87	2.38	2.19	2.23	2.26	2.25	2.39	2.43	2.45	2.50	2.49	2.82	2.59	2.39	2.35
1987/88	2.39	2.26	2.29	2.42	2.51	2.58	2.65	2.68	2.74	2.71	2.72	2.91	2.57	
1988/89	3.29													
Sorghum: 3/														
1984/85	3.01	2.89	2.77	2.57	2.49	2.48	2.51	2.52	2.51	2.59	2.68	2.76	2.65	3.32
1985/86	2.71	2.58	2.24	2.06	2.05	2.13	2.25	2.23	2.16	2.25	2.36	2.33	2.28	3.32
1986/87	2.16	1.97	1.67	1.50	1.54	1.51	1.51	1.51	1.47	1.53	1.61	1.71	1.64	3.24
1987/88	1.73	1.62	1.53	1.52	1.58	1.67	1.69	1.70	1.81	1.83	1.82	1.82	1.69	
1988/89	2.57	2.82*												
						Corn Belt (Soft Red Winter)								
Wheat: 2/														
1984/85	3.26	3.22	3.29	3.29	3.29	3.40	3.42	3.44	3.39	3.42	3.44	3.19	3.34	3.32
1985/86	3.01	2.94	2.74	2.66	2.77	3.10	3.22	3.18	3.24	3.37	3.42	2.87	3.04	3.32
1986/87	2.40	2.30	2.28	2.27	2.57	2.65	2.74	2.71	2.77	2.85	2.75	2.65	2.58	2.36
1987/88	2.42	2.37	2.41	2.51	2.66	2.74	2.90	3.02	3.07	2.85	2.96	3.08	2.75	
1988/89	3.32													
Corn: 4/														
1984/85	3.80	3.66	3.50	3.17	2.83	2.76	2.76	2.84	2.85	2.91	2.95	2.91	3.08	2.76
1985/86	2.89	2.85	2.65	2.38	2.21	2.38	2.47	2.48	2.49	2.48	2.50	2.59	2.53	2.76
1986/87	2.56	2.19	1.84	1.54	1.46	1.56	1.61	1.59	1.57	1.60	1.67	1.85	1.76	1.94
1987/88	1.88	1.74	1.61	1.62	1.68	1.79	1.82	1.95	2.02	2.05	2.10	2.18	1.87	
1988/89	2.75	3.27*												
						Northern Plains (Spring and Durum)								
Other spring 2/														
1984/85	3.86	3.69	3.52	3.49	3.47	3.46	3.41	3.45	3.46	3.49	3.57	3.56	3.53	3.34
1985/86	3.50	3.30	3.05	3.18	3.36	3.49	3.58	3.51	3.47	3.51	3.57	3.48	3.38	3.34
1986/87	2.81	2.41	2.38	2.34	2.29	2.51	2.58	2.69	2.66	2.63	2.65	2.68	2.55	2.44
1987/88	2.50	2.36	2.37	2.55	2.62	2.65	2.70	2.76	2.77	2.74	2.78	2.98	2.65	
1988/89	3.30	3.70*												
Durum: 2/														
1984/85	3.96	3.73	3.84	3.78	3.75	3.77	3.69	3.63	3.61	3.55	3.60	3.55	3.75	3.34
1985/86	3.53	3.34	3.18	3.08	3.01	3.07	3.16	3.17	3.17	3.21	3.29	3.41	3.22	3.34
1986/87	3.30	2.38	2.24	2.29	2.36	2.54	2.64	2.88	2.93	3.05	3.12	3.14	2.49	2.44
1987/88	3.15	3.06	2.87	3.19	3.30	3.33	3.20	3.21	3.29	2.93	3.22	3.47	3.19	
1988/89	4.61	5.24*												
						Pacific Northwest (White)								
Wheat: 2/														
1984/85	3.71	3.26	3.32	3.31	3.38	3.38	3.35	3.43	3.45	3.53	3.57	3.54	3.44	3.43
1985/86	3.35	2.97	3.05	3.16	3.29	3.39	3.44	3.40	3.41	3.52	3.60	3.49	3.34	3.43
1986/87	2.97	2.44	2.36	2.35	2.40	2.48	2.56	2.61	2.69	2.67	2.74	2.73	2.58	2.50
1987/88	2.60	2.54	2.48	2.57	2.70	2.62	2.73	2.88	2.89	2.79	2.95	3.09	2.74	
1988/89	3.51													
Barley: 5/														
1984/85	3.50	3.15	2.98	2.98	2.92	2.98	3.02	3.00	2.98	2.99	2.95	2.87	3.03	2.74
1985/86	2.68	2.73	2.63	2.55	2.52	2.69	2.77	2.73	2.65	2.53	2.48	2.54	2.62	2.74
1986/87	2.19	2.14	2.31	2.19	2.29	2.24	2.26	2.29	2.35	2.28	2.32	2.37	2.27	1.67
1987/88	2.43	2.64	2.53	2.48	2.36	2.45	2.53	2.56	2.55	2.25	2.29	2.43	2.46	
1988/89	2.94	3.33*												
						U.S. average								
Wheat:														
1984/85	3.46	3.29	3.43	3.43	3.43	3.45	3.38	3.38	3.38	3.38	3.43	3.30	3.39	3.30
1985/86	3.09	2.93	2.89	3.01	3.10	3.22	3.25	3.19	3.16	3.28	3.37	3.01	3.08	3.30
1986/87	2.47	2.25	2.26	2.28	2.30	2.43	2.49	2.53	2.58	2.58	2.62	2.66	2.42	2.40
1987/88	2.44	2.32	2.36	2.53	2.62	2.69	2.70	2.75	2.79	2.74	2.79	2.99	2.64	2.28
1988/89	3.36	3.46*												2.21

1/ To adjust price to relative feed value, multiply: corn 1.00, wheat 1.05, barley .90, sorghum .95; reported in Consumption of Feed by Livestock, Report No. 79, ERS, USDA. 2/ Wheat prices by class represent averages for the entire United States. 3/ Kansas, Nebraska, Texas, Oklahoma, and Arkansas. 4/ Ohio, Indiana, Illinois, and Missouri. 5/ Washington, Oregon, and Idaho. * = preliminary

Table 10--Wheat cash prices for leading classes at major markets, 1983-88

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Simple Year average	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Average
							Dollars per bushel						
KANSAS CITY, NO. 1 HARD RED WINTER (ORDINARY PROTEIN)													
1983/84	3.92	3.71	3.88	3.90	3.84	3.82	3.85	3.81	3.71	3.85	3.93	3.89	3.84
1984/85	3.80	3.67	3.80	3.89	3.86	3.85	3.76	3.76	3.74	3.67	3.62	3.42	3.74
1985/86	3.38	3.17	3.03	3.07	3.15	3.35	3.42	3.32	3.30	3.36	3.45	3.40	3.28
1986/87	2.80	2.50	2.48	2.53	2.60	2.68	2.68	2.70	2.80	2.90	2.90	3.02	2.72
1987/88	2.70	2.59	2.65	2.78	2.90	2.90	3.10	3.20	3.28	3.10	3.14	3.20	2.96
1988/89	3.79	3.79											
13% PROTEIN													
1983/84	4.22	4.15	4.16	4.21	4.20	4.17	4.11	4.06	3.95	4.12	4.22	4.17	4.14
1984/85	4.15	3.99	3.98	4.03	4.01	3.99	3.91	3.87	3.87	3.80	3.84	3.72	3.93
1985/86	3.72	3.53	3.36	3.41	3.50	3.70	3.81	3.69	3.65	3.67	3.70	3.65	3.62
1986/87	2.90	2.70	2.55	2.66	2.75	2.84	2.89	2.95	2.98	3.00	3.05	3.17	2.87
1987/88	2.95	2.86	2.90	3.01	3.10	3.15	3.20	3.30	3.38	3.21	3.26	3.31	3.14
1988/89	3.92	3.89											
CHICAGO, NO. 2 SOFT RED WINTER													
1983/84	3.53	3.59	3.71	3.62	3.56	3.42	3.55	3.47	3.34	3.57	3.65	3.65	3.56
1984/85	3.51	3.44	3.49	3.47	3.51	3.62	3.49	3.51	3.55	3.58	3.63	3.34	3.51
1985/86	3.27	3.09	2.87	2.83	3.04	3.33	3.46	3.34	3.37	3.40	3.39	3.25	3.22
1986/87	2.52	2.58	2.44	2.36	2.57	2.73	2.76	2.87	2.91	3.11	3.16	3.08	2.76
1987/88	2.63	2.54	2.61	2.77	2.82	2.80	3.00	3.23	3.23	2.94	3.02	3.13	2.89
1988/89	3.56	3.52											
ST. LOUIS, NO. 2 SOFT RED WINTER													
1983/84	3.46	3.51	3.79	3.70	3.62	3.58	3.67	3.62	3.46	3.71	3.82	3.51	3.62
1984/85	3.45	3.44	3.50	3.52	3.60	3.72	3.67	3.69	3.65	3.67	3.65	3.24	3.57
1985/86	3.29	3.07	2.84	2.85	3.10	3.42	3.58	3.48	3.49	3.64	3.66	2.74	3.26
1986/87	2.61	2.60	2.54	2.55	2.88	3.05	3.06	3.08	3.05	3.09	2.88	3.03	2.87
1987/88	2.63	2.58	2.59	2.77	2.95	2.97	3.22	3.24	3.18	2.98	3.10	3.20	2.95
1988/89	3.50	3.56											
TOLEDO, NO. 2 SOFT RED WINTER													
1983/84	3.42	3.48	3.69	3.54	3.43	3.37	3.46	3.43	3.26	3.50	3.61	3.60	3.48
1984/85	3.50	3.44	3.44	3.44	3.43	3.53	3.43	3.52	3.56	3.54	3.58	3.30	3.48
1985/86	3.22	3.02	2.77	2.74	2.90	3.18	3.39	3.32	3.34	3.47	3.30	3.22	3.16
1986/87	2.58	2.55	2.45	2.33	2.61	2.75	2.81	2.92	2.93	3.06	2.99	3.07	2.75
1987/88	2.60	2.55	2.54	2.69	2.86	2.82	3.10	3.21	3.20	2.97	2.99	3.07	2.88
1988/89	3.63	3.63											
TOLEDO, NO. 2 SOFT WHITE													
1983/84	3.42	3.51	3.71	3.56	3.42	3.36	3.46	3.43	3.25	3.50	3.62	3.49	3.48
1984/85	3.35	3.37	3.42	3.42	3.41	3.51	3.41	3.50	3.53	3.48	3.48	3.18	3.42
1985/86	3.13	3.02	2.89	2.89	3.12	3.30	3.41	3.26	3.26	3.31	2.89	2.93	3.12
1986/87	2.50	2.52	2.48	2.29	2.54	2.69	2.75	2.80	2.84	2.87	2.79	2.89	2.66
1987/88	2.63	2.57	2.69	2.81	2.88	2.95	3.14	3.28	3.27	2.96	3.02	3.09	2.94
1988/89	3.62	3.61											
PORTLAND, NO. 1 SOFT WHITE													
1983/84	4.15	4.08	4.06	4.12	4.03	3.90	3.81	3.79	3.69	3.73	4.03	4.05	3.95
1984/85	4.03	3.73	3.74	3.70	3.73	3.78	3.76	3.77	3.83	3.93	3.94	3.91	3.82
1985/86	3.73	3.57	3.45	3.57	3.72	3.77	3.80	3.75	3.74	3.85	3.88	3.78	3.72
1986/87	3.03	2.75	2.68	2.70	2.78	2.84	2.86	2.93	3.07	3.07	2.99	3.09	2.90
1987/88	2.87	2.79	2.73	2.94	3.08	2.97	3.05	3.26	3.21	3.10	3.32	3.36	3.06
1988/89	3.79	4.05											
MINNEAPOLIS, NO. 1 DARK NO. SPRING (ORDINARY PROTEIN)													
1983/84	4.15	4.07	4.21	4.30	4.33	4.23	4.20	4.15	4.06	4.20	4.28	4.39	4.21
1984/85	4.40	4.21	3.72	3.57	3.64	3.64	3.48	3.47	3.52	3.55	3.64	3.55	3.70
1985/86	3.54	3.29	2.87	2.97	3.01	3.42	3.45	3.38	3.32	3.33	3.42	3.05	3.25
1986/87	2.51	2.17	2.39	2.64	2.70	2.81	2.77	2.82	2.65	2.61	2.60	2.76	2.62
1987/88	2.66	2.52	2.60	2.74	2.85	2.81	2.96	3.12	3.26	3.05	3.19	3.30	2.92
1988/89	4.17	3.96											
14% PROTEIN													
1983/84	4.39	4.38	4.34	4.33	4.33	4.25	4.21	4.17	4.08	4.24	4.37	4.45	4.30
1984/85	4.45	4.34	4.07	3.97	4.03	4.02	3.92	3.90	3.92	3.94	4.36	4.02	4.06
1985/86	3.99	3.77	3.56	3.76	3.91	4.09	4.16	3.97	3.90	4.00	4.17	4.03	3.94
1986/87	3.17	3.00	2.86	2.85	2.98	3.09	3.04	3.08	3.13	3.19	3.17	3.24	3.07
1987/88	3.07	2.94	2.94	3.04	3.15	3.11	3.13	3.24	3.32	3.15	3.30	3.42	3.15
1988/89	4.32	4.23											
HARD AMBER DURUM, (MILLING)													
1983/84	4.76	4.74	5.04	5.10	4.99	4.91	4.82	4.81	4.69	4.70	4.74	4.71	4.83
1984/85	4.68	4.57	4.65	4.43	4.47	4.46	4.43	4.34	3.37	4.33	4.36	4.32	4.44
1985/86	4.16	4.05	3.99	4.07	4.03	4.08	4.09	4.01	4.01	3.99	4.07	4.24	4.07
1986/87	3.79	3.08	3.04	3.21	3.31	3.49	3.60	3.68	3.78	3.89	3.93	4.03	3.57
1987/88	3.91	3.66	3.80	4.30	4.31	4.33	4.22	4.19	4.22	4.02	4.21	4.39	4.15
1988/89	6.13	6.30											

Source: Grain Market News, Agricultural Marketing Service.

Table 11--Domestic and foreign wheat prices, 1980-88

Year and month	United States				Foreign		
	Farm 1/	Kansas City 2/	Gulf ports 3/	Rotterdam 4/	Argentina 5/	Canada 6/	Australia 7/
	Dollars per metric ton						
Calendar year							
1980	143	159	176	213	203	192	176
1981	142	160	176	210	190	194	175
1982	129	147	161	187	166	165	160
1983	132	145	158	185	138	169	161
1984	127	140	153	180	135	166	153
1985	117	125	137	169	106	173	141
1986	97	107	117	148	88	161	120
1987	91	104	114	141	89	134	115
1987							
January	89	100	110	141	82	136	110
February	90	103	114	145	92	138	112
March	91	107	116	140	90	139	115
April	91	107	115	138	88	134	115
May	93	111	120	146	88	136	119
June	87	100	110	144	86	130	111
July	83	95	106	134	84	126	107
August	85	97	108	134	84	124	109
September	90	103	114	139	89	130	115
October	92	105	116	139	95	134	118
November	94	105	116	140	95	134	118
December	97	114	126	148	95	142	126
1988							
January	99	118	130	158	94	148	127
February	101	120	132	155	106	151	135
March	100	114	126	149	107	143	131
April	100	115	128	156	108	145	133
May	107	118	130	159	107	152	131
June	121	140	151	191	125	166	158

1/ Hard Red Winter wheat. 2/ No. 1, Hard Winter, ordinary protein. 3/ No. 2, Hard Winter, ordinary protein, f.o.b vessel. 4/ U.S., No. 2 Dark Northern Spring, 14 percent, c.i.f. 5/ F.o.b Buenos Aires. 6/ No. 1, CWRS, 13.5 percent, in-store, St. Lawrence. 7/ ASW, f.o.b.

Table 12--Wheat and wheat flour: World trade, production, stocks, and use 1984-88 1/

!80

Country or region	1984/85	1985/86	1986/87	1987/88 as of August 11	1988/89 projected
			Million metric tons		
Exports					
Canada	19.4	16.8	20.8	22.6	16.0
Australia	15.8	16.0	14.8	12.2	11.0
Argentina	8.0	6.1	4.3	3.8	5.6
EC-12	18.5	15.6	16.4	14.5	17.0
USSR	0.5	0.5	0.5	0.5	1.0
All others	6.6	4.9	5.5	6.3	7.2
Total non-U.S.	68.9	60.0	62.3	60.9	57.8
USA 2/	38.1	25.0	28.4	43.5	38.5
World total	107.0	85.0	90.7	104.4	96.3
Imports					
EC-12	3.4	2.8	2.4	2.5	2.4
USSR	28.1	15.7	16.0	22.0	14.0
Japan	5.6	5.5	5.8	5.4	5.4
E. Europe	2.6	3.4	3.7	3.5	2.5
China	7.4	6.6	8.5	13.5	13.5
All others	59.8	50.9	54.3	56.5	58.5
World total	107.0	85.0	90.7	104.4	96.3
Production 3/					
Canada	21.2	24.3	31.4	26.3	18.0
Australia	18.7	16.2	16.2	12.0	13.5
Argentina	13.2	8.5	8.9	10.0	8.5
EC-12	82.9	71.6	71.9	71.3	74.8
USSR 3/	68.6	78.1	92.3	83.3	91.0
E. Europe	42.1	37.1	39.1	39.8	42.6
China	87.8	85.8	90.0	87.7	88.0
India	45.5	44.1	47.1	45.6	45.0
All other foreign	61.3	68.1	75.9	71.4	74.2
USA	70.6	66.0	56.9	57.3	49.6
World total	511.8	499.8	529.7	505.5	505.1
Utilization 4/					
USA	31.4	28.5	32.5	29.3	30.1
USSR 5/	91.2	91.6	102.8	100.5	103.0
China	92.2	100.4	101.5	105.7	104.5
All others	278.0	275.2	284.9	297.8	295.9
World total	492.8	495.7	521.7	533.3	533.5
Stocks, ending 6/	164.2	168.2	176.1	148.0	119.7

1/ July-June years. 2/ Includes transshipments through Canadian ports; excludes products other than flour. 3/ Production data include all harvests occurring within the July-June year shown, except that small grain crops from the early harvesting Northern Hemisphere areas are moved forward; i.e., the May 1984 harvests in areas such as India, North Africa, and Southern United States are included in the 1984/85 accounting period, which begins July 1, 1984. 4/ Utilization data are based on an aggregate of different local marketing years. For countries where stock data are unavailable (excluding the USSR), utilization estimates represent apparent utilization, i.e., they are inclusive of annual stock level adjustments. 5/ "Bunker weight" basis: not discounted for excess moisture and foreign material. 6/ Stocks data are based on an aggregate of different local marketing years. They are unavailable for some countries including parts of Eastern Europe. World stock levels have been adjusted for estimated year-to-year changes in USSR grain stocks, but do not purport to include the entire absolute level of USSR stocks.

Source: World Grain Situation and Outlook, USDA, Foreign Agricultural Service.

Table 13--CCC wheat auctions, 1987/88

Date	Amount	Value	Average bid
	Mil. bu.	Mil. dol.	Dols./bu.
1987:			
Nov 6	8.6	20.4	2.37
Nov 13	9.2	22.0	2.39
Nov 20	9.8	23.9	2.44
Nov 27	10.3	26.2	2.55
Dec 4	15.3	41.4	2.70
Dec 11	14.6	37.8	2.59
Dec 18	25.7	66.9	2.60
Dec 23	25.5	67.1	2.63
Dec 30	12.0	31.4	2.62
1988:			
Jan 8	26.0	72.3	2.78
Jan 15	23.1	65.5	2.83
Jan 23	25.5	67.6	2.65
Jan 29	14.1	38.1	2.71
Feb 5	26.4	72.7	2.76
Feb 12	16.1	43.5	2.71
Feb 19	11.0	29.7	2.70
Feb 26	15.8	42.7	2.71
Mar 1	10.0	26.8	2.68
Mar 2	1.4	3.5	2.56
Mar 4	1.6	3.8	2.33
Mar 8	7.7	20.5	2.67
Mar 9	9.9	25.3	2.56
Mar 11	9.9	24.3	2.46
Mar 15	.5	1.4	2.71
Mar 16	1.6	4.2	2.54
Mar 18	.3	.7	2.60
Mar 22	.3	.9	2.97
Mar 23	7.2	19.1	2.65
Mar 25	10.3	26.8	2.60
Mar 29	3.3	9.2	2.81
Mar 30	1.0	2.7	2.57
Apr 6	11.5	30.4	2.65
Apr 13	.9	2.3	2.63
Apr 15	11.2	30.2	2.68
Apr 20	.9	2.7	2.87
Apr 27	2.9	7.8	2.66
May 4	.1	.3	2.74
May 11	1.1	2.8	2.65
May 18	.5	1.3	2.72
May 25	.5	1.5	2.85
Total	383.6	1,017.7	2.65

Source: ASCS.

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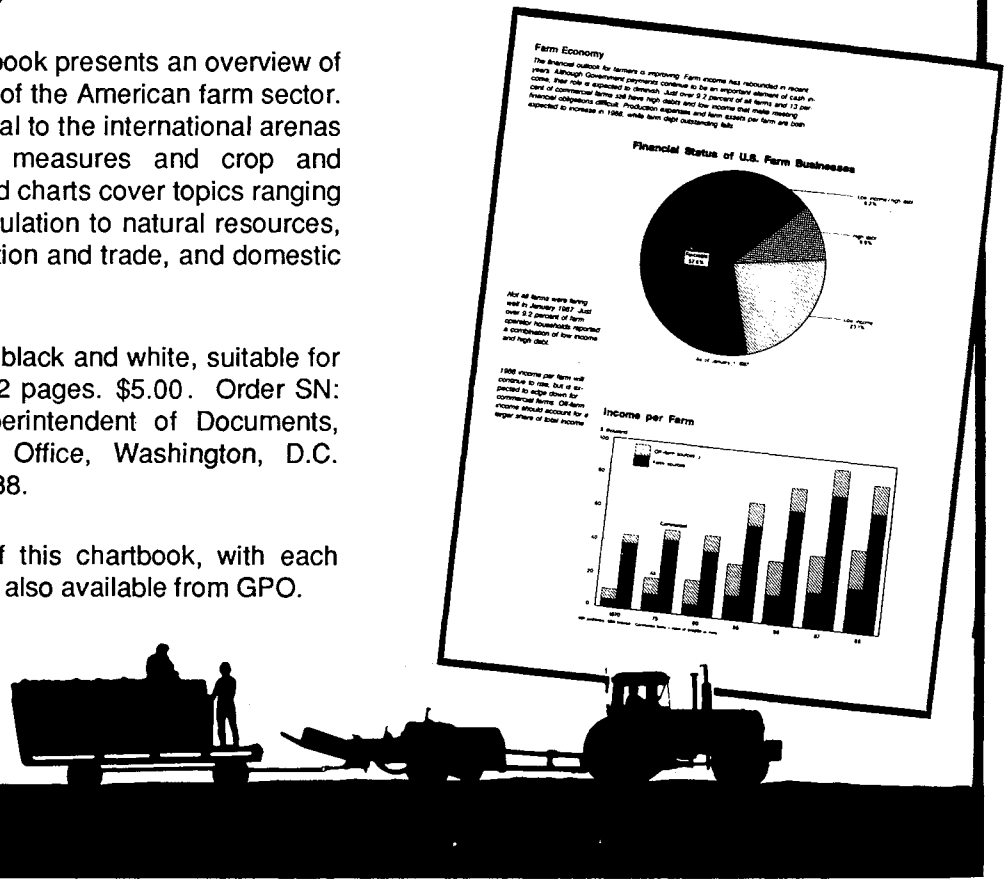

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