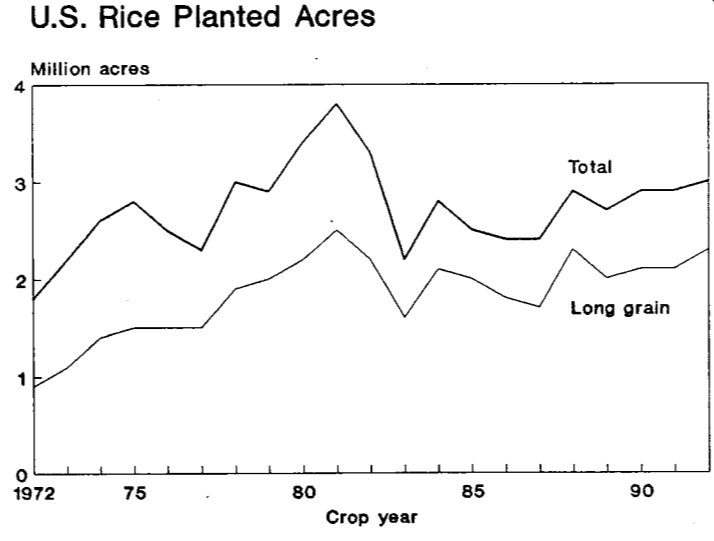
United States
Department of
Agriculture

Economic
Research
Service

RS-63
April 1992

Rice

Situation and Outlook Report



Rice Growers Plan To Seed More Acres

Rice Situation and Outlook. Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture, April 1992, RS-63.

Contents

Situation Coordinator
Janet Livezey
Principal Contributors
Janet Livezey (U.S. Outlook) (202) 219-0840
Nathan Childs (Domestic Use) (202) 219-0840
Sara Schwartz (International) (202) 219-0825
Jenny Gonzales (Statistics) (202) 219-0840
Cheryl Allen (Charts) (202) 219-0840
Editor
Dixie Lee

Approved by the World Agricultural Outlook Board. Summary released April 1992. The summary of the next *Rice Situation and Outlook* is scheduled for release in July 1992. Summaries of Situation and Outlook reports may be accessed electronically through the USDA CID system. For details, call (202) 720-5505.

The *Rice Situation and Outlook Report* is published three times a year -- April, July, and October. Subscriptions are available from ERS-NASS, P.O. Box 1608, Rockville, MD, 20849-1608; call, toll free, 1-800-999-6779 (U.S. and Canada only). All other areas, please call 301-725-7937.

Time to renew? Your subscription to *Rice Situation and Outlook Report* expires in the month and year shown on the top line of your address label. If your subscription is about to expire, renew today. Call 1-800-999-6779.

Rice Conversions
1 cwt = 100 pounds = 2.22 bushels = .0454 metric tons
1 metric ton = 2,204.6 pounds = 22.046 cwt = 48.992 bu.
1 cwt rough rice = .032 metric ton milled
1 metric ton milled = 31 cwt rough

Summary

Farmers in early March indicated they plan to plant 3.0 million acres to rice in 1992, up 5 percent from 1991, according to the *Prospective Plantings* report. Producers are responding, at least in part, to the decrease in the Acreage Reduction Program (ARP) from 5 percent to 0. Part of the 1992 acreage increase, however, reflects 1991's weather-related problems. Many California farmers had water allocations reduced because of the drought and some Delta farmers were unable to plant because of too much rain. For 1992, water supplies have improved in California and rice planting has been proceeding well in the south.

U.S. 1991/92 rice supply is down 1 percent from a year ago, as lower carryin stocks and production are offsetting a forecast increase in imports. Total use in 1991/92 is forecast down about 5 percent from 1990/91's level, and the lowest since 1987/88. Domestic use continues to grow, but exports are projected down 15 percent. High U.S. prices relative to other exporters are causing some importers to turn to other suppliers.

With forecast use well below production plus imports, 1991/92 ending stocks are forecast up 23 percent from a year earlier to 30.2 million cwt. This is boosting the stocks-to-use ratio almost to 20 percent, well above 1990/91's 15 percent and the first year since 1987/88 when the ratio will exceed 17 percent. Although stocks are forecast to rise relative to use, the ratio is still well below previous levels. In the early to mid-1980's the stocks-to-use ratio averaged 45 percent.

The U.S. season-average-farm price for rough rice is forecast to range between $7.40 and $7.60 in 1991/92, well above the $6.70 in 1990/91. In addition to higher world prices so far this year, the U.S. premium over world prices is expected to average about 25 cents per cwt higher than a year ago. The higher U.S prices are due largely to strong domestic use, relatively tight U.S. supplies, and producer holding.

Foreign rice production in 1991/92 is forecast down 1 percent, and trade by foreign exporters is projected up 11 percent. Expected increases in imports by Indonesia, the former Soviet Union, and Middle Eastern countries are fueling most of the gain in trade. The U.S. market share is forecast to fall as U.S. prices continue high relative to Asian competitors.

U.S. Outlook for 1992/93

1992 Planting Prospects

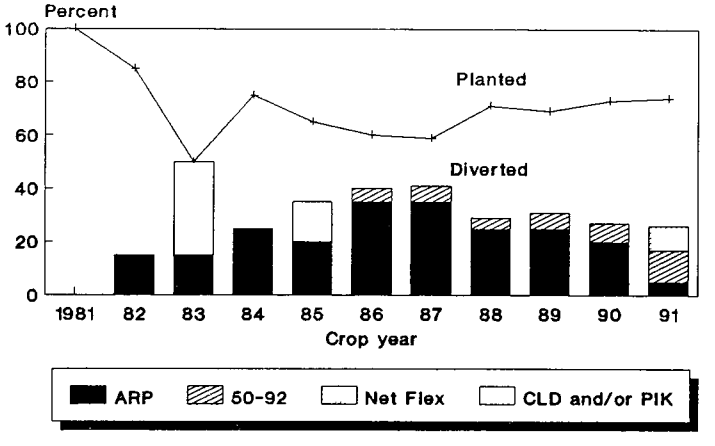
Farmers in early March indicated they plan to plant 3.0 million acres to rice in 1992, up 5 percent from the current 1991 estimate, according to the *Prospective Plantings* report. Producers are responding, at least in part, to the change in the ARP. In 1991, rice farmers were required to keep 5 percent of their base acreage out of production in order to be eligible for program benefits. For 1992, the ARP was reduced to zero. In other words, producers could plant all of their base acreage to rice and still be eligible for program benefits. Since participation in the rice program is about 95 percent, rice acreage would be expected to increase 5 percent based solely on the change in the ARP level.

Part of this year's acreage increase, however, reflects the 1991 weather-related problems. Many California farmers had water allocations reduced because of the drought and some Delta farmers were unable to plant because of too much rain. As a result, nearly 147,000 acres of rice land were categorized as "prevented plantings." If this acreage could have been planted in 1991, the current estimate of 1991 rice plantings would exceed the planned 1992 acreage reported in *Prospective Plantings*. For 1992, water supplies have improved in California and rice planting has been proceeding well in the south.

As a result, it appears that producers are not planning to fully utilize for rice the additional land made available by the change in the ARP and/or are not intending to fully plant to rice the acres classified as "prevented planting" in 1991.

In addition to the ARP change and weather considerations, producers will also base planting decisions on production costs and expected returns. Producers have the option of using the 50/92 program if they do not want to plant all of their permitted acreage. Since 1985, participation in the 50/92 program has increased considerably (see special article).

Figure 1
U.S. Rice Acreage: Percent Planted and Diverted



The 1990 farm legislation introduced planting flexibility. Producers are given the option of planting other crops on 15 percent of their base (NFA or normal flex acres), but no longer receive deficiency payments on this land. Returns are based on market prices and marketing loans, but not on the target price. Most rice producers have opted not to plant rice on their NFA because net returns favor other crops or not planting at all (see special article).

Prospective Plantings reported that rice producers in the southern States plan to increase their rice acreage at a greater rate than California producers. Over the past several years California rice acreage has made up a smaller percentage of the U.S. total because of reduced levels of irrigation water. Since the early 1980's the percentage has dropped from 16 percent to 12.

Long grain acreage typically makes up about 75 percent of the total. Producers indicated that they would increase long grain acreage in 1992 to 76 percent from 74, while cutting back on medium and short grain acreage. Nearly all long grain rice is grown in the south, while almost half of medium grain rice is produced in California. The reduction in medium grain acreage would occur in Arkansas and Louisiana, while California acreage would show a modest increase.

1992 Rice Program

Provisions of the 1992 rice program, the second under the Food, Agricultural, Conservation, and Trade Act of 1990, were announced on January 28, 1992. The acreage reduction program was set at zero percent for the 1992 crop.

Some other provisions of the 1992 program:

- The established target price will be $10.71 per hundredweight, unchanged from the past 2 years.
- The national-average loan and purchase rate will remain at $6.50 per hundredweight (the legislative minimum), unchanged from the past 3 years.
- The differential between price support rates for whole-kernel milled rice will remain at $1.00 per hundredweight, unchanged from the past 5 years.
- Advance deficiency payments will be 40 percent of the estimated deficiency payment rate of $3.51 per hundredweight. This estimated rate is the minimum guaranteed payment level under the 50/92 program.

Looking Beyond 1992/93

As suggested by *Prospective Plantings*, U.S. rice acreage is likely to expand in 1992. Beyond 1992, however, further increases in acreage are unlikely. This is because the ARP is already at zero percent. The maximum acres that can be planted with deficiency payment protection has been reached. Weak prices relative to production costs discourage many producers from planting additional rice acreage without target price protection. Also, NFA rice acreage will likely continue to be switched to other crops that offer higher net returns. In addition, rice acreage expansion is limited by availability of irrigation water and the need for disease-preventing crop rotations.

Rice yields also appear to have leveled off. Disease problems and unfavorable weather have caused yields to remain relatively flat in recent years except for the record high in 1989. During the mid-1980's, substantial yield increases occurred when new higher-yielding varieties were being adopted. Unfortunately, many of these varieties are very susceptible to diseases such as blast that can cause severe yield loss. Also, yield potential has not been achieved because of difficulties controlling red rice and less productive land being brought back into rice production as acreage limitations eased.

If rice acreage expands in 1992 and yields hold steady, this could be the first year since 1988 that production increases substantially. Beyond 1992, however, production growth appears to be limited.

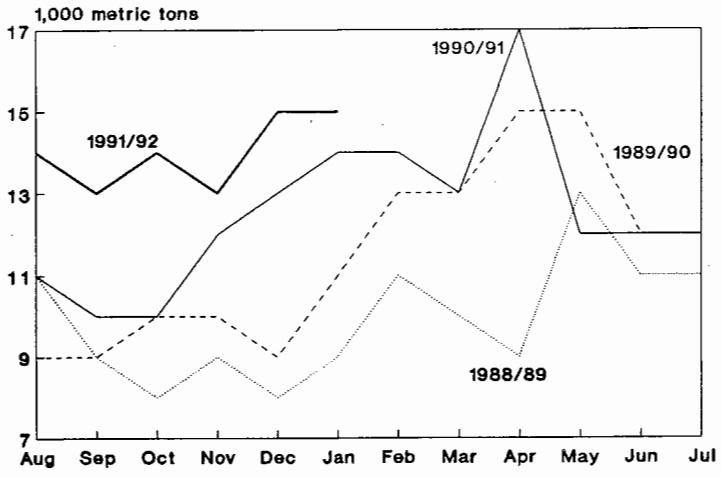
The Current Situation

U.S. Supply Down Slightly, Imports Up

U.S. 1991 rice production decreased an estimated 1 percent from a year earlier to 154.5 million cwt, based on USDA's annual *Crop Production Summary* released in January 1992. Harvested area was down 3 percent from 1990, due largely to weather-related problems. Reductions in California, Louisiana, and Texas more than offset increased acreage in Arkansas and Missouri. Average yield was above the 1990 average, but below the record high of 1989. Growers in southern Louisiana and along the upper coast of Texas benefited from good second crops.

U.S. 1991/92 rice supply is forecast down 1 percent from a year ago. Carryin stocks and production are down 3.2 million cwt, but imports are forecast up 1.2 million to 6 million cwt. Imports continue to account for a growing share of U.S. domestic use (about 9 percent of 1991 forecast food use). Imports have doubled since 1987/88 (see special article in the October 1991 *Rice Situation and Outlook Report*).

Figure 2
U.S. Imports (Milled)



Domestic Use Remains Strong

Overall domestic use for 1991/92 is forecast up 5 percent. Food use is forecast up 7 percent based on trend increases estimated from USDA's milled rice survey. Brewers' use, however, is projected down from a year ago. Brewers have been substituting lower priced corn grits for rice in their brewing formulas. Also, rice is used mostly in the premium beers and sales are off due to the recession. Brewers' use currently accounts for 17 percent of total domestic use.

Exports Lowest Since 1985/86

U.S. rice exports are projected at 60 million cwt, down 15 percent from 1990/91, and the lowest since 1985/86. Strong domestic demand, reduced U.S. supplies, and farmer holding pushed U.S. prices up -- in some cases over $100 per ton above Asian competitors.

GSM credit exports, as well as exports outside of specified export programs, are down. PL 480 rice exports, which typically average around 20 percent of the total, nearly match 1990/91's level. The Export Enhancement Program (EEP) remains a small, but important, tool in several markets.

Latin America is currently the largest customer for U.S. rice. In 1990/91, strong sales to Brazil helped offset the loss of exports to Iraq. However, while sales to Brazil continued strong into the first half of the 1991/92 marketing year, they have fallen off in the second half. Other exporters have been selling rice to Brazil at lower prices. Also, Brazil's crop is forecast up sharply and consumption is projected down, reducing Brazil's need for imports. Brazil's irrigated crop is harvested from March to May and it is unclear if Brazilian importers will reenter the U.S. market.

Prior to the Persian Gulf Conflict in 1990/91, Iraq was the United States' largest customer for rice. Other Middle Eastern markets have also been strong customers for U.S. rice, but in 1991/92 sales to several major Middle Eastern markets (including Turkey, Saudi Arabia, Jordan, and Yemen) are down, largely because of uncompetitive prices. While Thailand's sales to some Middle Eastern markets are up, particularly to Jordan, it appears that increased competitively priced basmati exports from India and Pakistan are also displacing U.S. rice in some of these markets.

In Turkey, competition from the EC and Australia have cut into the U.S. market share. The EEP helped move U.S. rice into Turkey early in the marketing year, but that allocation has been used up for this year.

As long as U.S. export prices remain uncompetitive to that of the Asian exporters, it is unlikely that U.S. exports will increase. Minimal growth in supply, combined with strong growth in domestic use, puts continued upward pressure on U.S. prices as domestic processors bid against each other for the available supply. Since the domestic market values U.S. rice higher than the export market, exports absorb the shock of any shortfall in supply. If U.S. rice supplies increase in 1992/93 and prices weaken, exports could possibly rebound.

Ending Stocks Forecast Up

With total U.S. supplies just slightly below last year and exports forecast substantially down, ending stocks are projected to rise 23 percent in 1991/92 to 30.2 million cwt. This is boosting the stocks-to-use ratio to almost 20 percent, well above 1990/91's 15 percent and the first year since 1987/88 when the ratio will exceed 17 percent. Although stocks are forecast to rise relative to use, the ratio is still well below previous levels. In the early to mid-1980's the stocks-to-use ratio averaged 45 percent.

This forecast build-up of stocks and the potential for a larger U.S. rice crop in 1992/93 is expected to eventually ease the upward pressure on U.S. prices.

U.S. Rice Prices Remain Higher Than a Year Ago

The U.S. season-average-farm price for rough rice is forecast to range between $7.40 and $7.60 per cwt in 1991/92, well above $6.70 in 1990/91. In addition to higher world prices so far this year, the U.S. premium over world prices is expected to average about 25 cents per cwt higher than a year ago. These higher U.S. prices are due largely to strong domestic use, reduced U.S. supplies, and farmer holding.

Also, the domestic market is taking a larger share of U.S. rice this year. With more rice valued at the generally higher-priced domestic level, overall rice prices have been higher than usual. As the remaining rice from this year's crop is marketed, prices will likely dip to reflect the lower export price necessary for the United States to be competitive on world markets.

Figure 3
Marketings by U.S. Farmers

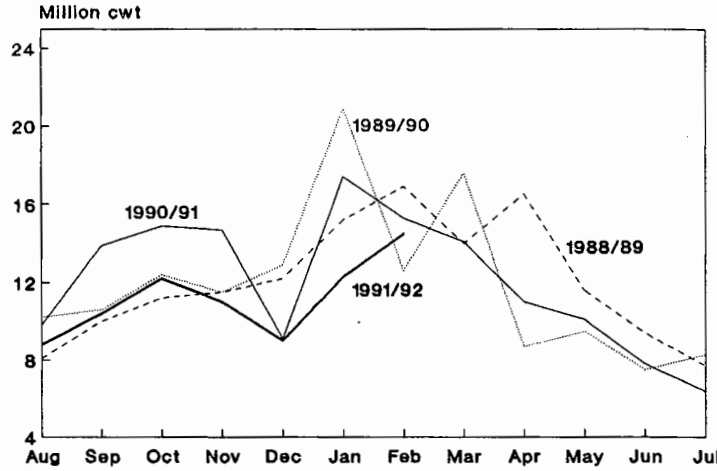
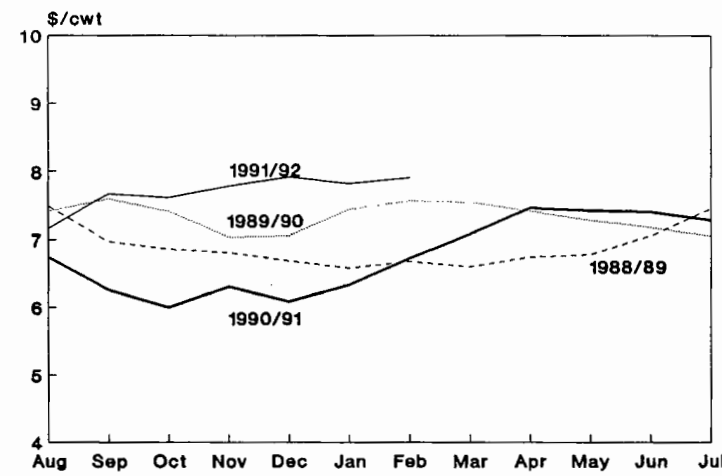


Figure 4
U.S. Rough Rice Prices



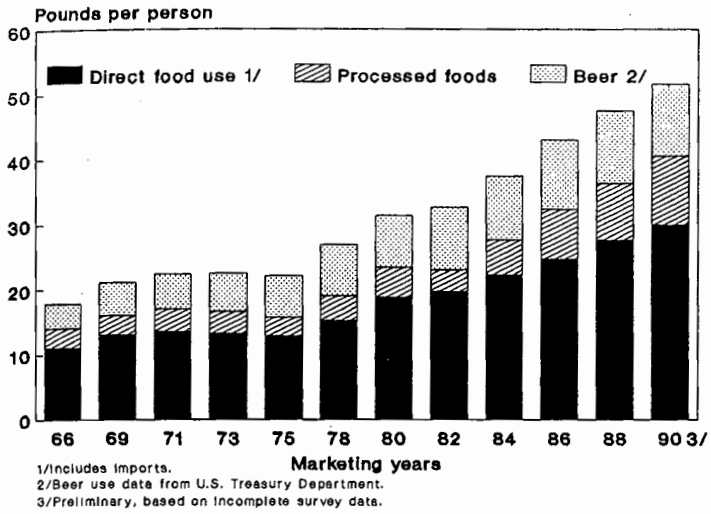
Survey Results Show Continued Growth in Domestic Use

Per Capita Consumption Almost 21 Pounds in 1990/91

Preliminary results of USDA's biannual milled rice distribution survey for marketing year 1990/91 indicate continued rising total and per capita domestic rice consumption. Using survey data for food use (excluding shipments to U.S. territories) and adding U.S. Treasury Department data for brewers use, plus imports, yields an estimated total use of over 51 million cwt for 1990/91. This is up over 9 percent from

Figure 5

U.S. Per Capita Rice Consumption



1/Includes imports.
2/Beer use data from U.S. Treasury Department.
3/Preliminary, based on incomplete survey data.

1988/89, the last completed survey, and almost double total use in 1978/79.

Per capita consumption is estimated up over 7 percent from two years earlier, to almost 21 pounds in 1990/91. Per capita rice consumption doubled between 1975/76 and 1990/91.

However, estimated growth for 1990/91 was not the same for all product categories and uses of rice. Although survey results are not yet complete, preliminary results indicate that growth was fastest in certain specialty rices, principally brown rice, and several processed food uses. Direct food use, accounting for almost 59 percent of domestic use, expanded at a slower rate than processed food use. In addition, U.S. Department of Commerce data indicate consumption of imports, mostly jasmine and aromatic rices from Asia, also expanded substantially faster than total use.

In contrast, brewers use of rice dropped slightly in 1990/91, from 11.2 million cwt in 1988/89 to 11 million. And brewers use of rice in 1990/91 was only slightly higher than in 1986/87. Brewers use has declined from about 25 percent of total domestic rice use (excluding seed and residual) in 1980/81, to around 21 percent in 1990/91. Some brewers have been substituting lower priced corn grits, or increasing the ratio of malt barley to rice in those beers that continue to use rice as an adjunct. Also, total domestic beer consumption has not grown in recent years due to demographic changes resulting in an aging average population plus greater health consciousness among consumers.

Processed Food Use Is Fastest Growing Category

Processed food use of rice is expected to reach 10.5 million cwt in 1990/91, up from 8.6 two years earlier and about double reported processed use in 1984/85. Processed food use of rice has been the fastest growing category of rice consumption since the late 1970's when use was about 3.7 million cwt. Preliminary estimates for 1990/91 indicate processed food use accounted for about 20 percent of domestic consumption (excluding seed use, residual, and shipments to U.S. territories), up from 18 percent in 1988/89 and 14 percent in 1980/81.

Rice in cereal, the largest processed food category excluding beer, propelled most of the growth of processed food use of rice in the early and mid-1980's, exceeding 4 million cwt in 1986/87. New products, such as pet foods and rice cakes, accounted for most of the expansion in the late 1980's. Cereal use of whole grain rice has slowed since the late 1980's.

Growth of processed food use in the 1990's has been due to greater use of rice in pet foods, larger uses in several smaller product categories, and expanding sales of package rice mixes.

In 1990/91, rice used in package mixes, pet foods, baby foods, frozen dinners, and soup were all noticeably up from two years earlier. Pet foods continue to be a strong user of brokens, more than making up for reduced brewers use of brokens. Rice use in pet foods is estimated at well over 1.7 million cwt in 1990/91, up from 1.3 million in 1988/89, and continuing the strong growth trend begun in 1986/87 when pet foods was first included in the survey questionnaire. Excluding beer, pet foods was the third largest processed food use of rice in 1988/89, and ranked at least that high in 1990/91.

Rice use in package mixes, estimated at close to 2 million cwt for 1990/91, continues the uninterrupted growth begun in the early 1980's. Package mixes use primarily long grain rice from the southern producing States. Excluding beer, package mixes, at 1.7 million cwt, was the second largest processed food use of rice in 1988/89, and will rank second or third in 1990/91.

Baby foods, frozen dinners, and soup individually account for only a small portion of total processed food use of rice. However, rice used in each product at least doubled between 1988/89 and 1990/91, and their combined use is estimated to have exceeded 800,000 cwt in 1990/91. Baby food use, mostly rice flour, grew from 172,000 cwt in 1988/89, to around 400,000 cwt in 1990/91.

Likewise, preliminary survey results indicate use of rice in soup and frozen dinners each grew from around 100,000 cwt in 1988/89, to roughly 200,000 cwt in 1990/91. Frozen dinners and soup use mostly long-grain parboiled rice from the southern rice growing areas. Soup and baby foods are

growth areas in the early 1990's that did not exhibit any long-term expansion during the previous two decades.

Use of rice in rice cakes, which more than doubled between 1986/87 and 1988/89, appears to have leveled off by the early 1990's. Preliminary survey results point to no expansion in 1990/91. In addition, preliminary survey results show no expansion in use of rice in candy, which exceeded 220,000 cwt in 1988/89. Use of rice in certain snack foods and crackers are not tracked separately, but growth of rice listed in the "other" category probably indicates greater consumption of these products. Future surveys likely will track crackers and other snack items separately.

Brown Rice Use Has Doubled Since 1988/89

Preliminary survey results for 1990/91 indicate brown rice consumption more than doubled between 1988/89 and 1990/91. Domestic brown rice shipments in 1990/91 were well over 1.3 million cwt, up from 691,400 cwt two years earlier and under 300,000 in the late 1970's. Most of the brown rice shipped in 1990/91 was medium and short grain rice from California. Health attributes associated with the bran layer remaining in brown rice, plus taste and product innovation, explain much of the growth in sales.

Increased consumption of domestic specialty rices and imported rices have accounted for a substantial portion of the growth in direct food use since the mid-1980's. Parboiled rice consumption expanded throughout the 1980's, reaching 4.4 million cwt in 1988/89. However, survey results are not yet complete enough to estimate 1990/91 consumption. While use of precooked regular milled white rice has declined since the early 1980's, shipments of precooked-parboiled rice were well over 550,000 cwt in 1990/91, up from 347,300 two years earlier. Virtually all parboiled and precooked rice are southern long grain.

International Rice Situation

World rice production in 1991/92 is forecast at 348 million tons (milled basis), down slightly from 1990/91. Global consumption is projected up, pulling ending stocks down from the 1990/91 record.

Foreign rice production in 1991/92 is projected at 343 million tons, down slightly from 1990/91, with the most significant declines expected in China and India. Production in Indonesia, the Philippines, South Korea, and Japan are also forecast down. The production decline in Indonesia is lending strength to the 1992 export market. This, together with larger imports projected for the former Soviet Union and Middle Eastern markets, is expected to boost world trade nearly 9 percent to 13.5 million tons. Despite increased imports, export prices are not expected to rise sharply because Asian exporters are expected to harvest larger crops in 1991/92.

Dry conditions have hampered production in several Asian countries. In India, erratic monsoon rains curtailed rainfed rice production in some of the northern States. Dry conditions also reduced the yields of Indonesia's 1991/92 minor dry-season crop and has raised concerns about the prospects for the 1992/93 main season crop, stimulating increased imports. Inadequate precipitation in Malaysia and Sri Lanka are also raising prospects for increased imports by those countries.

Production Down in China and India

China is forecast to produce 130 million tons of rice, down slightly from the 1990/91 record, but still representing nearly 40 percent of the world's production. Area was down because of severe flooding last summer in the Yangtze River Valley and drought last spring. Yields also fell because of the adverse weather, despite improved distribution of inputs and increased government investment that helped boost production in several regions. However, the losses caused by adverse weather were isolated and large stocks helped to cushion the impact on total supply.

Farmers in China are required to sell a proportion of their rice to the government at a fixed State price. The balance of the crop can be sold into free market channels or to the government at a negotiated price that approximates the free market price. Free market prices were extremely low in 1990/91 because of the record crop and the government failure to deliver on its promise to pay protection prices. The low prices contributed to farmers' marked lack of enthusiasm for growing rice in 1991/92.

The government subsidizes the price of rice in urban areas. Since the proportion of the budget used to subsidize food has been growing, in 1991, the government decided to raise the subsidized ration price of rice for the first time since 1958. The ration price of rice in China rose 50 percent. However, total consumption did not decline. Rationed rice is generally of poorer quality than the rice available in the free market and many urban consumers had shifted to the higher quality rice even before the price rise. When the price of rationed rice rose, the difference between the price of rationed and free market rice narrowed and it now appears that even more consumers have shifted to the higher quality rice.

In early 1992, the government announced a 40 percent increase in the price of rationed rice and flour, beginning April 1. Salaries will rise to offset part of the price increase. Similar to last year's price rise, this increase combined with rising wages might have little impact on total grain consumption.

India's 1991/92 production is forecast at 71 million tons, down 5 percent from the 1990/91 record. Last summer's monsoon rains were erratic. Planting was delayed in the north and west, including Uttar Pradesh and Bihar, where rice is mostly rainfed. The monsoon retreated in September (earlier than expected) and the late season rains were inadequate. Both area and yields in the northwest rice regions declined. Despite initial concerns, the irrigated crop in the Punjab is estimated to equal the 1990/91 output and is of very high quality. Production in the south is also estimated to be above average because of the abundant rain received throughout the growing season.

Government procurement is down from a year ago because of the reduced harvest. However, carryin stocks were record high and State procurement so far has been enough to meet the needs of the public distribution system. India is expected to continue exporting basmati and coarse rice and stocks are projected to decline over 30 percent to 10 million tons, but are still considered to be adequate.

Dryness Creating Concern In Other Parts of Asia

Indonesia's 1991/92 rice crop is estimated at 28.7 million tons, down slightly from the 1990/91 record. Yields increased, but area fell 3 percent because of delayed planting of the main season crop, rains at harvest, and dry conditions which affected the minor dry season crop in late 1991.

Carryin stocks were down 25 percent from 1990/91 and the lower crop created a tight supply situation through much of 1991, raising domestic prices. The government released stocks into the market to dampen prices, drawing publicly held stocks down to the lowest level since 1988.

The Indonesian government contracted to import 700,000 tons of rice for delivery in late 1991 and early 1992 as it became apparent that the 1991 dry season crop would be down and concerns about the 1992/93 main season crop increased. The 1992/93 main season crop has already been planted and might only match last year's crop, falling far short of the government's goal of a 5 percent increase.

Self-sufficiency is still a goal of the Indonesian government, but that goal may be harder to achieve in coming years. Rice land near urban areas, especially in Java, is being converted to non-agricultural uses. While the government is trying to encourage farmers to shift area from commercial crops, like sugar, to rice to offset this loss of land, it is unclear if government efforts will be successful.

Yield growth has slowed in recent years and subsidies on fertilizer and pesticides have been reduced. The Indonesian government is encouraging farmers to apply input packages to boost yields, but input prices are generally beyond the means of most small-scale farmers, given current rice prices.

Indonesia imported 200,000 tons of rice in calendar 1991 and is forecast to import 750,000 tons in 1992 to offset the decline in production. Indonesia has already contracted for 700,000 tons including the 200,000 tons delivered in 1991, mostly from Thailand and India. In addition, Indonesia will likely receive rice from Vietnam and the Philippines in the form of loan repayments.

The rice crop in the Philippines was larger than expected, given problems associated with the explosion of Mt. Pinatubo and drought in Mindanao. Total 1991/92 production is forecast at 6.3 million tons, down 2 percent from 1990/91. The main season crop was smaller than the 1990/91 record, but early projections had forecast a larger decline. Adequate irrigation supplies in Luzon allowed production of a good dry season crop, but yields and area fell in Mindanao.

Early concerns about the crop raised prospects for imports in 1991. However, the smaller crop led to higher prices through much of 1991 compared to 1990, and total consumption fell as consumers shifted to competitively priced wheat products. The forecast of a larger-than-expected 1991/92 outturn and adequate carryin stocks, the result of 1990 imports and a record 1990/91 crop, eliminated the need for 1991 rice imports. Stocks are estimated to be well above the government target and it is likely that the Philippines will be a net exporter in calendar 1992.

Dryness brought down 1991/92 production in Malaysia and delayed planting of the 1992/93 crop. As a result, Malaysian imports rose over 11 percent in calendar 1991 to 400,000 tons. Production is likely to improve in 1992/93, assuming normal weather, and imports are forecast to decline somewhat in calendar 1992. However, until the 1992/93 crop is harvested, the import forecast remains very uncertain.

Dryness in Sri Lanka is expected to sharply curtail 1991/92 yields. Production is forecast down 6 percent, despite increased area. Imports in calendar 1991 fell to 132,000 tons, the lowest since 1988 because of the record 1990/91 crop, but imports are projected to expand to 200,000 tons in calendar 1992.

Improved irrigation led to expanded area and higher yields in Bangladesh as farmers substitute rice for other dry season crops, including pulses, oilseeds, and wheat. Total production is forecast at a record 18.4 million tons, up 3 percent from 1990/91. The gain comes primarily from the expansion of the dry season (boro) crop. The cyclone damage early in 1991 and the September flooding in the northern part of the country did not result in large scale losses to the 1991/92 rice crop.

Increased public distribution of rice to cyclone and flooding victims has led to government stock drawdowns. However,

rice prices have remained relatively stable and there appears to be no scarcity of rice supplies. Bangladesh imported 100,000 tons of rice in calendar 1991, mostly in the form of disaster relief donations. Imports in calendar 1992 are forecast to match 1991. When there is a grain shortage in Bangladesh, the government generally turns to lower priced wheat rather than rice imports.

Japan's 1991/92 rice crop fell 8 percent to 8.7 million tons, the smallest in almost 40 years. Area continued its long-term decline due to government policies that encourage land diversion away from rice production. However, adverse weather at harvest led to a sharp reduction in yields. Ending stocks are forecast at their lowest since 1983/84. Production in 1992/93 is likely to increase. The government is expected to relax the land diversion program requirements for one year only and, assuming normal weather, yields should rise.

Latin American Imports Forecast Down as Brazilian Production Improves

Brazil's production is forecast up 14 percent to 7.3 million tons. In 1990/91, area fell because of reduced access to credit and yields dropped because of a decline in input use and adverse weather. This year, the government boosted the credit available to rice producers and the weather has been favorable. Area expanded in the center-west region and yields improved in the irrigated southern States.

The small 1990/91 crop led to 800,000 tons of rice imports in calendar 1991. The larger crop and reduced consumption is expected to lead to a drop in imports in calendar 1992 to 500,000 tons. Austerity measures have reduced economic growth and inflation and, with high unemployment, have led to a reduction in overall food consumption, including rice.

Production in several other countries in Latin America are projected to fall. In Mexico, the 1991/92 crop is forecast down 5 percent from the poor 1990/91 crop. Area continues to decline because of high production costs, low support prices, and lack of adequate credit. Imports are forecast up by two-thirds to 250,000 tons in calendar 1992 to make up for the production shortfall.

Dryness is constraining production in several central American countries, including Costa Rica. Production in Peru is also forecast down from a poor 1990/91 crop as dry weather continues and lack of credit discourages farmers from planting rice. Peru's imports are forecast up 17 percent to 350,000 tons in calendar 1992.

Sub-Saharan African Imports Forecast To Rise

Despite good crops in several West African countries, dryness in East Africa constrained Sub-Saharan Africa's rice production, down slightly from 1990/91. Imports in calendar 1991 rose 3 percent to 2.9 million tons and are forecast to rise 7 percent in 1992.

Mali, the Ivory Coast, and Nigeria experienced favorable growing conditions. Unfavorable conditions in the beginning of the growing season affected the harvest in other West African countries, including Senegal. Continuing violence in Liberia led to area declines and a 5 percent decline in production.

Imports by West African countries rose 7 percent to 1.8 million tons in calendar 1991, with the largest gain in the Ivory Coast and Liberia. Regional imports in 1992 are likely to nearly equal those of 1991.

In the rest of Sub-Saharan Africa, drought in Tanzania reduced the rice crop 13 percent from 1990/91. Drought also cut the 1991/92 crop in Madagascar, where production fell 8 percent to 1.4 million tons. However, the 1992/93 crop was recently planted and favorable weather might lead to higher production. Madagascar is projected to increase calendar 1992 imports by more than 50 percent to 200,000 tons.

Middle Eastern Imports To Expand in 1992

Middle Eastern countries import the equivalent of more than two-thirds of their annual consumption. In calendar 1991, imports fell 14 percent, mostly because of reductions by Iraq and Iran. Iraq's imports did not expand after the Persian Gulf war although the U.N. allowed it to import food products. Potential payment problems discouraged exporters. Sources of Iraq's rice imports in 1991 appear to have been India, Pakistan, and Thailand. Despite announced intentions of buying 600,000 tons of rice from Thailand in 1991 and 1992, only 39,000 tons were actually shipped directly to Iraq in 1991. As of the end of March, no further shipments from Thailand had taken place.

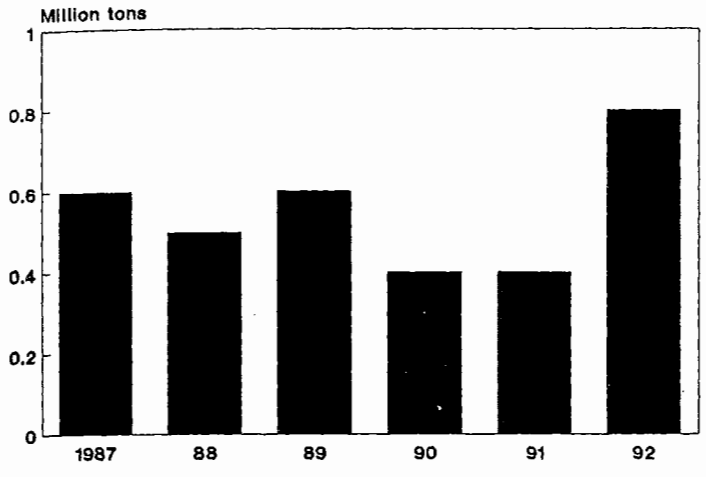
Iran's 1991/92 crop is estimated to have increased 17 percent and imports in 1991 declined by a third to 565,000 tons. Calendar 1992 imports are forecast to rise again to 800,000 tons.

Turkey produces nearly half the rice it consumes. However, in 1991/92, rice production is estimated to have fallen 38 percent because support prices for rice were significantly less than for other grains. In addition to a drop in area, yields are forecast down 6 percent from last year. Consumption has been rising and 1992 imports are projected to expand 25 percent to 250,000 tons. Calendar 1992 imports by other countries in the region are forecast to nearly equal 1991.

Former USSR Becomes a Major Rice Market

In the 1980's the former Soviet Union imported an average of about 500,000 tons of rice annually for its own use and for client States. Primary sources for these imports were India and Thailand. Imports for 1992 are projected at 800,000

Figure 6
Former USSR Rice Imports



1992 forecast.

tons, double 1991. Recently, the former USSR has financed nearly all of its rice imports with credit, grants, or barter arrangements with Thailand and other exporting countries, including the United States.

In calendar 1991, the former USSR imported over 175,000 tons of rice from Thailand, bought on credit. In February, the Russian Republic arranged for another credit package with Thailand to purchase a reported 500,000 tons for delivery in 1992.

In November 1991, the United States allocated $1.25 billion of GSM-102 credit guarantees. Of the total, $7 million was allocated to rice. In November, 1991, the United States made an EEP allocation of 100,000 tons to the former USSR. By mid-April, the former USSR had purchased 40,000 tons of rice largely using the GSM credit and EEP subsidies, the first purchase from the United States since 1979. In addition, 7,200 tons of U.S. rice was included in a food relief package. In April, another 1.1 billion dollars of guaranteed credit was allocated to Russia, Ukraine, and other former Soviet Republics. As of April 15, specific commodity allocations had not yet been made.

The EC has provided credit for subsidized Italian rice sent to the former USSR. Taiwan has announced that it will donate 100,000 tons of rice to Russia for delivery in calendar 1992 and shipments have already begun. Vietnam is reported to have bartered rice for fertilizer and has reportedly offered to repay debts to the former USSR with rice. On the other hand, India has not exported rice to the former USSR since the end of 1990, presumably because it is not willing to barter or to sell rice on credit.

Competitors' Production To Rise, Exports To Expand

The major Asian exporters (Thailand, Vietnam, and Pakistan) are forecast to expand production in 1991/92 and increase exports in calendar 1992. Australia is expected to have more exportable supplies. India's exports are projected to grow despite expectations of a smaller grain crop and China's are also expected to be slightly larger. Burma's exports are forecast down because of the forecast decline in production.

Thailand's 1991/92 crop is forecast at 13.5 million tons, up 19 percent from the 1990/91 poor crop. In 1990/91, brown planthoppers infested the main season crop and poor weather brought yields down even further. Concerns about low water levels constrained dry season area. Exports in calendar 1991 matched 1990 at nearly 4 million tons, but stocks were drawn down and prices were high through much of the year.

In 1991/92, area is forecast up 14 percent and yields are expected to recover. Farmers expanded area in response to the relatively high prices. They switched to insect resistant varieties and controlled isolated pest outbreaks with pesticides. Favorable monsoon rains helped boost the main season crop, despite early season dryness which led to some late plantings. However, once again, there is concern about low reservoir levels limiting dry season production.

The larger main-season crop was expected to lower rice prices. In November, the Thai government announced a support program to lift farm prices at harvest. The government set target prices for 5 percent broken paddy at 4000-4,200 baht per ton (25.66 baht = $1). Intervention programs include credit to rice mills and a paddy mortgage scheme whereby farmers receive low interest loans, allowing them to purchase inputs and hold their paddy for a few months until prices rise. Other programs provide funds 1) to buy a limited amount of paddy from small-scale farmers at the target price and 2) for the government to buy rice from exporters early in the season.

Exports for calendar 1992 are forecast at 4.3 million tons, up 8 percent from 1991. Thailand's larger crop, competitive prices, and higher global imports will help maintain Thailand's market share at 32 percent, the same as in 1991. The price support programs will probably prevent Thailand from gaining market share, particularly in the low quality markets.

Vietnam is forecast to remain the third largest rice exporter. The 1991/92 crop is projected at 13.1 million tons, up 11 percent from 1991/92 when, as in Thailand, brown planthoppers and other pests damaged much of the crop. Area is expected to expand only slightly, but yields are forecast up sharply.

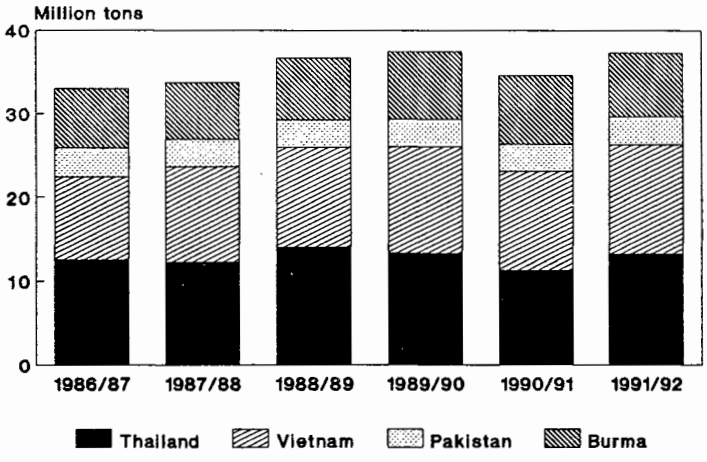
Calendar 1992 exports are forecast at 1.2 million tons, up 20 percent from 1991. In 1991, Vietnam's central government scaled back exports to ensure adequate domestic supplies by restricting exports by provincial trading companies. Those restrictions were lifted in mid-1991. While concerns about adequate domestic distribution remain, the larger crop and loosened controls by the central government is likely to stimulate stronger exports in 1992.

Exports from Vietnam to China appear to be significant but the data has not been published by China's customs statistics and are not included in the USDA forecast. Relations between China and Vietnam are improving, border trade has increased, and 21 trading centers will be opened in 1992. Rice trade data will likely show up in official statistics once trade relations are formalized.

Pakistan's 1991/92 production is forecast at 3.2 million tons, down 2 percent to 1990/91. While total production is nearly the same, the shift from basmati rice to coarse rice (IRRI varieties) continues. Procurement prices for both varieties were raised, but the increase for the IRRI rice exceeded the rise in production costs while the price increase for basmati rice did not. In addition, dryness in the Punjab region, where most basmati rice is grown, reduced area planted to basmati further. Area planted to IRRI rice in Sindh expanded.

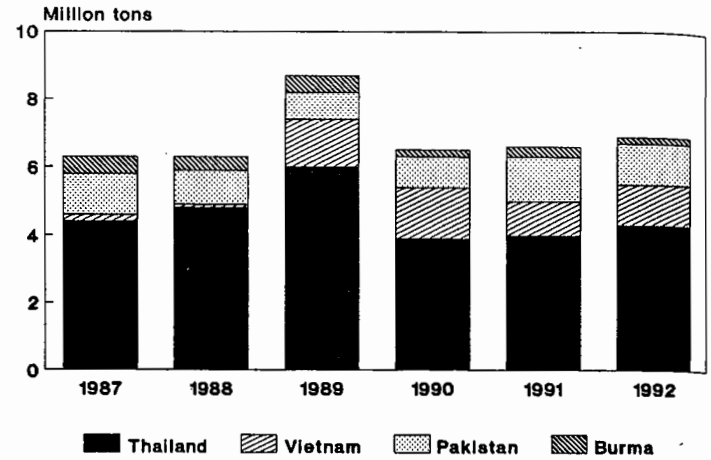
The government decided to reduce incentives to grow basmati to keep down government stocks. Increased competition with India has made it more difficult for the government to export basmati rice. And, the private sector has been more successful exporting basmati rice than the government. Supplies will be tighter as carryin stocks are down from 1990/91. Exports are projected to decline 7 percent to 1.2 million tons in calendar 1992.

Figure 7
Asian Exporters' Rice Production



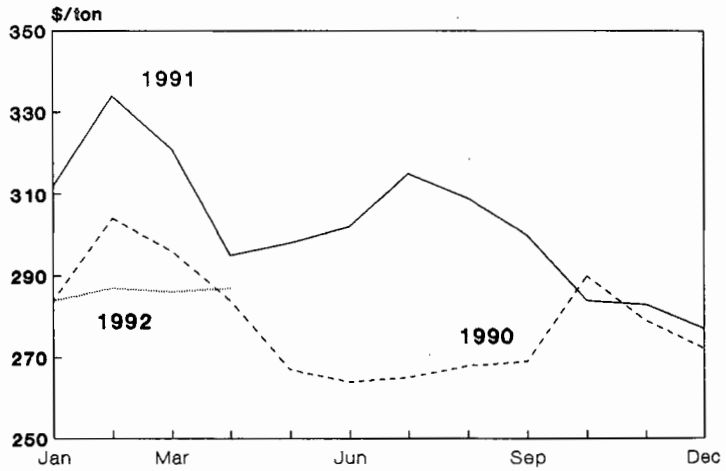
1991/92 forecast.

Figure 8
Asian Rice Exports



1992 forecast.

Figure 9
Thai Export Prices



F.o.b. Bangkok 100 percent B, average monthly price quotes.

While Pakistan's exports are forecast down in calendar 1992, India's exports are projected up 20 percent to 600,000 tons. Despite the drop in production, India's stocks are large enough to support modest exports. However, 1992 exports might be constrained by the expectations of a lower 1992/93 wheat crop.

In calendar 1991, India exported 500,000 tons of rice, up nearly 20 percent from 1990. Usually, India's exports consist mostly of basmati rice. However, in 1991, domestic basmati prices rose and India faced stronger competition with Pakistan for markets than in 1990. Basmati exports slowed. But India made substantial gains in coarse rice markets, particularly with exports to Indonesia, Jordan, and Iraq.

India's coarse rice exports became particularly attractive in the last half of 1991 when the rupee was devalued. The government authorized the private sector to export 800,000 tons of coarse rice. However, logistical problems and delays resulting from licensing procedures, contracting problems, and minimum export price rules prevented the entire amount from being exported in 1991. Much of the original 800,000 tons is likely to be reauthorized for export and shipped in calendar 1992.

In calendar 1991, China's rice exports more than doubled to 689,000 tons. While sales to Eastern Europe fell as Eastern European countries increased imports from western sources, China's exports to the Philippines, Cuba, Hong Kong, and African countries more than offset the decline.

China's calendar 1992 exports are forecast at 750,000 tons, up 9 percent from 1991. China's exports continue to be constrained by central government control. Exports must be licensed by the central government. Provinces which produce surplus rice, in general, would prefer to export it to earn hard currency. However, the central government limits the volume that can be exported to maintain appropriate stocks and to encourage interprovincial shipments.

Dry weather contributed to a decline in Burma's 1991/92 crop. Production is forecast at 7.7 million tons, down 7 percent from 1990/91. The monsoon was shorter than normal and then floods washed out about 25 percent of the seeded area in the Irrawaddy Division, a primary producing area. In addition, fertilizer use continued to decline, contributing to the forecast drop in yields. While carryin stocks are large, they are generally privately held, limiting the supply available for government export.

Exports in calendar 1992 are forecast at 200,000 tons, declining one-third from 1991. The government continues to control exports. Recently, the government's emphasis has appeared to be on maintaining adequate domestic supplies and keeping internal prices stable. Exports are a secondary priority. In the past, a large proportion of Burma's exports consisted of rice smuggled out of the country and into Bangladesh. Recent bumper rice crops in Bangladesh have discouraged this cross-border trade.

Australia's 1991/92 production is forecast at nearly 670,000 tons, up 38 percent from 1990/91. In 1990/91, growers in New South Wales, Australia's largest producing State, voluntarily reduced area 25 percent in response to low prices and high carryin stocks. In 1991/92, with prices higher and world imports forecast stronger, producers returned land to rice production. The larger supply will add to export supplies and calendar 1992 exports are projected at a record 550,000 tons, up 38 percent from 1991.

EC production is forecast at 1.4 million tons in 1991/92, down 10 percent from 1990/91. Low prices and large carryin stocks of medium grain rice stimulated the overall area decline, particularly in Italy where over 50 percent of the EC's rice is grown, and stimulated a shift from medium grain rice to long grain indica varieties. Italy's area and production of indica rice expanded over five times from 1990/91.

Indica production has gained popularity in Italy and Spain after 5 years of a special subsidy for long grain production. This is the final year for the subsidy and some land area will likely revert back into medium grain production. However, EC consumption of long grain rice continues to grow. Italy and Spain have expanded their exports of long grain rice to other EC countries and this market niche is likely to encourage producers to maintain a larger share of area planted to indica varieties than they did prior to the introduction of subsidies five years ago.

Total calendar 1992 EC exports, including intra-EC trade are forecast at 1.1 million tons, up 11 percent. Exports to the former Soviet Union, Eastern Europe, and Mediterranean countries are likely to remain strong, as they were in 1991.

GATT Update

On December 20, the General Agreement on Tariffs and Trade (GATT) Director-General Arthur Dunkel released a draft final agreement covering all of the negotiating areas of the Uruguay Round, including agriculture. This document is the focus of the current negotiations of the Round. President Bush's meeting with the EC President Delors at the Hague, the Netherlands, in early November, gave new momentum to the Round and spurred intensive negotiations at all levels.

On November 21, the Director-General released a draft working paper on agriculture that consolidated and refined earlier Secretariat papers, reflecting current positions of the Contracting Parties. Largely based on the draft working paper, Dunkel submitted a draft agricultural text on December 12. This draft text served as the model for the agriculture section submitted with the draft final agreement on December 20.

The Trade Negotiations Committee, made up of representatives from all of the participating countries, met in Geneva on January 13 to report their general reactions to the draft agreement. While many countries, including the United States, voiced concerns over specific sections of the draft, their comments were generally positive.

Mr. Dunkel set a work plan to guide the negotiations to a conclusion. He directed all countries to submit a country plan in early March detailing their commitments under the agreement. The United States submitted its country schedule on March 5. Currently, countries are thoroughly reviewing

all submissions to ensure that correct methodologies are followed and to negotiate further commitments in products that are of particular concern. During the course of the next few months, the U.S. is expected to be involved in serious negotiations, including bilateral meetings with the EC.

While this is not a final document to be accepted or rejected, it does reflect the Director-General's effort to strike a compromise across all of the negotiating areas. This will make any dramatic changes difficult to include in a final document submitted by the GATT secretariat. In several areas, including agriculture, Mr. Dunkel was unable to secure a consensus among the participants and proposed his own solutions. Therefore, the draft represents his attempt to resolve many contentious issues.

The draft includes specific disciplines in all four areas of the agricultural negotiation: market access, export competition, internal support, and sanitary and phytosanitary measures. The section on agriculture includes proposals to reduce the volume of subsidized exports by 24 percent from a 1986-1990 base period and cut the value of export subsidies up to 36 percent.

According to the proposal, nontariff barriers are to be converted into tariffs. Tariffs are to be reduced during the implementation period (1993-99) by 36 percent on a simple-average basis for all commodities, with a minimum 15 percent reduction for each tariff line item.

A minimum market access of 3 percent of 1986-88 consumption was proposed, increasing to 5 percent by 1999. Trade-distorting domestic support programs are to be reduced by 20 percent from the 1986-88 base period during the implementation period. Policy changes implemented since 1986 will be taken into account.

Developing countries can apply for lower reductions in the areas of tariffs, export subsidies, and domestic support programs. They have 10 years to implement the reductions in all three areas. The participants are to agree to continue the trade reform process, beginning in 1998, 1 year before the end of the initial implementation period. The text also includes a proposal to establish a multilateral framework to minimize the effects of sanitary and phytosanitary restrictions on trade.

The text has minuses as well as pluses for all participants, including the United States. Nevertheless, Dunkel's draft final agreement text establishes the basis for long-term movement toward fairer trade for agriculture. Moreover, an agreement on this text would provide immediate benefits for agricultural exporters and increase the role of market forces in world agricultural trade. The United States will be discussing its concerns and other issues in Geneva in the coming weeks.

U.S. Market Share Falls as High Prices Continue

Reduced U.S. supplies and strong domestic demand has pushed up the price of U.S. rice. The difference between U.S. and Asian prices has been increasing since mid-1991, before declining in recent weeks, coinciding with the slowdown of U.S. sales and exports. Sales in the last half of 1991 were bolstered by large purchases of rice, much of it rough rice, to Brazil. Brazil has been out of the market since the end of 1991 and U.S. sales and shipments to other markets in the first 3 months of 1992 have plummeted.

Calendar 1991 exports reached 2.2 million tons, down 8 percent from 1990. The loss of exports to Iraq accounted for much of the decline. However, reduced overall world trade and rising U.S. prices in the last half of the year also contributed to the fall. Exports to Brazil, Central American countries, and Sub-Saharan African countries increased substantially, but not enough to offset the decline in exports to Turkey, the EC, Algeria, and several Middle Eastern countries outside of Iraq.

The countries that cut back on U.S. exports account for much of the higher value commercial markets, while the countries where gains were made generally imported rough rice or lesser quality, lower priced rice.

Calendar 1992 exports are expected to match 1991 at 2.2 million tons. This forecast, however, depends on several factors. The pace of exports is expected to pick up in the last half of the calendar year, particularly given expectations of a larger U.S. crop in 1992/93. The larger crop is likely to reign in prices and allow exports to be more competitively priced. However, since world trade is forecast higher and, with the U.S. projected only to equal 1991 exports, the U.S. market share is forecast to drop to 16 percent from 18 percent in calendar 1992.

Compared to previous first quarter exports, January through March 1992 exports are the second lowest in a decade, only exceeding the first quarter of 1986, the period just prior to the institution of the marketing loan program.

Government programs played a smaller role in U.S. rice exports in fiscal 1991 than in previous years because much of the support, in the form of GSM-102 credit, used to go to Iraq. Iraq alone accounted for almost 55 percent of GSM-102 rice exports in fiscal 1990. In fiscal 1992, the proportion of government-assisted rice exports is expected to remain relatively low.

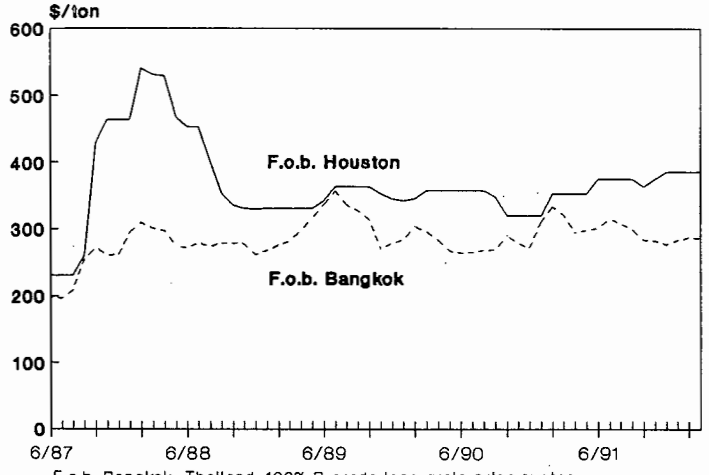
As of April 3, GSM-102 allocations for rice in fiscal 1992 had reached more than $81 million, compared to $195 mil-

lion at the same time in 1991. Credit approvals were $46 million compared to $33 million at the same time a year ago. The major purchasing markets have been Mexico, Senegal, and the former USSR, with the former USSR participating for the first time. For GSM-103, allocations were small (to Jordan only) and no sales had been reported as of April 3.

As of April 3, P.L. 480 Title I allocations for fiscal 1992 reached almost 100,000 tons compared to 129,000 tons at approximately the same time in 1991. Some countries, particularly the Philippines, which were allocated rice under P.L. 480 Title I in fiscal year 1991, were not included in the fiscal 1992 allocation. Actual P.L. 480 Title I sales reached 41,000 tons as of April 3, about 11,000 tons more that the sales registered under Title I a year ago. In addition, about 170,000 tons of rice have been allocated under Title II and 25,000 tons of rice have been allocated under Title III as of March 1.

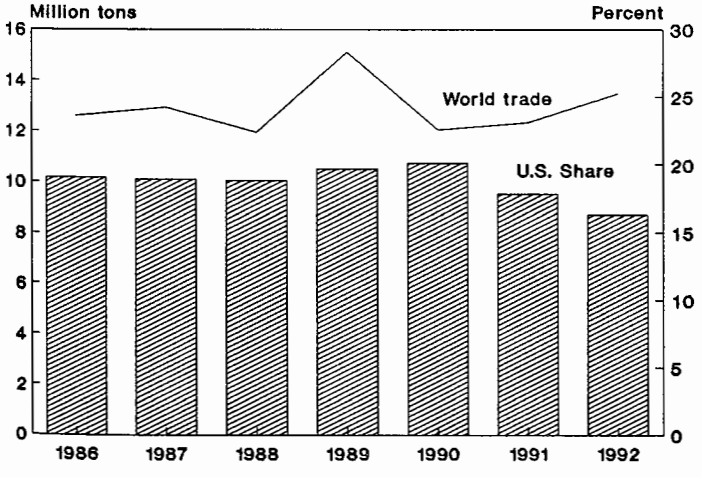
Since the beginning of fiscal 1992, the EEP has assisted U.S. exporters to counter subsidized EC sales of rice in Turkey, Eastern Europe, the former USSR, and Jordan. Total rice EEP sales between October and April reached 273,800 tons. The average bonus between October and April was $61.27 per ton, but the range has been wide. Turkey bought over 200,000 tons under EEP with an average bonus of $49.69 per ton. Czechoslovakia has purchased 29,500 tons under EEP with an average bonus of $133.03 per ton. The former USSR has purchased 40,000 tons under EEP with an average bonus of $73.99 per ton.

Figure 10
U.S. and Thai Rice Export Prices



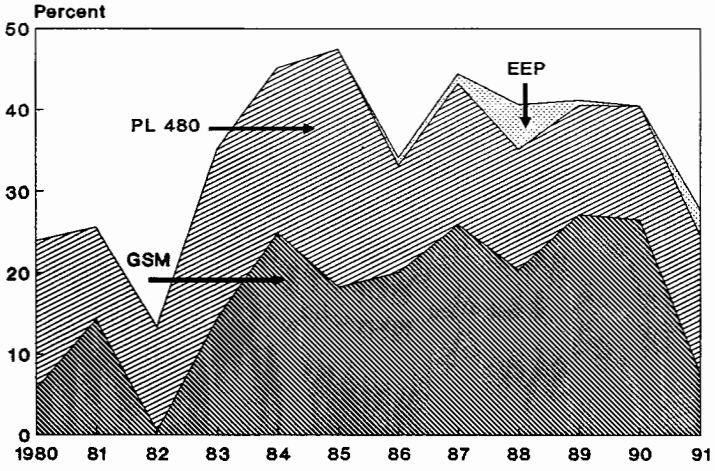
F.o.b. Bangkok, Thailand, 100% B grade long grain price quotas.
F.o.b. Houston, U.S. No. 2, 4% broken, long grain price quotas.

Figure 11
World Rice Trade and U.S. Share



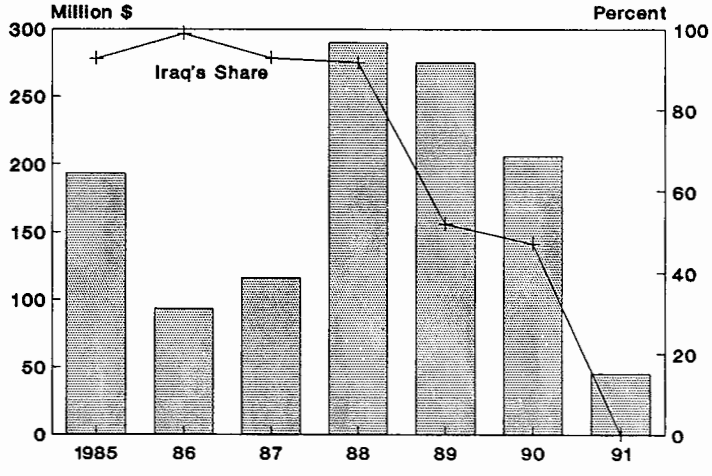
1991 forecast; 1992 projected.

Figure 12
U.S. Export Programs and Share



Fiscal years.

Figure 13
GSM-102 Credit Approvals for Rice



Fiscal years.

Forecasting Producer Prices of Rough Rice with Futures Prices

Linwood A. Hoffman[1]

Abstract: A method, which uses futures prices to forecast the season-average price of U.S. rough rice, is developed. A historical monthly-average basis is computed and deducted from the nearby futures price, resulting in a monthly farm price forecast for each month of the crop year. Next, a weighted season-average price is computed. Results provide timely and reasonably accurate forecasts of season-average producer prices for rough rice.

Keywords: Basis, rice, forecasts, futures prices, futures-method forecast, season-average prices.

Introduction

Commodity price forecasting is an ongoing activity conducted by the private and public sectors. Forecasting methods range from sophisticated econometric models to expert qualitative judgement. Policymakers seek to quickly assess the effects of domestic or international events upon producers' season-average prices.[2] Producers' price expectations influence planting decisions, which, in turn, affect harvested supplies and market prices. Thus, commodity price forecasts are important to producers, consumers, and policymakers.

A short-run change in farm prices depends upon numerous factors that affect commodity supply and demand functions. Estimates of commodity prices should be based on expected supply and demand conditions. While some have questioned the impact of technical traders on the futures market, futures prices are still considered a composite indicator of expected supply and use and thus can be used to forecast short-run farm prices.

Futures prices are determined by the interaction of current and expected demand for, and supply of, a commodity. Hedgers and speculators evaluate a number of factors, including, but not limited to planting intentions, weather, government policies, and potential domestic and/or export consumption. Hedgers deal with the actual commodity, as well as futures contracts. Frequently, speculators have no direct connection to the cash commodity, but expect to profit from changes in futures prices.

Current prices of futures contracts provide important information about expected cash prices on future dates. However, most futures market participants need to be able to forecast a price at the location and time when they plan to buy or sell. Thus, they benefit from predicting the "basis," the difference between the futures price and their local price. Similarly, in making decisions about farm programs, policymakers can benefit from accurate forecasts of a national-average farm price.

This article describes a methodology used in forecasting season-average prices. Weekly updates of season-average price forecasts are then presented for the 1991/92 crop year. Forecast accuracy results are presented from 1990/91. To assess accuracy, forecasts are compared with the actual season-average price and an alternative forecast. The alternative used is USDA's monthly season-average price forecast, released in the *World Agricultural Supply and Demand Estimates* (WASDE).

Forecasting Method

Forecasts are made of the monthly average cash price received by farmers for each of the 12 months of the crop year, which starts with August. Each month's forecast is based on the current futures price for the nearest contract maturing after the month being forecast. The forecast for each month is obtained by adding a historical average-price difference "basis" (cash price minus futures price) to the nearby futures price. Monthly price forecasts are then weighted by a historical monthly percentage of annual sales to calculate the weighted season-average price forecast.

Relationships within the forecast method are expressed as:

(1) $P_m = F_{mt} + b_m$

where:

[1] Agricultural economist, Commodity Economics Division, Economic Research Service, USDA.

[2] The U.S. Department of Agriculture is analyzing the ability of futures prices to forecast producers' season average prices. This paper focuses on rough rice, one of the commodities included in the analysis.

P_m = Rough rice forecast of U.S. farm price in month m for 12 months, August through July. Thus, this method provides a short-term forecast based on the availability of futures contract prices.

F_{mt} = Futures settlement price of rough rice observed on day t of the first contract to mature after month m. Each crop year contains six futures contracts: September, December, January, March, May, and July.

b_m = Expected basis, in month m, equals the U.S. farm price less the price of the nearby futures contract for rough rice averaged for month m over the previous 5 years.

The forecast of the weighted season-average price (SAP) is computed as:

$$(2) \qquad SAP = \sum_{m=1}^{12} w_m P_m$$

where:

w_m = monthly weight for month m.

P_i = the average actual farm price for past months and/or $(F_{mt} + b_m)$ for future months.

Basis

As previously mentioned, the difference between a cash price at a specific location and the price of a particular futures contract is the basis. The basis tends to be more stable or predictable than either the cash price or futures price. Several factors explain the basis and the influence each provides may vary from one location to another. Some specific factors that influence the basis include: local supply and demand conditions for the commodity and its substitutes, transportation and handling charges, transportation bottlenecks, availability of storage space, storage costs, conditioning capacities, and market expectations. Because the basis calculated for this analysis represents an average of U.S. conditions, it reflects a composite of these factors.

The basis in this study is the arithmetic difference between the monthly U.S. average cash price received by producers and the nearby futures settlement price. For example, the August basis is the difference between the August average cash price received by producers and August's average settlement price of the September futures contract. A 5-year moving average of each monthly basis is used to reduce large variations that will likely occur in any given month and is updated at the end of every crop year.[3]

[3] Since the July rice futures contract began trading in April 1989, a 3 year average was used instead of a 5 year.

Monthly Weights

Monthly marketings are used to construct a weighted season-average price. Each month's weight represents the proportion of the annual crop marketed in that month. A 3-year moving average of these monthly weights is constructed (1988/89 through 1990/91) and is updated annually after the release of USDA's December issue of *Agricultural Prices*. The monthly prices, actual or forecast, are multiplied by each month's weight to estimate the season-average price.

Data

Historical daily settlement prices are obtained from the Commodity Futures Trading Commission (crop years 1986-91) of each rice futures contract traded on the Mid-America Commodity Exchange. Current futures settlement prices are from the *Wall Street Journal* (crop year 1991). Cash prices are from *Agricultural Prices*, published by USDA's National Agricultural Statistics Service. Weights for monthly marketings are from various issues of USDA's *Agricultural Prices*.

Procedure

This method produces a forecast of the season-average price based on futures quotes at any given time. Table 1 illustrates the method used in forecasting the season-average rough rice price for the crop year 1991-92. A weekly futures settlement price, as observed on each Thursday, is used for each of the contracts that contribute to the forecast. Thus, a weekly estimate is computed for illustration.

Six steps are involved in the forecast process.

1. The latest available futures settlement prices (line 1) are gathered for the contracts that are trading. Settlement prices for Thursday, April 16, 1992, are used for illustration (line 1). Futures quotes are used for May, July, and September 1992 contract settlement prices. Actual monthly prices received are available and used for August 1991 through March 1992. (The March monthly cash price represents a mid-month price and is updated the following month.)

   If this forecast were started in June 1991 (shortly after the start of USDA's price forecasts for crop year 1991/92), the May, July, and September 1992 futures price would not be available. Thus, a 3-year average spread between the March contract and May, July, and September contracts would be used to estimate the May, July, and September 1992 futures price.

2. Monthly futures prices are the settlement prices of the nearby contracts. For example, the futures price for April 1992 (line 2) represents the April 16, 1992, settlement price of the May 1992 contract. The nearby contract price is used because it has greater stability than the contract-expiring

Table A-1--Futures method forecast of U.S. rice producers' season average price, 1991-92

Item	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Sep.
							$/cwt.						
Current futures price by contract (settlement) 1/										7.40		7.39	7.20
Monthly futures price based on nearby contract									7.40	7.39	7.39	7.20	
Plus the historical basis (cash less futures)	-0.12	-0.31	-0.33	-0.34	-0.35	-0.73	-0.86	-0.93	-0.98	-1.30	-1.43	-0.90	
Forecast of monthly average farm price									6.42	6.09	5.96	6.30	
Actual monthly farm price	7.16	7.67	7.61	7.78	7.92	7.82	7.91	7.61					
Spliced actual/forecasted monthly farm price	7.16	7.67	7.61	7.78	7.92	7.82	7.91	7.61	6.42	6.09	5.96	6.30	
Annual price projections:													
Simple average	7.19												
Marketing weights (percent)	6.50	8.00	8.92	8.75	7.94	12.40	10.40	10.60	8.40	7.22	5.73	5.18	
Weighted average	7.31												

1/ Contract months include: September, November, January, March, May, and July. Futures price quotation from the Mid-America Commodity Exchange, April 16, 1992, settlement.

month, as contract liquidity decreases during the delivery month. Also, the contracts usually expire about the third week of the month, which would reduce the number of observations that could be used to calculate the average monthly settlement price.

3. A forecast of the monthly average farm price (line 4) is computed by adding the basis (cash price minus futures price) (line 3) to the monthly futures price (line 2).

4. The actual monthly average farm price is entered on line 5 as it becomes available. If this 1991/92 forecast was made during June 1991, all 12 monthly prices would be forecast and line 5 would remain blank.

5. The actual and forecast farm prices are spliced together in line 6. At this stage of the 1991/92 marketing year, 7 of the monthly prices shown are actual rough rice prices (August through January), while the last 5 monthly prices are forecasts.

6. The monthly percentage of producers' rough rice marketings (3-year moving average, line 7) is used to weight the monthly farm prices (line 6). A weighted season-average farm price of rice is then computed (line 8).

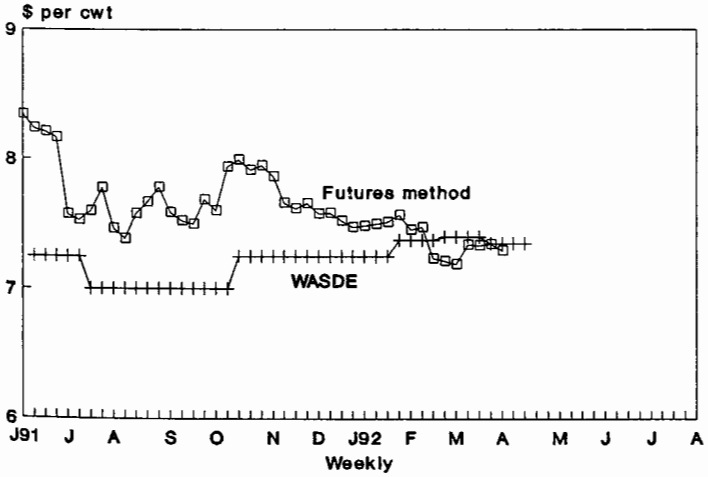
Forecast for 1991/92 Crop Year

Season-average price forecasts are based on expectations reflected in the futures market and, if available, actual farm prices. As of April 16, 1992, the futures method projection for the 1991/92 price of rough rice was $7.31 per cwt (table 1 and figure 1).

The initial forecast, as of June 6, 1991, was $7.96 per cwt for the 1991/92 crop year, $1.26 per cwt above the season-average price for the previous crop year. Prices were expected to rise in 1991/92 because of tighter U.S. supplies and a strong domestic demand. The futures method forecast dropped in July because of a 3.5 million cwt increase in projected U.S. 1991 production due to a larger area planted than reported in the March *Prospective Plantings*. Futures forecasts rose in October due, in part, to the news of reduced world rice production caused by an expected drop in India's crop. The futures season-average price forecast fell in November because of an estimated decline in world rice production resulting from the probable increase in China's crop. Between December 1991 and March 1992, price forecasts settled into a range of $7.19-$7.58 per cwt.

Figure A-1

U.S. Rough Rice, 1991/92 Crop Year



Forecast Accuracy

Forecast accuracy was examined for crop year 1990/91. A mean absolute percentage error was computed for the crop year and a monthly percentage error was computed between the monthly forecast and actual season-average farm price.

Accuracy of the futures method was also compared with an alternative, the WASDE forecast. Because WASDE numbers are released monthly, the historical futures forecast was computed on a monthly basis. The mid-point of the WASDE forecast range is used to represent the WASDE forecast. The monthly futures projection uses the settlement price available the day after the release of the WASDE forecast. This procedure attempts to equalize information available to each forecasting method.

Table A-2--Forecast accuracy of rough rice's season-average farm price, 1990/91 crop year

Forecast month	----Forecast methods---- Futures method	WASDE 1/
	Percentage error between actual and forecast	
June	3.84	4.48
July	5.79	4.48
August	-3.78	-2.99
September	-3.82	-2.99
October	2.18	0.75
November	0.57	4.48
December	-4.75	0.75
January	-2.84	0.75
February	3.55	0.75
March	1.06	-2.99
April	0.69	-2.99
May	1.30	0.75
June	1.46	0.75
July	-0.10	0.75
	Mean absolute percentage error	
Crop year	2.55	2.19

1/ Based on midpoint of rough rice's price forecast published monthly in USDA's World Agricultural supply and Demand Estimates.

Table A-3--Forecasts and actual season-average farm price of rough rice, 1990/91 crop year

Forecast month	----Forecast methods---- Futures method	WASDE 1/
	$/cwt	
Forecasts:		
June	6.96	7.00
July	7.09	7.00
August	6.45	6.50
September	6.44	6.50
October	6.85	6.75
November	6.74	7.00
December	6.38	6.75
January	6.51	6.75
February	6.94	6.75
March	6.77	6.50
April	6.75	6.50
May	6.79	6.75
June	6.80	6.75
July	6.69	6.75
Actual	6.70	6.70

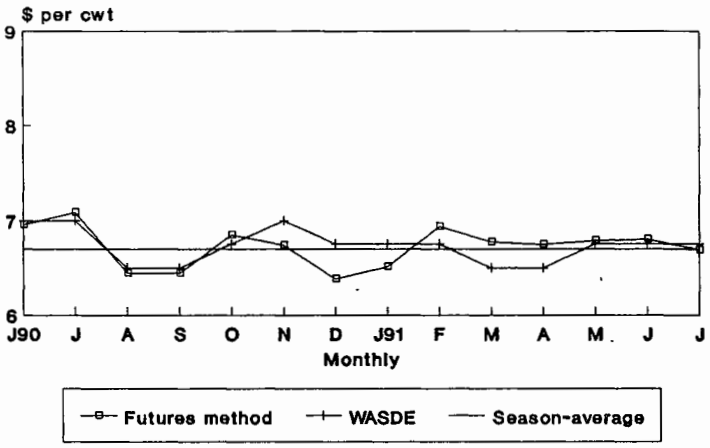
1/ Based on midpoint of rough rice's price forecast published monthly in USDA's World Agricultural Supply and Demand Estimates.

The mean absolute percentage error for the futures forecast was 2.6 percent for the 1990/91 crop year, compared to WASDE's 2.2 percent (tables 2 and 3, figure 2). Based on the mean absolute percentage error, forecasts from the futures method were roughly equivalent to the WASDE forecasts.

During the forecasting period for crop year 1990/91, the monthly percentage error indicates that the WASDE method performed better than the futures method. For example, the

Figure A-2

Forecasts and Actual U.S. Rough Rice Price, 1990/91 Crop Year



WASDE forecast had the lowest percentage error in 9 out of 14 monthly forecasts, while the futures method had the lowest percentage error in 5 out of 14 monthly projections.

Conclusions

This analysis suggests that the futures method can provide a timely and reasonable forecast of producers' season-average prices. This procedure can provide a useful service to policy analysts, producer organizations, and consumer organizations. The futures forecast method can also provide a useful cross-check against other season-average price forecasts.

Risk Analysis of Planting Flexibility Choices on Rice Farms in the Mississippi River Delta

Parveen P. Setia[1]

Abstract: Under the planting flexibility provision of the 1990 farm legislation, rice producers may plant a portion of their rice acreage base in other crops and still maintain their rice base. This paper analyzes what crops might be chosen by producers under uncertainty given differences in their risk attitudes and available alternatives. Results indicate that the preferred crop mix changes as the level of risk aversion changes. In addition, rice is generally preferred on optional flexible acres, while soybeans, sorghum, and cotton compete strongly for the normal flexible acreage for rice farms in the Mississippi River Delta.

Keywords: Planting flexibility, rice, risk, normal flex, optional flex.

Introduction

The 1990 Food, Agriculture, Conservation, and Trade Act (FACT) continues many of the income support provisions of the 1985 Food Security Act (FSA). However, the addition of planting flexibility provision to the FACT Act is noteworthy. The planting flexibility provision relaxes restrictions on program participants to plant a specific program crop on base acres in order to maintain their crop base and be eligible for deficiency payments. For example, under FSA, to receive deficiency payments for rice, producers had to plant rice on the permitted acres of their rice base. If they participated in the 50/92 program, they were allowed to plant from 50 to 92 percent of their permitted acres in rice and devote the remainder to conserving uses or certain nonprogram crops (crops other than wheat, feed grains, cotton, rice, or soybeans) (9). They could not plant other program crops on that acreage in response to changing market conditions.

The 1990 legislation addresses this issue through planting flexibility provisions whereby rice producers plant other crops on a portion of their rice base acreage (flex acres) and still maintain base history for rice. Deficiency payments are not made on flex acres, therefore the flexibility option exposes producers to risk associated with changes in market conditions for rice and other crops. Producers now need to evaluate other crops instead of just rice to make a sound decision as to which crop to produce on flex acres (15).

This article examines possible planting flexibility choices under uncertainty for rice farms located in the Mississippi River Delta. This region is the largest of three major rice-producing areas of the country and accounts for more than 70 percent of acreage and 65 percent of production in the U.S. (table B-1). The area includes Arkansas, northeast Louisiana, Mississippi, and southeast Missouri. The other two regions are Texas and California.

Table B-1--Mississippi River Delta rice area, yield, and production, 1989-91

	Area harvested			Yield			Production		
	1989	1990	1991	1989	1990	1991	1989	1990	1991
	------1,000 acres------			---------Lbs/acre--------			---------1,000 cwt---------		
Arkansas	1,140	1,200	1,260	5,600	5,000	5,300	63,840	60,000	66,780
Louisiana	485	545	510	4,430	4,860	4,850	21,488	26,469	24,735
Mississippi	235	250	220	5,700	5,700	5,600	13,395	14,250	12,320
Missouri	79	80	92	5,200	4,700	5,100	4,108	3,760	4,692
Total Delta	1,939	2,075	2,082	5,233	5,065	5,212	102,831	104,479	108,527
Total U.S.	2,687	2,823	2,750	5,749	5,529	5,617	154,487	156,088	154,457
					Percent				
Share of U.S. total	72.2	73.5	75.7	91.0	91.6	92.8	66.6	66.9	70.3

1 Agricultural economist, Commodity Economics Division, ERS/USDA.

Rice Program

The target price for rice is frozen at the 1990 level of $10.71 per cwt. The loan rate is still determined in the same manner as under the 1985 FSA, i.e, 85 percent of the 5-year moving average of past market prices, excluding the highest and lowest years. The loan may not be reduced more than 5 percent from the previous year, and has an absolute minimum of $6.50 per cwt. The acreage reduction program (ARP) will be set such that ending stocks will range between 16.5 and 20 percent of total use in the 3 preceding crop years. The ARP ceiling is 35 percent and the marketing loan and 50/92 provisions, as specified in the 1985 FSA, are continued (**5**).

Under the marketing loan provision, rice placed under Commodity Credit Corporation (CCC) loan in 1991 can be repaid below the loan rate if world rice prices are below the loan rate. Producers can repay their loans at the stated repayment rate, sell their rice on the domestic market, and receive the difference between the loan rate and repayment rate as a marketing loan gain. Alternatively, producers can receive an equivalent loan deficiency payment with an agreement not to place their crop under loan. The amount of this deficiency payment is the difference between the loan rate and the repayment rate.

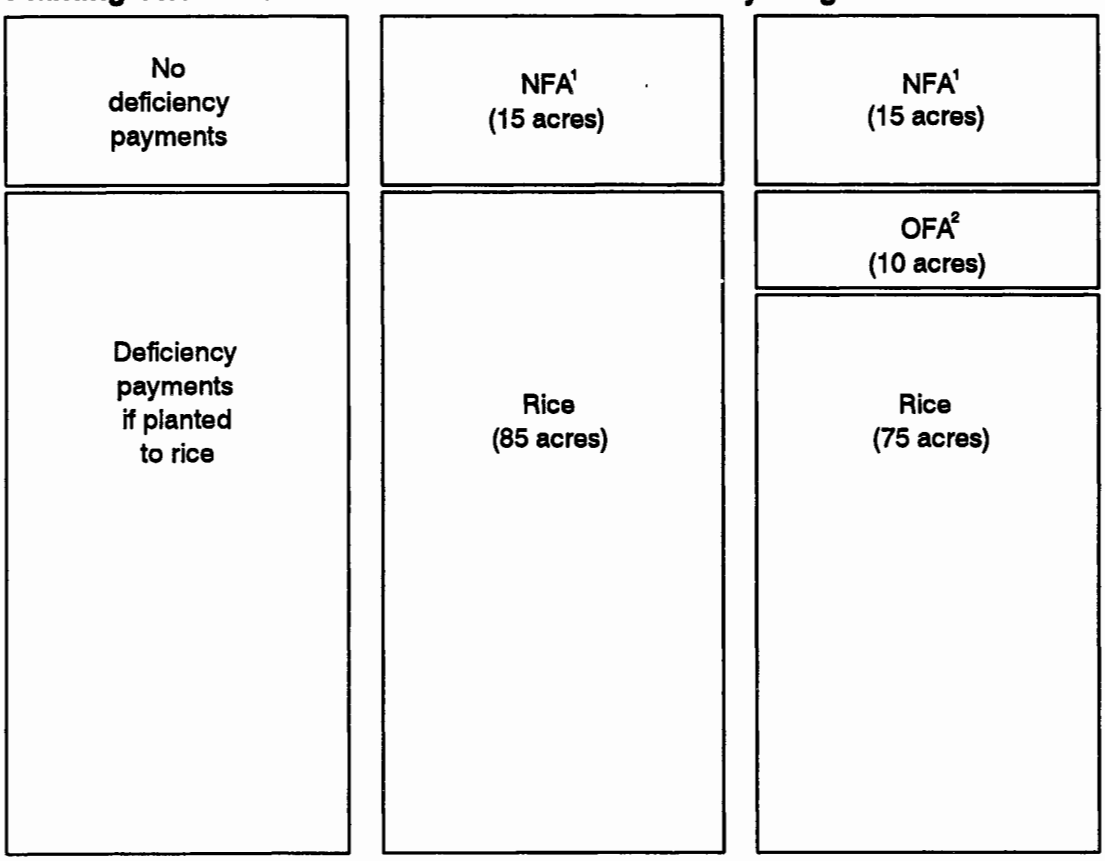
Planting Flexibility Provision

Planting flexibility for rice is provided by two new base acre categories:

(a) *Normal Flexible Acres (NFA):* New legislation allows producers to plant other crops on 15 percent of their rice acreage base without loss of rice acreage base. These acres are referred to as normal flexible acres. Other crops permitted on the normal flexible acres of a rice base include all other program crops, any oilseed crop, any experimental or industrial crop, and any other nonprogram crop except fruits and vegetables. Producers may plant rice or other crops on this acreage, however, deficiency payments will not be received on this acreage regardless of the crop planted. Any program crop planted on this acreage (including rice) would be eligible for CCC loans and marketing loans, if available for that crop.

(b) *Optional Flexible Acres (OFA):* Rice producers who want greater planting flexibility may use an additional 10 per-

Figure B-1
Planting Choices for Rice Under Standard Flexibility Program in 1992



[1]NFA = Normal flexible acres.
[2]OFA = Optional flexible acres.

cent of their rice acreage base to plant other crops. Permitted crops on these optional flexible acres are the same as for normal flexible acres. The only difference is that if rice is planted on optional flexible acres, deficiency payments are received. However, if crops other than rice are planted, this acreage is not eligible for deficiency payments, but the producer's program acreage base for rice is still protected. Program crops other than rice planted on the optional flexible acres of a rice base would be eligible for CCC and marketing loans, if available.

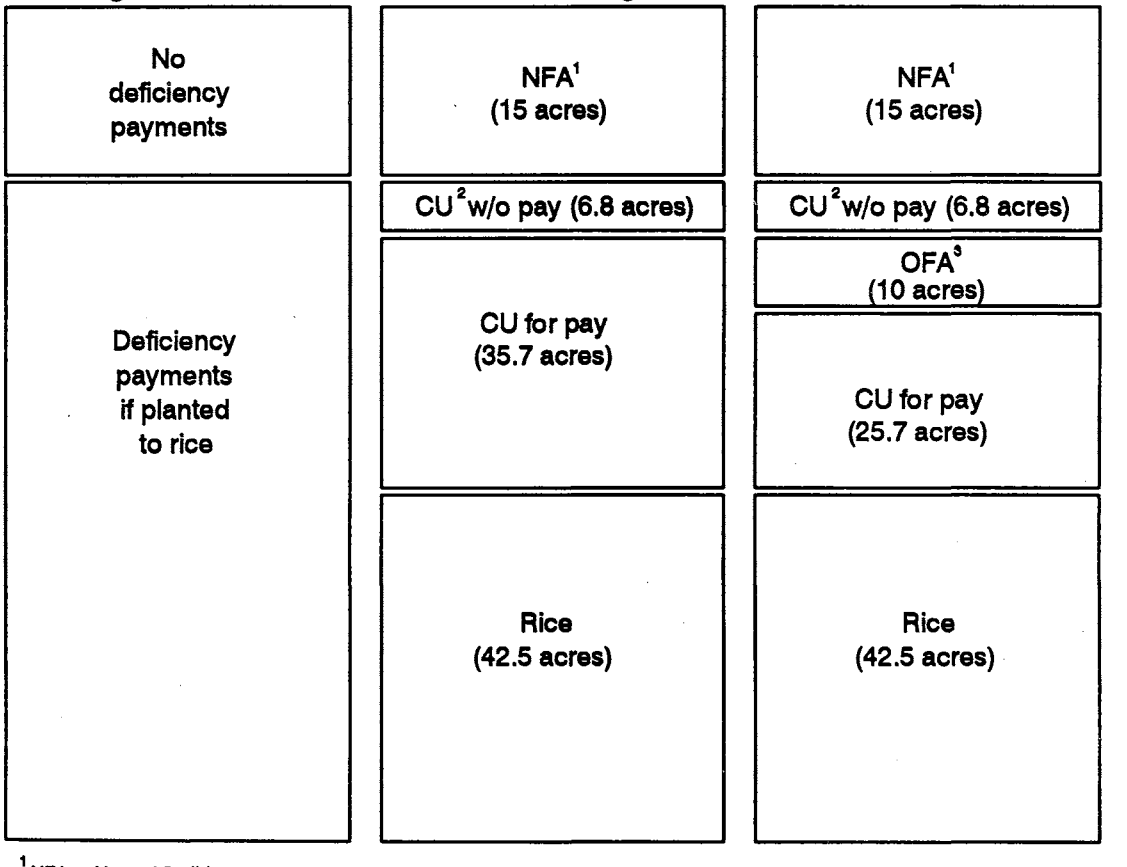
The planting and payment choices for rice under the standard program of the flexibility provision for 1992 are shown in figure B-1. Assuming a 100-acre rice base, 15 percent of base (15 acres), normal flexible acres, is not eligible for deficiency payments, but may be planted to rice or other crops. Because the 1992 ARP for rice is zero, the remaining 85 percent of base can be planted in rice and is eligible for deficiency payments. These are called payment acres. If the producer desires greater planting flexibility, an additional 10 percent of rice base acreage, optional flexible acres, may be planted to other crops but without any deficiency payments.

Under the standard program, a producer would have to plant at least 75 percent of rice base acreage in rice in order to protect it, and could plant the total rice base acreage. Deficiency payments are made on the 75 percent of base planted to rice and on the optional 10 percent of base (OFA) if it is planted to rice.

Figure B-2 illustrates planting and payment choices for rice producers who participate in the 50/92 program. The figure depicts maximum participation in the 50/92 program for a 100-acre base farm. The ARP for 1992/93 is set at zero percent, i.e., no acres are required to be idled. Normal flexible acres (15 percent of base) may be planted in rice or other permitted crop, although no deficiency payments will be paid.

Under 50/92 provisions, a producer must plant at least 50 percent of his maximum payment acreage in rice, but can put the other 50 percent into conserving uses and still receive deficiency payments on 92 percent of the maximum payment acres. The only exception is when a producer is unable to plant 50 percent of payment acres for reasons such as the California water rationing. The producer can then subtract

Figure B-2
Planting Choices for Rice Under 50/92 Program in 1992



[1] NFA = Normal flexible acres.
[2] CU = Conserving use acres.
[3] OFA = Optional flexible acres.

the prevented acreage directly from the minimum required acres to be planted to rice and plant no acres to rice and still receive deficiency payments.

In the example shown in figure B-2, the producer has planted 50 percent of the maximum payment acres (42.5 acres) in rice and the remaining 50 percent have been put into conserving use. Of the latter, 84 percent (35.7 acres) are eligible for rice deficiency payments, while the remaining 16 percent (6.4 acres) are not. The portion of payment acres planted in rice or devoted to conserving use will vary depending upon the producer's degree of participation in the 50/92 program. Under the maximum participation scenario, a producer could plant as little as 42.5 percent of total base acreage in rice, receive deficiency payments on 78.2 percent, and still protect the rice base. For rice planted on 42.5 to 78.2 percent of total base acreage, deficiency payments would be made on 78.2 percent of total base acreage.

The planting flexibility information for 1991 (first year to apply the flexibility option) reveals that, though the use of flexibility option varies for different crop bases, oats and rice program participants seem to be most interested. For example, the use of flex acres (flex acres planted to other crops divided by the maximum permissible flex acres) was 48 percent for oats followed by rice at 37 percent. In comparison, wheat and corn had 12 and 19 percent, respectively, of flex acres planted to other crops. Maximum possible flex acres equal 25 percent (15 percent NFA plus 10 percent OFA) of the enrolled base. Specifically, 379 thousand (or 9.6 percent) of the 3.96 million acres enrolled rice base were flexed out to other crops in 1991. Note that the acres flexed out of a crop base were less than 15 percent (NFA not eligible for deficiency payments), which could be due to factors such as lack of familiarity with the program, land unsuitable for other crops, individual's own cost and returns situation, lack of desire or organization to produce another crop, or insufficient marketing opportunities for the alternative crop, etc.

Planting Flexible Acres

Determining which crop to plant on normal and optional flexible acres within a rice base involves comparing expected returns, variability of expected returns, and individual's risk preferences associated with each portfolio. The preferred portfolio would provide the greatest expected utility. The portfolio in this analysis is defined essentially in the crop mix, i.e., the proportion of crops in the mix in a given year.

Data

Cropping Practices Survey

The Cropping Practices Survey, conducted by the Economic Research Service, gathers information on major U.S. field crops to identify various crop rotation patterns. The 1990

Table B-2--Cropping pattern used on land producing rice in 1990

Previous crop 1989	Arkansas	Louisiana	1990 Area
	Million acres planted		
	1.23	0.57	1.80
	Percent		
Rice	17	23	20
Soybeans	63	55	61
Sorghum	5	NR	3
Fallow	8	16	10
Other	7	6	6
Total	100	100	100

Source: Agricultural Resources (Inputs) S&O, October 1991, ERS, USDA.

survey shows that, in the two major rice-producing States, Arkansas and Louisiana, the most common crop rotation patterns are either all-rice or rice-soybeans. The share of 1990 rice acres with rice-soybean rotation was 63 percent in Arkansas and 55 percent in Louisiana (table B-2). In comparison, continuous rice production was more common in Louisiana (23 percent) than Arkansas (17 percent). With both States combined, 61 percent of the 1990 rice acreage was planted to soybeans the previous year. Continuous rice production and rice-fallow cropping patterns covered 20 percent and 10 percent, respectively, of 1990 rice acreage in these States (7).

Production Costs

Variable costs are the only relevant costs in deciding which crop to produce in the short run (3). These costs include the purchase of inputs that are consumed in one production period. Seed, fertilizer, chemicals, fuel, lubrication, machinery repairs, harvesting, drying, and custom operations are typical variable cash expenses on crop farms.

Fixed or overhead costs, by definition, are not affected by changes in planting decisions and include real estate taxes, property taxes, insurance, and general farm business expenses such as accounting and legal fees, registration and license fees, farm office equipment purchases, and association memberships. Therefore, fixed cash costs, as well as noncash costs, are not considered in making changes in short run production decisions.

Methodology

To evaluate how rice farmers might use flexibility, net returns were calculated for five alternative crop mix combinations (portfolios). The portfolios (all-rice, rice-soybeans, rice-sorghum, rice-cotton, and rice-fallow) considered in this analysis reflect the rotations identified in the ERS cropping practices survey. Net returns (historical average and most

likely scenario for 1992) for each portfolio were derived for alternative combinations regarding use of NFA and OFA levels, as well as with alternatives using both the standard flexibility program and the 50/92 option. In total, 40 combinations were evaluated. Marketing loan payments to rice producers were also estimated and included in all net returns calculations. For example, average net returns for a rice-soybean portfolio with soybeans planted on the NFA, would be *{0.85 * (market price of rice * quantity of rice - variable cost + marketing loan payment + deficiency payment)} + {0.15 * (market price of soybeans * quantity of soybeans - variable cost)}*.

Risk Considerations

Since market returns of a portfolio are stochastic due to variability in market prices and quantity produced, portfolios should be analyzed by incorporating the risk associated with them. This paper applies the methodology developed by Markowitz (1952) for portfolio selection under uncertainty. It essentially utilizes information about expected returns, variability of expected returns, and risk preferences. There is evidence that farmers are risk averse and, given a choice, they prefer certain income to a risky, but potentially higher income alternative (1, 2, 6, 8, 10). The expected income and variance of the portfolio is calculated as follows:

Estimation of Portfolio Returns and Variance

$$E(V) = r_1 P_1 + r_2 P_2 \qquad (1)$$

$$\sigma_T^2 = P_1^2 \sigma_1^2 + P_2^2 \sigma_2^2 + 2 P_1 P_2 \sigma_{12} \qquad (2a)$$

or

$$\sigma_T^2 = P_1^2 \sigma_1^2 + P_2^2 \sigma_2^2 + 2 P_1 P_2 C \sigma_1 \sigma_2 \qquad (2b)$$

Where

P_1, P_2 = Proportion of resources in X_1 and X_2,

r_1, r_2 = Expected market returns of X_1 and X_2,

σ_1^2, σ_2^2 = Variances of X_1 and X_2,

σ_1, σ_2 = Standard Deviation of X_1 and X_2,

σ_{12} = Covariance of X_1 and X_2,

$= C \sigma_1 \sigma_2$, and

$C = \sigma_{12} / \sigma_1 \sigma_2$.

X_1, X_2 = Crops 1 and 2 in the portfolio.

Risk Analysis

Quadratic Utility Function:

$$EU = E(V) - b \{E(V)\}^2 - b \sigma_v^2 \qquad (3)$$

Where

EU = Expected utility,

E(V) = Expected returns,

σ_v^2 = Variance of expected returns,

b = Risk factor,
where $b > -1/2 V$ for $b < 0$ as derived from the use of quadratic utility function.

Risk factor in this analysis indicates the level of certainty a decisionmaker requires to realize the desired outcome. For example, b = 0 implies that the decisionmaker is indifferent (risk neutral) and accepts 50-50 chance of realizing the desired outcome; b>0 implies increasing marginal utility as V (returns) increases, i.e., the decisionmaker is a risk preferrer and b<0 implies decreasing marginal utility as V increases or the variability in V is disliked, i.e., the decisionmaker is risk averse. A risky alternative (higher variability) reduces utility with a larger risk aversion factor, b. Thus, a producer with higher risk aversion requires higher levels of certainty to choose that alternative.

The expected utility of selected portfolios, based on the quadratic utility function, can be compared to identify the cropping mix that provides the highest level of utility. When expected utility of two portfolios is equal, the producer is indifferent as to which crop mix to plant. In that case, other factors such as availability of equipment, expertise, market conditions, etc. will influence the selection of a portfolio.

Results

Net returns and their variability for selected crops were estimated by using the data available from 1975 to 1989. In addition to looking at the historical information, the most likely 1992 expected net returns for each crop were calculated by using the outlook for these crops in December 1991. By utilizing the estimated returns for selected crops, the portfolio net returns and their variability for NFA and NFA + OFA scenarios were estimated as stated above. Returns associated with these portfolios under the 50/92 provision of the Act were also calculated, with minimal required acreage planted to rice assumed (table B-3).

Generally, expected returns are higher when competing crops are grown only on NFA and not on Optional Flex Acreage (OFA) but the variability is also higher. For example, rice-soybean portfolio generates $199 per acre net return under NFA scenario compared to $186 per acre under NFA +

Table B-3--Expected portfolio net returns from planting flexibility

Portfolio	Expected returns	Standard deviation of expected returns	Most likely expected returns	50/92 option: Expected returns	50/92 option: Standard deviation of expected returns	50/92 option: Most likely expected returns
			$/acre			
NFA:						
All-rice	204	63	202	176	40	169
Rice-soybeans	199	52	207	171	28	174
Rice-sorghum	195	51	205	167	28	172
Rice-cotton	203	53	217	175	30	185
Rice-fallow	186	51	197	158	27	163
NFA + OFA:						
All-rice	204	63	202	172	49	157
Rice-soybeans	186	46	191	164	29	166
Rice-sorghum	179	46	188	157	28	162
Rice-cotton	191	49	207	170	33	183
Rice-fallow	165	45	174	142	27	147

Table B-4--Ranking of selected portfolios, with expected returns, for planting flexibility under quadratic utility decision criterion

Portfolio	Expected returns	Standard deviation of expected returns	b = 0.0	Rank	b = -0.00001	Rank	b = -0.0005	Rank	b = -0.002	Rank
					$/acre					
NFA:										
All-rice	204	63	204	1	204	1	181	1	113	4
Rice-Soybeans	199	52	199	3	199	3	178	3	114	2
Rice-Sorghum	195	51	195	4	195	4	175	4	114	2
Rice-Cotton	203	53	203	2	203	2	181	1	115	1
Rice-Fallow	186	51	186	5	186	5	167	5	112	5
NFA + OFA:										
All-rice	204	63	204	1	204	1	181	1	113	1
Rice-Soybeans	186	46	186	3	186	3	168	3	112	3
Rice-Sorghum	179	46	179	4	179	4	162	4	111	4
Rice-Cotton	191	49	191	2	191	2	172	2	113	1
Rice-Fallow	165	45	165	5	165	5	150	5	106	5

OFA scenario. This difference in return is primarily due to deficiency payments available for OFA if planted to rice under the rice program. Note that since a portfolio contains more than one crop (diversified), the variability of net returns tends to decline. Hence, in the absence of program payments, a producer adds another crop, depending upon his risk aversion level, to his portfolio.

Table 3 also shows most likely returns for selected portfolios for 1992/93 crop year. Rice-cotton portfolio will generate the highest per acre returns under both NFA and NFA + OFA scenarios. However, though the rice-cotton portfolio has higher returns, the variability is also greater compared to other diversified portfolios. With the 50/92 option of planting flexibility, both expected net returns and variance will decline for each portfolio because of fewer acres planted to rice.

Producers do not always select a portfolio solely on the basis of net returns. Other factors also influence the decision to plant a particular crop on rice flexible acres. These factors include established rotation patterns; availability of equipment and expertise for alternative crops; land suitability; weed, disease, and pest considerations; and USDA program payment limitations.

Risk Analysis

Under the NFA scenario, for a risk-neutral producer (b = 0) an all-rice portfolio is ranked highest, with an expected utility of 204 per acre; followed by rice-cotton with 203 per acre; and rice-soybeans with 199 per acre (table B-4). Rice-fallow has the lowest expected utility (186 per acre) among the selected portfolios. Portfolio rankings remain unchanged for a producer with low risk aversion level (b = -0.00001). However, for a decisionmaker with medium (b = -0.0005) or high (b = -0.002) levels of risk aversion the preference for portfolios changes (4). For example, for a highly risk averse decisionmaker, rice-cotton is the most preferred portfolio. It is followed by rice-soybeans or rice-sorghum. All-rice then ranks next to the lowest. This suggests that variability in net returns may influence some high-risk-averse producers.

Again, the ranking changes for high-risk-averse producers under the NFA + OFA scenarios. However, this time rice-cotton and all-rice portfolios are the most preferred choices.

These are followed by rice-soybeans and rice-sorghum portfolios.

When most-likely expected net returns instead of historical average returns were considered, ranking of selected sets of portfolios changed again for decisionmakers with high levels of risk aversion (table B-5). For example, under the NFA scenario, with high level of risk aversion (b = -0.002) the rice-cotton portfolio remained the number one choice, but ranking of other portfolios did change. For example, rice-sorghum that was third now ranks the same as rice-soybeans. Surprisingly, rice-fallow, the least preferred portfolio, is now above all-rice, suggesting that a high-risk-averse decision-maker will plant other crops or nothing instead of rice on normal flex acres. Similarly, in the case of NFA + OFA scenario, rankings of selected portfolios were different for high-risk-averse individuals than individuals with low or no aversion to risk. Risk analysis for the 50/92 option of the rice program also provided similar results.

Summary and Implications

The planting flexibility provision of the 1990 FACT Act provides an opportunity for rice producers to respond to market signals on part of their rice base without jeopardizing their program base acreage. Given market conditions, rice producers can increase income by growing another crop on their flex acres. Flexibility also supports the rotation system and can help improve rice quality by controlling weeds, diseases, and pests associated with monoculture farming.

This analysis shows that flexibility, however, is not without risk. The uncertainty of net returns because of market or production conditions can complicate rice producers' decisions. Generally, it seems that rice production in the Mississippi River Delta is more profitable than other competing crops on optional flexible acres. However, in the case of high-risk-averse producers, other crops like cotton and soybeans might be preferred. Hence, the relative profitability of rice compared to competing crops and a producer's risk attitudes could influence the decision to plant rice.

Depending upon an individual's risk attitudes, the preference for a portfolio may not be same. Any change in a selected portfolio will have implications for commodity markets. This analysis should be helpful to commodity analysts in predicting which commodities are likely to be produced on flex acres. In addition, commodity program managers can utilize this information to determine budget allocations for different commodities.

References

1. Anderson, J.R., et al. *Agricultural Decision Analysis.* Iowa State University Press, Ames, Iowa, 1977.

2. Arrow, K.J. *Essays in the Theory of Risk Bearing.* Markham Publishing Company, Chicago, Illinois, 1971.

3. Boehlje, M.D. and V.R. Eidman. *Farm Management.* John Wiley and Sons, New York, New York, 1984.

4. Boggess, W.G. and J.T. Ritchie. "Economic and Risk Analysis of Irrigation Decisions in Humid Regions". *Journal of Production Agriculture* 1, 1988: 116-122.

5. Collins, K., L. Salathe, and W.J. Hudson. *The 1990 Farm Act and The 1990_Budget Reconciliation Act, Economic Research Service, U.S. Department of Agriculture, MP-1489, December 1990.*

6. Dillon, J.L. *The Analysis of Response in Crop and Livestock Production.* Pergamon Press, Oxford, London, 1977.

7. Gill, M. and S. Daberkow. "Crop Sequences Among 1990 Major Field Crops and Associated Farm Program Participation." *Agricultural Resources Situation and Outlook Report,* Economic Research Service, U.S. Department of Agriculture, AR-24, 1991: 39-46.

Table B-5--Ranking of selected portfolios, with most likely expected returns, for planting flexibility under quadratic utility decision criterion

Portfolio	Most likely expected returns	Standard deviation of expected returns	b = 0.0	Rank	b = -0.00001	Rank	b = -0.0005	Rank	b = -0.002	Rank
					$/acre					
NFA:										
All-rice	202	63	202	4	202	4	180	4	112	5
Rice-Soybeans	207	52	207	2	207	2	184	2	116	2
Rice-Sorghum	205	51	205	3	205	3	183	3	116	2
Rice-Cotton	217	53	217	1	217	1	192	1	117	1
Rice-Fallow	197	51	197	5	197	5	176	5	114	4
NFA + OFA:										
All-rice	202	63	202	2	202	2	180	2	112	4
Rice-Soybeans	191	46	191	3	191	3	172	3	114	2
Rice-Sorghum	188	46	188	4	188	4	169	4	113	3
Rice-Cotton	207	49	207	1	207	1	184	1	116	1
Rice-Fallow	174	45	174	5	174	5	158	5	109	5

8. Grisley, W. and E.D. Kellogg. Risk-taking Preferences of Farmers in Northern Thailand - Measurement and Implications. Paper presented at the annual meeting of the American Agricultural Economics Association, University of Illinois, Urbana, Illinois, 1980.

9. Glaser, L.K. *Provisions of the Food Security Act of 1985*. AIB-498. Economic Research Service, U.S. Department of Agriculture, Washington, D.C., 1986: 23.

10. Just, R.E. Risk Aversion Under Profit Maximization. *American Journal of Agricultural Economics* 57, 1975: 347-352.

11. Markowitz, H.M. "Portfolio Selection". *Journal of Finance* 7, 1952: 77-91.

12. Salassi, M.E. "Planting Flexibility Options for Mississippi River Delta Rice Farms. *Rice Situation and Outlook Report*, RS-60. Economic Research Service, U.S. D Department of Agriculture, Washington, D.C., 1991: 13-20.

13. U.S. Department of Agriculture. *Crop Production: 1989 Annual Summary*. CrPr 2-1(90), National Agricultural Statistics Service, Washington, D.C., 1990.

14. U.S. Department of Agriculture. *Rice Situation and Outlook Report*. Economic Research Service, Washington, D.C., Various issues, 1991.

15. Westcott, P.C. Planting Flexibility and Land Allocation. *American Journal of Agricultural Economics* 73, 1991: 1105-1115.

Assessment of the 50/92 Provision and the U.S. Rice Program

Kathryn A. Broussard[1]

Abstract: Participation in 50/92 has increased since its 1986 inception. This paper examines the role of 50/92 in, initially, helping reduce excessive stocks while allowing producers to retain their government payments. For the 1991 crop, 50/92 eligibility was relaxed for growers who were prevented from planting the minimum requirement because of weather-related problems. The 50/92 is also being used to "finish out" a field, as part of an established rotation practice, and to increase income when production costs are high and returns are low. All States increased participation in the program, but the level of use differs considerably.

Keywords: 50/92 provision, prevented planting provision, rice program.

The Food Security Act of 1985, (the 1985 Act) included a provision in Title VI--Rice, which allowed rice producers to underplant their rice acreage base and still collect payments on 92 percent of eligible acres. This provision is commonly referred to as "50/92."

When the 1985 Act was written, excessive stocks were contributing to low rice prices. The purpose of the 50/92 program was to help reduce excess supplies while allowing producers to retain their government payments. In order to be eligible for the 50/92 program, a producer is required to put 8 percent of his acres into conserving uses (CU) and plant at least 50 percent of the eligible crop acres. The remaining acres not planted to rice must also be put into conserving use. If these criteria have been met, a producer is then eligible to receive payments on 92 percent of the eligible crop acres.

The Food, Agriculture, Conservation, and Trade Act of 1990 (the 1990 Act) added another dimension to the 50/92 provision, the prevented-planting provision. This provision allows producers, who were prevented from planting due to circumstances beyond their control, to be eligible for 50/92 payments and the minimum-planted-acreage requirement is reduced by the amount of the prevented planting acres.

50/92 Participation

Since the first year of the 50/92 program, producers have cited many different reasons for using the program. Initially, the program served its original purpose--allowing producers to retain income while not planting a crop already in excess supply. The 50/92 is also used to "finish out" a field or as part of an established rotation practice. More recently, producers have cited the increasing production costs and lower returns as incentives to reduce plantings under the 50/92 program. Being guaranteed payments for 92 percent of the eligible acres, while only planting 50 percent of the eligible acres, has provided income these producers may not have generated if the entire eligible crop acreage base was planted.

In addition to the increased costs and lower returns, an increasing number of producers have cited water constraints as a reason for participating in 50/92. This is true not only in drought stricken California, but also in Texas where the infrastructure for surface water is at near maximum capacity. In some areas, particularly Texas, financing without the guaranteed 50/92 payments is difficult to obtain for some producers.

Historical Perspective

Rice has traditionally had the highest participation in 0/92 and 50/92 since these programs were implemented in 1986 (0/92 for wheat and feed grains; 50/92 for upland cotton and rice). This continues to hold true in 1991 with 37 percent of the total effective rice base enrolled in 50/92. In 1991, participation in 0/92 for wheat and feed grains ranged from a high of 34 percent of the effective barley base, to a low of 8 percent of the effective corn base being enrolled.

Participation in 50/92 has increased since 1986 from 18 percent of the total effective base to a record 37 percent in 1991 (table C-1). The 50/92 provision has been used in all the rice producing States. Texas has led participation in 50/92 with more than 50 percent of the effective rice base being enrolled, followed by Mississippi and Louisiana with 14 to 50 percent. Arkansas and Missouri have traditionally had less than 15 percent of the total effective base in 50/92, while, prior to 1990, California had less than 10 percent. In 1988, base enrolled in 50/92 declined in all rice producing States because of higher price expectations.

The prevented-planting provision, effective with the 1991 crop, increased 50/92 participation in all the rice States (figure C-1). For the crop year, almost 150,000 acres of the ef-

[1] Agricultural Economist, Fibers and Rice Analysis Division, ASCS/USDA.

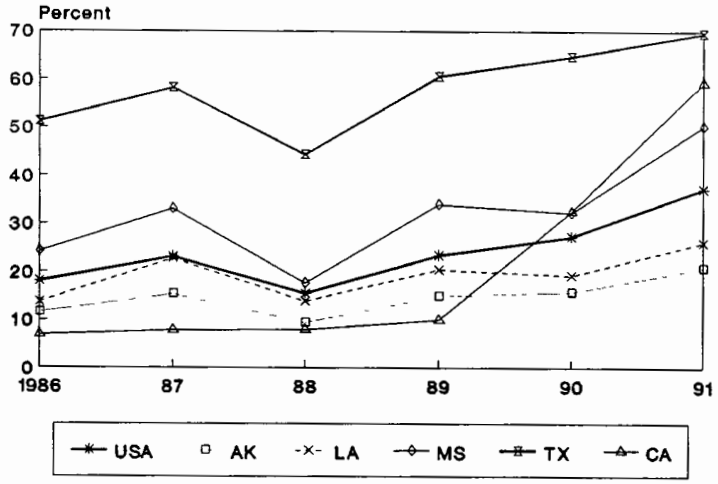
Table C-1--Effective rice base enrolled in 50/92, all rice producing States, 1986-91

Year	Unit	Arkansas	Louisiana	Mississippi	Missouri	Texas	California	USA
1986	Acres	191,579	94,819	85,655	9,179	292,072	41,178	716,711
	Percent	11.6	13.8	24.2	8.6	51.2	6.9	18.0
1987	Acres	252,922	161,919	119,363	15,105	332,130	46,651	928,140
	Percent	15.4	22.7	33.1	13.9	58.2	7.8	23.2
1988	Acres	150,122	96,044	61,190	4,518	249,126	47,470	608,562
	Percent	9.4	13.9	17.6	4.3	44.3	8.0	15.5
1989	Acres	240,735	142,754	119,505	11,006	340,446	58,691	913,568
	Percent	15.0	20.5	34.0	10.2	60.6	10.0	23.4
1990	Acres	253,295	133,960	105,954	10,813	367,846	190,213	1,062,261
	Percent	15.8	19.2	32.2	10.0	64.7	32.6	27.3
1991	Acres	335,264	181,782	178,533	22,847	399,726	346,318	1,469,547
	Percent	20.8	26.1	50.2	19.2	69.6	59.2	37.2

Source: USDA/ASCS Complying Farms Report, 1986-1991.

Figure C-1

Rice: Effective Base Under 50/92



fective rice base (4 percent) was reduced under the prevented-planting provision. Producers used this provision in Mississippi, Missouri, Louisiana, and Arkansas as relief from the flooding that occurred during planting. The water shortage in California increased participation in 50/92 in 1990 and 1991, with the most dramatic increase occurring in 1991 when participation went from almost 33 to 59 percent of the effective rice base reduced under this provision.

50/92 and the 1992 Rice Program

Within the rice title, the 1990 Act provides legislative authority to establish an annual acreage reduction program (ARP) between 0 and 35 percent, which would result in an ending stocks-to-use ratio for the previous three years between 16.5 and 20 percent. In order to achieve the ending stocks objective for the 1992 rice program, the options for the analysis included No ARP, 0, 2.5, 5, and 7.5 percent ARP levels.

There are significant differences between the provisions oa a zero ARP and a No ARP program. If a 0 percent ARP was in effect, the program regarding deficiency payments, loan eligibility, and flexibility would operate the same as if it were a 35 percent ARP. But under a No ARP program, there is no legislative requirement for advance deficiency payments. Flexibility onto rice base acreage may not be permitted and there is no authority for the 50/92 provision.

During the public comment period for the 1992 rice program, the reaction from producers was strongly "anything but" a No ARP rice program. The distinctions between a No and a 0 percent ARP heightened the producers' awareness of the intricacies involved in interpreting the legislative language.

A 0 percent ARP level was decided upon for the 1992 rice program. This decision allowed producers to receive advance deficiency payments, participate in full flexibility, and maintain the 50/92 program with guaranteed payments.

Summary

The 50/92 provision has accomplished its original objective of decreasing stocks while still providing the legislatively required payments to producers. Participation in 50/92 has increased since its 1986 inception for a variety of reasons. However, in the last few years, producers have used 50/92 to maintain farm income while planting fewer acres. For the 1991 rice crop, 50/92 and the prevented-planting provision provided much needed relief when wet weather in the Delta States and lack of water in California restricted planting.

While no longer needed for its original intent, 50/92 has begun to play yet another important role within the annual rice program. Under current budget constraints, this type of program will be scrutinized under the next farm bill. The challenge will be for rice producers, industry, and the government to provide guidance as to the future of 50/92 and the annual rice program.

List of Tables

Appendix table 1--Estimated supply, disappearance, and price, by type of rice, U.S. (rough equivalent of rough and milled rice) 1/

Item	Unit	1987/88	1988/89	1989/90	1990/91	1991/92 2/ (as of April 1992)
Total rice:						
Area planted	Mil. acre	2.36	2.93	2.73	2.90	2.86
Area harvested	"	2.33	2.90	2.69	2.82	2.75
Yield	Pounds/acre	5,555	5,514	5,749	5,529	5,617
Beginning stocks 3/	Mil. cwt	51.40	31.40	26.70	26.30	24.60
Production	"	129.60	159.90	154.50	156.10	154.50
Imports	"	3.00	3.80	4.40	4.80	6.00
Total supply	"	184.00	195.10	185.60	187.20	185.00
Domestic & residual 4/	"	80.40	82.50	82.10	91.70	94.80
Exports	"	72.20	85.90	77.20	70.90	60.00
Total use	"	152.60	168.40	159.30	162.60	154.80
Ending stocks	"	31.40	26.70	26.30	24.60	30.20
CCC	"	0.20	0.10	0.40	0.00	0.00
Free	"	31.20	26.60	25.90	24.60	30.20
Average market price 5/	$/cwt	7.27	6.83	7.35	6.70	(7.40-7.60)
Long:						
Area harvested	Mil. acres	1.70	2.23	2.00	2.07	2.02
Yield	Pounds/acre	5,241	5,345	5,464	5,206	5,393
Beginning stocks	Mil. cwt	27.40	19.10	15.40	13.20	11.50
Production	"	89.00	119.40	109.20	107.80	109.00
Total supply 6/	"	119.40	142.10	128.90	125.70	126.50
Domestic & residual 4/	"	49.80	55.60	54.90	58.20	61.50
Exports	"	50.50	71.20	60.80	56.00	46.50
Total use	"	100.30	126.80	115.70	114.20	108.00
Ending stocks	"	19.10	15.40	13.20	11.50	18.50
Average market price 5/	$/cwt	7.77	6.96	7.59	NA	NA
Medium/short:						
Area harvested	Mil. acres	0.64	0.67	0.69	0.75	0.73
Yield	Pounds/acre	6,395	6,077	6,579	6,420	6,237
Beginning stocks	Mil. cwt	21.10	10.80	9.00	11.60	11.70
Production	"	40.60	40.50	45.30	48.30	45.40
Total supply 6/	"	61.70	51.40	54.30	60.00	57.10
Domestic & residual 4/	"	29.20	27.80	26.30	33.40	33.30
Exports	"	21.70	14.70	16.40	14.90	13.50
Total use	"	50.90	42.50	42.70	48.40	46.80
Ending stocks	"	10.80	9.00	11.60	11.70	10.30
Average market price 5/	$/cwt	6.36	6.47	6.71	NA	NA

NA = Not available.
Note: Totals may not add because of rounding.
1/ Marketing year beginning August 1. 2/ Projected. 3/ Includes the following quantities of broken kernel rice (type undetermined) not included in estimates of beginning stocks by type (in mil. cwt.): 1987/88, 2.9; 1988/89, 1.5; 1989/90, 2.4; 1990/91, 1.4; 1991/92, 1.4. 4/ Residual: unreported use, processing losses, and estimating errors. Use by type does not add to total rice use because of the difference in brokens between beginning and ending stocks. 5/ Marketing year weighted average price received by farmers. 6/ Includes imports.

Appendix table 2--Rough and milled rice (rough equivalent): Marketing year supply and disappearance, 1970/71-1991/92

Year beginning Aug. 1	Supply: Beginning stocks	Supply: Production	Supply: Imports	Supply: Total	Disappearance: Domestic use: Food	Seed	Brewers	Total	Exports	Residual	Total disappearance	Ending stocks--July 31--: CCC inventory	Free	Total
	Million cwt													
1970/71	16.4	83.8	1.5	101.7	25.1	2.5	6.8	34.4	46.5	2.2	83.1	9.5	9.1	18.6
1971/72	18.6	85.8	1.1	105.5	25.5	2.5	7.4	35.4	56.9	1.8	94.1	2.7	8.7	11.4
1972/73	11.4	85.4	0.6	97.4	25.1	3.0	7.7	35.8	54.0	2.5	92.3	0.1	5.0	5.1
1973/74	5.1	92.8	0.2	98.1	26.1	3.6	8.1	37.8	49.7	2.7	90.2	0.0	7.8	7.8
1974/75	7.8	112.4	0.1	120.3	28.6	4.0	8.4	41.0	69.5	2.7	113.2	0.0	7.1	7.1
1975/76	7.1	128.4	0.0	135.5	27.7	3.5	9.1	40.3	56.5	1.8	98.6	18.7	18.2	36.9
1976/77	36.9	115.6	0.1	152.6	29.2	3.2	10.3	42.7	65.6	3.8	112.1	18.6	21.9	40.5
1977/78	40.5	99.2	0.1	139.8	23.5	4.3	9.9	37.7	72.8	1.9	112.4	10.8	16.6	27.4
1978/79	27.4	133.2	0.1	160.7	33.7	4.3	11.2	49.2	75.7	4.2	129.1	8.3	23.2	31.6
1979/80	31.6	131.9	0.1	163.6	33.2	4.8	11.2	49.2	82.6	6.1	137.9	1.7	24.0	25.7
1980/81	25.7	146.2	0.2	172.1	38.4	5.1	11.0	54.5	91.4	9.7	155.6	0.0	16.5	16.5
1981/82	16.5	182.7	0.4	199.6	42.5	4.4	12.7	59.6	82.0	9.0	150.6	17.5	31.5	49.0
1982/83	49.0	153.6	0.7	203.3	37.6	2.9	13.5	54.0	68.9	8.9	131.8	22.3	49.2	71.5
1983/84	71.5	99.7	0.9	172.1	32.7	3.8	12.8	49.3	70.3	5.6	125.2	25.0	21.9	46.9
1984/85	46.9	138.8	1.6	187.3	35.2	3.4	13.9	52.5	62.1	8.0	122.6	44.3	20.4	64.7
1985/86	64.7	134.9	2.2	201.8	45.2	3.0	14.1	62.3	58.7	3.5	124.5	43.6	33.7	77.3
1986/87	77.3	133.4	2.6	213.3	52.8	2.9	15.0	70.7	84.2	7.0	161.9	8.7	42.7	51.4
1987/88	51.4	129.6	3.0	184.0	54.9	3.6	15.4	73.9	72.2	6.5	152.6	0.2	31.2	31.4
1988/89	31.4	159.9	3.8	195.1	57.5	3.4	15.6	76.5	85.9	6.0	168.4	0.1	26.6	26.7
1989/90	26.7	154.5	4.4	185.6	60.1	3.6	15.4	79.1	77.2	3.0	159.3	0.4	25.9	26.3
1990/91 1/	26.3	156.1	4.8	187.2	63.8	3.6	15.3	82.7	70.9	9.0	162.6	0.0	24.6	24.6
1991/92 2/	24.6	154.5	6.0	185.0	68.0	3.8	15.0	86.8	60.0	8.0	154.8	0.0	30.2	30.2

1/ Estimated. 2/ Projected as of April 1992.

Appendix table 3--Long grain rough and milled rice (rough equivalent): Marketing year supply and disappearance, 1982/83-1991/92

Year beginning August 1	Supply			Disappearance			Ending stocks
	Beginning stocks	Production	Total 1/	Domestic and residual 2/	Exports	Total	Total
	Million cwt						
1982/83	17.6	93.4	111.0	38.7	47.0	85.7	25.8
1983/84	25.8	64.3	90.7	29.5	44.8	74.3	16.4
1984/85	16.4	96.0	113.3	34.1	42.0	76.1	37.7
1985/86	37.7	100.4	140.1	48.8	42.0	90.8	49.3
1986/87	49.3	96.8	148.6	51.3	69.9	121.2	27.4
1987/88	27.4	89.0	119.4	49.8	50.5	100.3	19.1
1988/89	19.1	119.4	142.1	55.6	71.2	126.8	15.4
1989/90	15.4	109.2	128.9	54.9	60.8	115.7	13.2
1990/91 3/	13.2	107.8	125.7	58.2	56.0	114.2	11.5
1991/92 4/	11.5	109.0	126.5	61.5	46.5	108.0	18.5

1/ Includes imports. 2/ Use by type does not add to total rice use because of the difference in brokens between beginning and ending stocks. 3/ Estimated. 4/ Projected as of April 1992.

Appendix table 4--Medium/short grain rough and milled rice (rough equivalent): Marketing year supply and disappearance, 1982/83-1991/92

Year beginning August 1	Supply			Disappearance			Ending stocks
	Beginning stocks	Production	Total 1/	Domestic 2/ and residual	Exports	Total	Total
	Million cwt						
1982/83	30.2	60.2	90.6	24.4	21.9	46.1	44.7
1983/84	44.7	35.4	80.2	26.0	25.4	51.4	28.8
1984/85	28.8	42.8	71.8	26.0	20.1	46.1	25.7
1985/86	25.7	34.5	60.4	17.5	16.7	34.2	26.2
1986/87	26.2	36.6	62.9	27.5	14.3	41.8	21.1
1987/88	21.1	40.6	61.7	29.2	21.7	50.9	10.8
1988/89	10.8	40.5	51.4	27.8	14.7	42.5	9.0
1989/90	9.0	45.3	54.3	26.3	16.4	42.7	11.6
1990/91 3/	11.6	48.3	60.0	33.4	14.9	48.4	11.7
1991/92 4/	11.7	45.4	57.1	33.3	13.5	46.8	10.3

1/ Includes imports. 2/ Use by type does not add to total rice use because of the difference in brokens between beginning and ending stocks. 3/ Estimated. 4/ Projected as of April 1992.

Appendix table 5--Rough rice milled, total milled produced, and milling yields, United States

Year beginning August 1	Rough milled	Total milled produced 1/	Milling yields	Total heads produced 1/	Milling yields
	1,000 cwt		Lbs./cwt	1,000 cwt	Lbs./cwt
1978/79	117,961	83,427	70.7	68,749	58.3
1979/80	123,993	89,071	71.8	78,327	63.2
1980/81	141,016	102,278	72.5	89,513	63.5
1981/82	131,841	95,129	72.2	82,022	62.2
1982/83	118,726	84,517	71.2	73,713	62.1
1983/84	111,151	79,012	71.1	68,237	61.4
1984/85	107,195	74,580	69.6	64,063	59.8
1985/86	115,542	81,808	70.8	69,347	60.0
1986/87	140,804	100,257	71.2	83,760	59.5
1987/88	130,818	91,481	69.9	76,863	58.8
1988/89	145,639	104,119	71.5	86,820	59.6
1989/90	136,994	99,453	72.6	85,188	62.2
1990/91	132,523	95,431	72.0	79,993	60.4

1/ Includes brown rice.

Sources: Rice Miller's Association Monthly Statistical Statements.
Rice Market News, Agricultural Marketing Service, USDA.

Appendix table 6--Rice Program Provisions, 1985-92

Item	Unit	Crop year							
		1985	1986	1987	1988	1989	1990	1991	1992
Target price	$/cwt	11.90	11.90	11.66	11.15	10.80	10.71	10.71	10.71
Statutory loan rate	"	8.00	7.20	6.84	6.63	6.50	6.50	6.50	6.50
Acreage reduction/paid diversion	Pct.	20/15	35	35	25	25	20	5	0
Participation rate	"	90	94	96	94	94	95	95	NA

NA = Not available.

Appendix table 7--Class loan rates and differentials, 1984-92

Item	Crop year								
	1984	1985	1986	1987	1988	1989	1990	1991	1992
	$/cwt								
Milled rice:									
Long whole kernels	14.96	14.53	12.44	11.36	10.89	10.81	10.84	10.74	10.74
Medium and short whole kernels	10.81	10.50	10.44	10.36	9.89	9.81	9.84	9.74	9.74
Broken kernels	6.20	6.02	4.98	5.68	5.45	5.41	5.42	5.37	5.37
Differential (milled basis) 1/	4.15	4.03	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Rough rice 2/:									
Average, all classes	8.00	8.00	7.20	6.84	6.63	6.50	6.50	6.50	6.50
Average, long grain	8.71	8.68	7.52	7.03	6.75	6.68	6.68	6.65	6.66
Average, medium grain	6.67	6.49	6.36	6.54	6.33	6.13	6.21	6.11	6.13
Average, short grain	6.65	6.49	6.44	6.39	5.98	5.98	6.12	6.07	6.13

1/ The loan differential (milled basis) is the difference between the class whole kernel loan rates.
2/ The rough rice loan rate for each class of rice is the sum of the whole kernels' loan rate weighted by its milling yield (average 56 percent) and the broken kernels' loan rate weighted by its milling yield (average 12 percent).

Appendix table 8--State and U.S. rice acreage, yield, and production, by class

State	Area harvested			Yield			Production		
	1989	1990	1991	1989	1990	1991	1989	1990	1991
	1,000 acres			Pounds/acre			1,000 cwt		
Long grain:									
Arkansas	1,030	1,071	1,111	5,580	4,950	5,250	57,458	53,034	58,328
California	30	18	15	7,500	7,300	7,200	2,250	1,314	1,080
Louisiana	295	304	250	4,450	4,870	5,000	13,128	14,805	12,500
Mississippi	235	250	220	5,700	5,700	5,600	13,395	14,250	12,320
Missouri	78	79	91	5,200	4,700	5,100	4,056	3,713	4,641
Texas	330	343	335	5,720	6,030	6,024	18,874	20,690	20,180
United States	1,998	2,065	2,022	5,464	5,221	5,393	109,161	107,806	109,049
Medium grain:									
Arkansas	109	128	148	5,800	5,400	5,670	6,322	6,912	8,392
California	330	365	300	7,974	7,730	7,837	26,315	28,215	23,510
Louisiana	190	241	260	4,400	4,840	4,706	8,360	11,664	12,235
Mississippi	1/	1/	1/	1/	1/	1/	1/	1/	1/
Missouri	1	1	1	5,200	4,700	5,100	52	47	51
Texas	8	10	8	4,900	4,900	5,000	392	490	400
United States	638	745	717	6,495	6,353	6,219	41,441	47,328	44,589
Short grain:									
Arkansas	1	1	1	6,000	5,400	6,000	60	54	60
California	50	12	10	7,650	7,500	7,600	3,825	900	760
United States	51	13	11	7,618	7,338	7,455	3,885	954	820
Total:									
Arkansas	1,140	1,200	1,260	5,600	5,000	5,300	63,840	60,000	66,780
California	410	395	325	7,900	7,700	7,800	32,390	30,429	25,350
Louisiana	485	545	510	4,430	4,860	4,850	21,488	26,469	24,735
Mississippi	235	250	220	5,700	5,700	5,600	13,395	14,250	12,320
Missouri	79	80	92	5,200	4,700	5,100	4,108	3,760	4,692
Texas	338	353	343	5,700	6,000	6,000	19,266	21,180	20,580
United States	2,687	2,823	2,750	5,749	5,529	5,617	154,487	156,088	154,457

1/ No medium grain estimated.

Source: Annual Crop Production 1991 Summary, January 1992 issue, National Agricultural Statistics Service, USDA.

Appendix table 9--State and U.S. rice area planted, by class

State	Area planted						
	1987	1988	1989	1990	1991	1992 1/	1992/91
	1,000 acres						Percent
Long grain:							
Arkansas	885	1,084	1,039	1,110	1,149	1,209	105
California	36	60	30	18	15	15	100
Louisiana	265	395	310	310	290	350	121
Mississippi	200	255	240	255	225	250	111
Missouri	64	81	80	91	96	109	114
Texas	264	382	332	345	337	344	102
United States	1,714	2,257	2,031	2,129	2,112	2,277	107.8
Medium grain:							
Arkansas	133	135	110	129	150	140	93
California	299	320	335	370	305	328	108
Louisiana	160	150	195	245	270	230	85
Mississippi	2/	10	2/	2/	2/	2/	2/
Missouri	3	2	1	1	1	1	100
Texas	6	8	8	10	8	11	138
United States	601	625	649	755	734	710	96.7
Short grain:							
Arkansas	2	1	1	1	1	1	100
California	39	50	50	12	10	7	70
United States	41	51	51	13	11	8	72.7
Total:							
Arkansas	1,020	1,220	1,150	1,240	1,300	1,350	104
California	374	430	415	400	330	350	106
Louisiana	425	545	505	555	560	580	104
Mississippi	200	265	240	255	225	250	111
Missouri	67	83	81	92	97	110	113
Texas	270	390	340	355	345	355	103
United States	2,356	2,933	2,731	2,897	2,857	2,995	104.8

1/ Intended plantings in 1992 as indicated by reports from farmers. 2/ No medium grain estimated.

Source: Crop Production and Prospective Plantings, March 1992.
National Agricultural Statistics Service, USDA.

Appendix table 10--Rice stocks: Rough and milled 1/

Date	Rough					Milled			
	On farms or in farm warehouses	At mills and in attached warehouses	In warehouses (not attached to mills)	In ports or in transit	Total all positions	At mills and in attached warehouses	In warehouses (not attached to mills)	In ports or in transit	Total all positions
					1,000 cwt				
January 1:									
1980	31,021	15,038	57,278	581	103,918	3,137	810	2,123	6,070
1981	26,179	21,111	48,817	6	96,113	3,055	929	2,556	6,540
1982	48,404	22,952	59,117	911	131,384	2,735	907	1,414	5,056
1983	34,551	24,151	76,070	200	134,972	2,960	858	2,401	6,219
1984	30,681	19,541	64,143	344	114,709	3,867	456	1,395	5,718
1985	32,426	19,535	74,514	797	127,272	3,343	524	2,058	5,925
1986	36,737	23,768	81,967	514	142,986	3,674	461	465	4,600
December 1:									
1986	36,264	18,739	90,153	384	145,540	4,578	461	650	5,689
1987	29,789	13,648	71,902	81	115,420	4,841	617	1,232	6,690
1988	39,581	12,741	79,245	121	131,688	4,813	550	915	6,278
1989	40,040	10,084	66,166	83	116,373	4,254	782	720	5,756
1990	37,662	9,548	65,905	52	113,167	4,046	605	1,180	5,831
1991	37,249	9,630	66,857	54	113,790	3,564	495	351	4,410
April 1:									
1980	12,030	15,581	39,224	563	67,398	3,500	402	2,888	6,790
1981	5,977	15,078	28,673	64	49,792	3,499	1,099	3,214	7,812
1982	26,807	21,289	41,773	411	90,280	4,371	725	1,689	6,785
1983	23,778	22,307	62,649	299	109,033	3,295	492	3,165	6,952
1984	15,802	17,432	46,515	17	79,766	3,838	464	2,999	7,301
1985	18,709	16,438	60,188	707	96,042	3,538	481	2,101	6,120
1986	22,232	19,371	73,700	914	116,217	2,818	425	208	3,451
March 1:									
1987	19,561	15,962	70,780	483	106,786	3,881	561	117	4,559
1988	10,104	28,905	39,464	125	75,598	5,680	1,233	1,059	7,972
1989	27,266	12,704	49,439	641	90,050	5,589	189	1,502	7,280
1990	15,965	10,390	51,381	218	77,954	5,259	327	410	5,996
1991	19,345	9,404	43,554	124	72,427	4,002	408	858	5,268
1992 2/	20,658	8,283	46,631	211	75,783	3,888	837	952	5,677
August 1:									
1980	563	9,248	9,940	342	20,093	2,128	403	1,504	4,035
1981	208	5,417	4,206	9	9,840	2,744	446	1,665	4,855
1982	4,453	12,544	23,906	484	41,387	3,191	409	1,877	5,477
1983	6,032	11,190	45,899	36	63,157	2,843	223	2,830	5,896
1984	1,250	11,017	27,425	14	39,706	3,976	50	1,095	5,121
1985	697	13,398	44,402	653	59,150	3,023	304	515	3,842
1986	2,031	15,432	52,476	1,008	70,947	3,033	398	1,099	4,530
1987	984	9,986	30,718	115	41,803	5,044	632	1,168	6,844
1988	1,242	7,714	14,789	3	23,748	4,461	189	679	5,329
1989	1,176	7,296	10,084	31	18,587	4,178	752	902	5,832
1990	599	5,370	13,133	51	19,153	3,650	548	998	5,196
1991	852	5,149	12,636	58	18,695	3,569	217	457	4,243

1/ These estimates do not include stocks located in States outside the major producing states of Missouri, Mississippi, Arkansas, Louisiana, Texas, and California. 2/ Preliminary.

Appendix table 11--World market rice prices, loan rate basis 1/

Date	Milled kernel rates				Rough rates		
	Long	Medium	Short	Broken	Long	Medium	Short
	Cents/lb.				$/cwt		
1986:							
April 11	6.78	7.36	7.36	3.40	4.19	4.47	4.53
April 18	6.78	5.86	5.86	3.39	4.18	3.65	3.70
April 29 - May 6	6.68	5.73	5.74	3.34	4.13	3.58	3.62
May 13	5.90	4.99	5.00	2.95	3.65	3.12	3.06
May 20	5.83	4.89	4.89	2.91	3.60	3.06	3.10
May 27 - June 24	5.78	4.79	4.79	2.89	3.57	3.00	3.04
July 1 - July 22	5.89	4.79	4.79	2.94	3.63	3.01	3.05
July 29 - August 5	6.07	4.96	4.96	3.04	3.75	3.11	3.15
August 12 - September 2	6.15	5.04	5.04	3.08	3.80	3.16	3.21
September 9 - September 30	5.90	4.81	4.81	2.95	3.64	3.02	3.06
October 7 - October 14	5.84	4.91	4.92	2.92	3.60	3.07	3.11
October 21 - November 18	5.85	5.06	5.07	2.93	3.62	3.15	3.20
November 25 - December 9	5.69	5.06	5.07	2.85	3.52	3.15	3.19
December 16 - December 30	5.57	4.95	4.95	2.78	3.44	3.07	3.12
1987:							
January 20 - March 31	5.70	5.12	5.06	2.85	3.53	3.23	3.13
April 7 - April 21	5.87	5.28	5.22	2.94	3.63	3.34	3.23
April 28	5.98	5.28	5.21	2.99	3.70	3.34	3.23
May 5 - May 19	5.98	5.38	5.31	2.99	3.70	3.40	3.29
May 26 - June 23	6.11	5.52	5.45	3.06	3.78	3.49	3.37
June 30	6.00	5.39	5.32	3.00	3.71	3.41	3.30
July 7 - July 21	5.89	5.29	5.22	2.95	3.65	3.35	3.23
July 28	6.02	5.45	5.38	3.01	3.73	3.44	3.33
August 4	6.15	5.58	5.51	3.07	3.81	3.52	3.41
August 11	6.27	5.69	5.62	3.13	3.88	3.59	3.48
August 18	6.39	5.69	5.62	3.19	3.95	3.60	3.48
August 25	6.51	5.84	5.76	3.25	4.03	3.69	3.57
September 1	6.76	6.11	6.03	3.38	4.18	3.86	3.73
September 8	7.28	6.56	6.49	3.64	4.51	4.15	4.02
September 15	7.90	7.22	7.14	3.95	4.89	4.56	4.41
September 22	8.66	7.95	7.87	4.33	5.36	5.01	4.86
September 29 - October 6	9.54	8.80	8.73	4.77	5.91	5.55	5.39
October 13 - October 27	10.21	9.42	9.35	5.10	6.32	5.94	5.77
November 3 - November 10	9.88	9.05	8.99	4.94	6.12	5.71	5.55
November 17 - November 24	9.81	9.04	8.93	4.91	5.90	5.63	5.43
December 1 - December 8	9.42	8.57	8.47	4.71	5.66	5.35	5.16
December 15 - December 29	9.42	8.43	8.32	4.71	5.66	5.27	5.08
1988:							
January 5	9.42	8.43	8.32	4.71	5.66	5.27	5.08
January 12	9.90	8.84	8.73	4.95	5.95	5.52	5.34
January 19 - January 26	11.22	9.72	9.61	5.61	6.74	6.10	5.90
February 2 - March 22	11.66	10.24	10.14	5.83	7.01	6.41	6.21
March 29	11.61	10.25	10.15	5.80	6.98	6.41	6.22
April 5 - April 19	11.83	10.46	10.36	5.92	7.12	6.54	6.35
April 26	11.56	10.31	10.21	5.78	6.95	6.44	6.25
May 3 - May 10	11.02	9.97	9.88	5.51	6.63	6.22	6.03
May 17 - May 31	10.58	9.72	9.62	5.29	6.37	6.05	5.86
June 7	10.09	9.28	9.18	5.04	6.07	5.78	5.59
June 14	10.28	9.44	9.34	5.14	6.19	5.88	5.69
June 21-28	10.69	9.87	9.77	5.35	6.43	6.14	5.95
July 5-12	10.98	10.17	10.08	5.49	6.61	6.32	6.13
July 19 - August 2	11.13	10.33	10.25	5.56	6.69	6.42	6.23
August 9	10.85	9.99	9.91	5.42	6.52	6.22	6.03
August 16	10.55	9.72	9.64	5.27	6.34	6.05	5.87
August 23 - September 6	10.68	9.82	9.74	5.34	6.42	6.11	5.93
September 13	10.43	9.57	9.48	5.22	6.28	5.96	5.78
September 20 - October 4	10.30	9.43	9.34	5.15	6.19	5.87	5.69
October 11 - October 25	10.13	9.30	9.21	5.07	6.10	5.79	5.61
November 1	10.03	9.23	9.16	5.01	6.18	5.78	5.53
November 8 - December 13	9.87	9.08	9.01	4.94	6.10	5.69	5.44
December 20 - December 27	9.55	8.80	8.74	4.77	5.90	5.51	5.27

See footnote at end of table.

Continued--

Appendix table 11--World market rice prices, loan rate basis 1/--Continued

Date	Milled kernel rates				Rough rates		
	Long	Medium	Short	Broken	Long	Medium	Short
	Cents/lb.				$/cwt		
1989:							
January 3 - January 10	9.55	8.80	8.74	4.77	5.90	5.51	5.27
January 17 - January 24	9.79	9.12	9.07	4.89	6.05	5.71	5.46
January 31 - February 21	9.97	9.29	9.23	4.98	6.16	5.82	5.55
February 28 - March 7	10.11	9.46	9.38	5.06	6.25	5.92	5.64
March 14 - April 4	10.33	9.69	9.62	5.17	6.39	6.06	5.78
April 11	10.56	9.85	9.78	5.28	6.53	6.17	5.88
April 18	10.64	9.93	9.86	5.32	6.58	6.22	5.93
April 25 - May 2	11.17	10.36	10.28	5.59	6.91	6.49	6.19
May 9 - May 16	11.41	10.69	10.60	5.71	7.05	6.69	6.37
May 23	11.60	10.83	10.74	5.80	7.17	6.78	6.46
May 30	11.91	11.09	11.00	5.96	7.36	6.94	6.62
June 6 - June 20	12.20	11.33	11.24	6.10	7.54	7.10	6.76
June 27	13.20	12.07	11.98	6.60	8.16	7.57	7.22
July 5	13.78	12.79	12.69	6.89	8.51	8.01	7.64
July 11 - August 1	14.41	13.39	13.30	7.21	8.91	8.39	8.00
August 8	14.15	12.91	12.82	7.07	8.74	8.10	7.73
August 15	13.00	11.82	11.74	6.50	8.04	7.42	7.08
August 22 - September 5	12.46	11.23	11.11	6.23	7.70	7.02	6.76
September 12	12.23	11.08	10.96	6.12	7.56	6.92	6.68
September 19 - October 10	11.74	10.57	10.45	5.87	7.26	6.61	6.38
October 17 - October 24	11.43	10.29	10.17	5.72	7.07	6.43	6.21
October 31	10.55	9.67	9.55	5.27	6.52	6.03	5.81
November 7 - November 14	10.16	9.37	9.25	5.08	6.28	5.84	5.63
November 21 - December 26	9.76	9.06	8.94	4.88	6.03	5.64	5.43
1990:							
January 2 - February 13	9.76	9.06	8.94	4.88	6.03	5.64	5.43
February 20	9.54	8.70	8.59	4.77	5.90	5.43	5.23
February 27-March 27	9.41	8.46	8.35	4.70	5.81	5.29	5.10
April 3 - April 17	9.31	8.25	8.14	4.66	5.75	5.17	4.98
April 24	9.11	8.10	7.99	4.56	5.63	5.07	4.89
May 1	8.87	7.95	7.84	4.43	5.48	4.97	4.79
May 8 - May 22	8.63	7.77	7.66	4.32	5.34	4.86	4.68
May 29	8.53	7.66	7.60	4.26	5.36	4.93	4.91
June 5 - June 19	8.45	7.58	7.52	4.22	5.31	4.88	4.86
June 26 - August 7	8.36	7.48	7.41	4.18	5.25	4.82	4.79
August 14 - August 21	8.31	7.38	7.31	4.16	5.22	4.75	4.73
August 28 - September 25	8.18	7.22	7.16	4.09	5.14	4.65	4.63
October 2 - December 18	8.28	7.32	7.27	4.14	5.20	4.72	4.70
1991:							
December 26 - January 22	8.30	7.23	7.24	4.15	5.09	4.47	4.40
January 29 - February 5	9.38	8.30	8.33	4.69	5.75	5.12	5.05
February 12 - March 5	9.39	8.36	8.37	4.70	5.76	5.15	5.07
March 12 - March 19	9.56	8.56	8.57	4.78	5.86	5.27	5.19
March 26 - April 9	9.66	8.69	8.70	4.83	5.92	5.35	5.26
April 16 - May 14	9.45	8.49	8.50	4.73	5.80	5.23	5.15
May 21 - July 30	9.63	8.64	8.65	4.81	5.90	5.32	5.24
August 6 - August 13	9.69	8.78	8.73	4.85	6.00	5.51	5.44
August 20 - November 19	9.74	8.80	8.75	4.87	6.03	5.52	5.45
November 26 - January 14	9.71	8.76	8.72	4.85	6.01	5.50	5.44
1992:							
January 21 - January 28	9.81	8.82	8.76	4.91	6.05	5.57	5.21
February 4 - March 24	9.98	9.03	8.95	4.99	6.15	5.70	5.32
March 31 -	9.62	8.70	8.57	4.81	5.93	5.49	5.10

1/ Repayment rates for 1985-crop loans are the world price for the specified class of rice. Repayment rates specified class of rice. Repayment rates for 1986 crop loans and 1987 crop loans are the higher of the world price or 50 percent of the loan rate for the specified class of rice. Repayment rates for 1988-crop loans are the higher of the world price or 60 percent of the loan rate for the specified class of rice. Repayment rates for 1989-1991 crop loans are the higher of the world price or 70 percent of the loan rate for the specified class of rice.

Appendix table 12--Rough rice: Average price received by farmers by month and marketing year 1/

Item	1981/82	1982/83	1983/84	1984/85	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92
						$/cwt					
Month:											
August	11.80	7.31	8.41	8.22	7.86	4.02	3.82	7.49	7.41	6.66	7.16
September	10.70	7.75	8.48	8.17	7.55	3.86	4.34	6.97	7.59	6.21	7.67
October	10.20	7.73	8.80	8.08	7.73	3.83	6.25	6.85	7.41	5.95	7.61
November	9.86	7.78	8.80	8.13	7.84	3.90	7.53	6.81	7.03	6.21	7.78
December	9.34	8.06	8.66	8.08	7.71	3.74	7.64	6.68	7.05	6.12	7.92
January	9.34	8.05	8.57	8.09	7.90	3.55	7.93	6.58	7.44	6.38	7.82
February	9.46	8.26	8.85	7.72	7.86	3.84	9.37	6.67	7.57	6.69	7.91
March	8.99	7.99	8.63	8.17	7.60	3.62	9.22	6.60	7.55	7.07	4/ 7.61
April	8.54	8.23	8.49	8.20	5.32	3.63	8.92	6.74	7.41	7.43	
May	8.55	8.23	8.24	7.91	4.52	3.71	7.97	6.78	7.28	7.45	
June	8.54	7.88	8.20	7.83	4.04	3.62	7.69	7.05	7.18	7.43	
July	8.25	7.95	8.18	7.54	3.86	3.49	7.94	7.45	7.05	7.18	
Season average price:											
12 months 1/	9.05	7.91	8.57	8.04	6.53	3.75	7.27	6.83	7.35	6.70	4/ (7.40-7.60)
5 months 2/	10.40	7.69	8.63	8.14	7.73	3.87	5.71	6.84	7.24	6.25	7.64
State: 3/											
Arkansas	9.37	8.61	9.18	8.51	6.70	3.68	7.60	6.90	7.46	6.75	NA
California	7.35	6.65	6.96	6.43	5.33	3.18	6.72	6.15	6.27	5.93	NA
Louisiana	9.36	8.05	8.90	8.20	7.24	4.03	7.65	6.90	7.81	6.73	NA
Mississippi	9.14	8.66	9.53	8.88	7.10	3.91	7.90	7.02	7.57	6.99	NA
Missouri	9.50	8.65	9.49	8.70	7.05	3.57	7.41	7.22	7.54	7.21	NA
Texas	10.40	8.94	9.97	8.90	7.38	4.22	8.07	7.24	8.02	7.41	NA
Type:											
Long	9.70	8.56	9.36	8.66	6.75	3.82	7.77	6.96	7.59	NA	NA
Medium	8.06	6.91	7.13	6.66	5.87	3.55	6.36	6.47	6.71	NA	NA

NA = Not available.
1/ Marketing year--August-July. 2/ First 5 months of marketing year--August-December. 3/ Marketing year for; Arkansas and Mississippi--August-July, California--October-September, Louisiana and Texas--July-June. 4/ Preliminary.

Source: Crop Values and Agricultural Prices, National Agricultural Statistics Service, USDA.

Appendix table 13--Milled rice: Average price, f.o.b. mills, at selected milling centers

Year and type	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar. 1/	Apr.	May	June	July	Simple average
						$/cwt, bagged							
Long 2/:						Southwest Louisiana							
1981/82	26.40	24.30	23.25	21.90	20.75	19.80	18.60	18.00	17.55	17.60	17.20	17.00	20.20
1982/83	17.50	17.40	17.50	17.55	18.40	18.35	17.50	17.50	18.50	18.50	18.60	18.75	18.00
1983/84	19.40	19.75	19.35	19.50	19.50	19.50	19.25	19.25	19.25	19.25	19.25	19.25	19.40
1984/85	18.25	18.25	17.60	18.00	18.00	18.00	18.00	18.00	18.00	18.00	18.00	17.70	18.00
1985/86	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	15.50	12.70	12.75	12.42	16.10
1986/87	10.60	10.25	10.25	9.90	10.10	10.10	9.95	9.90	10.40	10.40	10.50	10.50	10.25
1987/88	10.70	12.05	17.70	19.75	19.70	20.60	24.45	24.50	24.00	20.75	18.85	17.90	19.25
1988/89	16.80	16.10	14.50	14.50	14.10	14.00	14.20	13.80	13.50	15.40	15.50	15.60	14.85
1989/90	16.40	15.90	15.60	15.00	14.65	15.40	15.65	15.40	15.65	15.80	15.65	15.30	15.55
1990/91	14.65	13.95	13.75	14.00	14.00	14.15	15.45	15.75	16.40	16.50	17.25	16.95	15.25
1991/92	16.40	16.55	16.60	17.15	17.35	17.30	17.20	16.60					
						Houston, Texas							
1981/82	25.00	24.85	23.50	22.60	22.00	21.75	20.20	19.20	19.00	19.00	18.75	17.75	21.15
1982/83	18.25	18.75	18.00	18.00	18.00	19.00	19.00	19.00	19.00	19.00	19.10	19.40	18.70
1983/84	19.50	19.65	20.00	20.00	20.00	20.25	20.25	20.25	20.10	19.50	19.50	19.50	19.90
1984/85	19.40	18.70	18.75	18.75	18.75	18.75	18.75	18.75	18.75	18.75	18.75	17.40	18.70
1985/86	18.70	18.30	18.30	18.30	18.30	17.90	17.50	17.30	17.25	13.75	13.50	13.00	16.85
1986/87	13.00	13.00	13.00	13.00	13.00	11.15	10.50	10.50	10.50	10.50	10.50	10.50	11.60
1987/88	10.50	11.25	19.00	21.00	21.00	21.00	23.65	24.05	24.00	21.70	20.50	20.50	19.85
1988/89	18.20	16.00	15.25	15.00	15.00	15.00	15.00	15.00	15.00	15.15	15.50	16.50	15.55
1989/90	16.50	16.50	16.50	16.00	15.70	15.50	16.25	16.25	16.25	16.25	16.25	16.25	16.20
1990/91	15.80	14.50	14.50	14.50	14.50	14.50	16.00	16.00	16.00	16.35	17.00	17.00	15.55
1991/92	17.00	17.00	16.65	17.00	17.50	17.50	17.50	17.50					
						Arkansas							
1981/82	26.40	24.30	23.05	22.30	20.85	19.60	19.00	18.20	17.55	17.40	17.20	16.60	20.20
1982/83	17.10	17.00	17.00	17.55	18.40	18.35	17.50	17.50	18.00	18.40	18.50	18.50	17.80
1983/84	18.50	18.50	18.85	19.00	19.00	19.00	18.50	18.50	18.50	18.50	18.50	18.50	18.65
1984/85	18.40	18.25	18.25	18.25	18.00	18.00	18.00	17.94	17.75	17.80	17.95	17.75	18.00
1985/86	17.75	17.50	17.40	17.25	17.25	17.25	17.25	17.25	15.50	13.25	13.00	13.00	16.15
1986/87	11.90	11.55	11.75	11.90	11.90	11.90	11.90	11.90	11.65	11.50	11.75	11.75	11.80
1987/88	11.90	13.25	18.50	20.50	20.20	21.20	24.05	24.05	24.00	22.50	21.15	19.00	20.00
1988/89	18.30	16.90	15.10	14.75	15.10	14.80	14.75	14.75	14.75	15.60	15.85	16.95	15.65
1989/90	17.20	16.65	15.95	15.70	15.75	15.90	16.00	16.00	16.00	16.00	16.00	16.00	16.10
1990/91	15.50	15.00	14.50	14.50	14.75	14.75	15.75	15.75	15.95	16.75	17.25	17.25	15.65
1991/92	16.85	16.55	16.50	17.40	17.30	17.25	17.25	17.15					
Medium 2/:						Southwest Louisiana							
1981/82	26.40	24.20	22.90	21.15	20.00	18.75	17.75	16.10	15.95	16.40	16.20	16.00	19.30
1982/83	16.50	16.50	16.45	16.65	17.75	17.30	16.50	16.50	16.50	17.10	17.50	17.50	16.90
1983/84	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50
1984/85	16.00	16.00	15.50	15.50	15.50	15.50	15.50	16.00	16.20	16.30	18.00	16.20	16.00
1985/86	16.00	16.00	16.00	16.00	16.00	16.00	15.70	15.50	14.60	11.90	12.00	11.35	14.75
1986/87	10.00	10.00	10.00	10.00	10.00	10.00	10.00	10.50	11.25	11.15	11.20	11.20	10.45
1987/88	11.10	11.95	16.60	17.25	16.75	18.50	19.80	20.15	20.00	18.00	17.40	16.70	17.00
1988/89	16.40	16.20	14.50	14.50	14.00	13.90	13.75	13.50	13.50	14.60	14.65	15.75	14.60
1989/90	15.55	15.30	14.80	14.30	14.04	14.80	15.13	15.13	15.50	15.75	15.65	15.30	15.10
1990/91	14.75	13.90	13.50	13.50	13.50	14.90	14.90	15.05	16.05	16.15	16.50	16.35	14.90
1991/92	15.85	16.00	16.00	16.00	16.00	16.00	15.90	15.50					
						Arkansas							
1981/82	26.40	24.10	22.95	21.30	19.85	18.60	17.90	17.05	16.50	16.40	15.90	15.60	19.40
1982/83	16.10	16.50	16.10	16.65	17.75	17.10	16.50	16.50	16.60	17.10	17.50	17.50	16.80
1983/84	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.50	17.20	17.00	17.00	17.00	17.35
1984/85	16.90	16.70	16.35	16.20	16.00	15.75	16.25	15.95	16.30	16.25	16.25	15.90	16.25
1985/86	16.00	16.00	16.20	16.50	16.50	16.50	16.50	16.25	14.80	12.35	12.50	12.50	15.20
1986/87	12.25	11.60	12.00	12.00	12.00	12.00	12.65	12.65	12.65	12.35	12.25	12.25	12.20
1987/88	12.25	12.65	16.70	18.00	17.85	18.70	20.50	20.50	20.50	19.00	18.90	18.00	17.80
1988/89	17.30	16.25	14.75	15.00	15.00	14.70	14.75	14.75	15.25	15.40	15.40	16.75	15.45
1989/90	17.20	16.65	15.95	15.45	15.25	15.40	15.50	15.50	15.50	15.50	15.50	15.50	15.75
1990/91	15.25	14.75	14.50	14.65	14.75	14.75	15.75	15.75	15.90	16.60	17.00	17.00	15.55
1991/92	16.60	16.10	16.10	16.70	16.65	16.65	16.65	16.35					
Medium 3/:						California							
1981/82	30.00	27.60	24.50	22.80	21.40	20.50	19.10	18.45	16.90	16.90	16.70	16.40	20.95
1982/83	16.25	16.10	15.55	15.50	15.50	16.50	16.00	16.00	16.00	15.90	15.95	15.75	15.90
1983/84	15.65	15.50	15.70	15.50	15.50	15.50	15.50	15.40	15.25	15.25	15.25	15.25	15.45
1984/85	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25
1985/86	15.25	15.60	16.00	15.95	15.90	16.00	15.75	15.75	15.75	15.59	15.25	15.25	15.65
1986/87	15.00	14.50	13.75	12.65	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	13.00
1987/88	12.50	13.00	16.15	17.00	17.00	16.85	18.50	18.50	18.50	18.00	18.00	18.00	16.85
1988/89	17.85	17.75	16.25	15.75	15.75	15.50	15.50	16.45	17.25	17.25	17.25	17.90	16.70
1989/90	18.45	18.25	17.50	16.55	16.00	15.75	15.75	15.70	15.50	14.90	15.00	15.25	16.20
1990/91	14.80	14.90	14.25	15.25	15.25	15.60	16.25	16.25	16.25	18.10	18.25	17.90	16.10
1991/92	17.65	17.50	17.00	17.80	18.00	18.00	18.05	18.25					
Short 3/:													
1981/82	30.00	28.25	25.75	23.90	22.00	22.00	20.25	19.50	18.25	18.25	18.25	18.10	22.05
1982/83	17.20	16.70	15.55	15.50	15.50	16.90	16.00	16.00	16.00	16.00	16.00	16.00	16.10
1983/84	15.80	15.50	15.70	15.50	15.50	15.50	15.50	15.38	15.25	15.25	15.25	15.25	15.45
1984/85	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25	15.25
1985/86	15.25	15.60	16.00	15.95	15.90	16.00	15.75	15.75	15.75	15.60	15.25	15.15	15.65
1986/87	15.00	14.50	13.75	12.80	12.50	12.50	12.50	12.50	12.50	12.50	12.50	12.50	13.00
1987/88	12.50	13.00	16.15	17.00	17.00	16.85	18.50	18.50	18.50	18.00	18.00	18.00	16.85
1988/89	17.85	17.75	16.25	15.75	15.75	15.50	15.50	16.40	17.25	17.25	17.25	17.90	16.70
1989/90	18.20	18.25	17.50	16.55	16.00	15.60	15.75	15.70	15.50	14.90	15.00	15.25	16.20
1990/91	14.80	14.90	14.25	15.25	15.25	15.60	16.25	16.25	16.25	18.10	18.25	17.90	16.10
1991/92	17.65	17.40	17.00	17.80	18.00	18.00	18.05	18.25					

1/ March 1992 data is preliminary. 2/ U.S. No. 2--broken not to exceed 4 percent. 3/ U.S. No. 1.

Source: Rice Market News, Agricultural Marketing Service, USDA.

Appendix table 14--Rice byproducts: Monthly average price, Southwest Louisiana

Year and type	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar. 1/	Apr.	May	June	July	Simple average
							$/cwt, bagged 2/						
Milled second head:													
1981/82	13.00	11.90	11.00	11.00	11.00	10.60	10.00	8.60	9.25	10.00	10.00	10.00	10.55
1982/83	10.00	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75	9.75
1983/84	9.75	10.25	10.25	10.25	10.25	10.25	10.25	10.80	10.20	10.00	10.00	10.00	10.20
1984/85	8.50	8.75	8.80	8.00	8.00	8.00	9.00	9.20	9.25	10.00	10.25	10.25	9.00
1985/86	10.25	10.25	10.17	10.00	10.00	10.00	10.25	10.25	8.80	7.75	7.75	7.75	9.45
1986/87	7.75	7.75	7.75	7.65	7.75	7.75	7.75	7.70	7.60	7.60	5.85	5.65	7.40
1987/88	5.75	6.00	6.90	7.50	7.50	7.75	7.70	7.75	7.75	7.75	7.85	8.25	7.40
1988/89	8.15	8.10	8.50	8.00	8.00	8.00	10.05	9.70	9.70	10.70	10.60	10.45	9.15
1989/90	9.95	9.65	9.00	8.10	8.00	8.00	8.50	8.50	8.50	8.50	8.50	8.40	8.65
1990/91	7.75	7.50	7.50	7.50	7.50	7.50	7.90	7.50	8.50	8.60	9.00	9.15	8.00
1991/92	8.65	8.50	9.20	9.50	9.50	9.50	9.15	8.75					
Rice bran, f.o.b. mills:							$/ton 3/						
1981/82	51.50	49.60	52.75	59.90	73.65	82.50	64.35	50.40	55.50	57.50	61.10	NQ	59.90
1982/83	52.80	53.00	54.00	77.65	85.00	77.50	52.15	47.25	59.65	70.30	61.25	NQ	62.80
1983/84	62.15	70.00	94.00	108.35	120.85	98.50	57.50	50.00	67.50	60.00	NQ	59.00	77.10
1984/85	69.15	49.50	45.15	53.75	69.15	85.00	77.50	53.25	40.50	45.67	45.00	47.50	56.75
1985/86	43.35	40.00	20.00	42.50	62.50	86.00	65.00	51.65	NQ	25.75	20.00	18.35	43.20
1986/87	16.25	23.80	26.50	34.00	53.15	50.00	36.70	28.40	23.50	20.65	18.80	17.00	29.05
1987/88	19.50	27.40	46.70	54.50	54.20	68.35	49.65	47.25	60.00	45.00	44.20	85.00	50.15
1988/89	64.00	58.10	64.00	64.00	70.65	71.40	52.25	64.10	65.00	45.85	46.65	48.75	59.55
1989/90	55.75	55.40	60.25	69.00	76.20	84.40	51.00	49.65	51.50	71.50	75.35	75.90	64.65
1990/91	72.25	52.40	50.75	52.00	56.00	66.40	51.75	48.65	57.65	47.35	50.25	57.50	55.25
1991/92	42.85	36.80	43.00	54.50	72.00	75.00	56.50	46.50					
Rice millfeed, f.o.b. mills:							$/ton 3/						
1981/82	22.60	10.90	17.75	22.00	30.65	29.75	16.50	13.15	13.40	15.40	19.40	NQ	19.25
1982/83	16.00	16.75	15.25	26.15	35.00	45.00	13.50	15.25	19.35	23.60	22.10	23.00	22.60
1983/84	24.00	25.40	33.30	42.10	61.65	53.00	22.50	24.75	31.20	21.25	25.00	27.75	32.65
1984/85	23.50	18.75	18.65	19.40	24.50	31.75	34.70	22.00	17.00	16.90	15.00	14.50	21.40
1985/86	13.00	13.00	8.00	15.40	19.50	34.10	NQ	19.50	20.85	8.50	5.00	4.50	14.65
1986/87	5.15	10.00	10.00	11.25	15.00	13.75	8.15	6.15	4.50	3.50	3.65	4.25	7.95
1987/88	8.50	9.50	21.35	22.70	21.50	28.35	17.40	18.85	22.50	16.00	19.50	40.00	20.50
1988/89	21.50	17.90	18.00	21.50	24.00	23.60	20.00	19.00	20.00	15.00	15.65	16.00	19.35
1989/90	17.15	16.75	14.00	22.65	23.70	27.70	14.20	14.65	16.50	22.40	25.00	25.00	19.95
1990/91	28.75	19.00	19.25	19.00	21.50	25.25	17.15	18.50	17.50	13.85	14.25	16.30	19.20
1991/92	12.15	11.20	13.40	19.90	39.50	37.15	17.50	14.50					

NQ = Not quoted.
1/ March 1992 data is preliminary. 2/ U.S. No. 4 or better. 3/ Prices quoted as bulk.

Source: Rice Market News, Agricultural Marketing Service, USDA.

Appendix table 15--Brewers' prices: Monthly average price for Arkansas brewers' rice and New York brewers' corn grits

Year and state	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Simple average
							$/cwt						
Arkansas: 1/													
1981/82	9.30	9.00	8.55	8.25	8.25	8.20	7.60	7.40	7.30	7.00	7.00	6.80	7.90
1982/83	6.55	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50	6.50
1983/84	6.50	6.75	7.00	7.00	6.90	6.76	6.63	6.50	6.62	6.70	6.90	7.10	6.80
1984/85	7.25	7.30	7.30	7.30	7.30	7.30	7.30	7.30	7.15	7.00	6.80	6.75	7.15
1985/86	6.75	6.70	6.50	6.50	6.50	6.30	6.00	6.00	5.75	5.50	5.50	5.50	6.15
1986/87	5.20	5.00	4.75	4.75	4.65	4.45	4.20	4.20	4.20	4.20	4.10	3.75	4.45
1987/88	4.00	4.15	6.00	6.20	6.10	6.10	6.95	7.25	7.25	6.90	7.40	8.35	6.40
1988/89	8.50	8.70	8.75	8.75	8.75	8.60	10.45	10.20	10.20	11.00	11.00	10.65	9.85
1989/90	9.65	9.00	8.50	8.00	7.75	7.75	7.75	7.45	6.85	6.60	6.60	7.05	7.75
1990/91	7.00	6.10	6.20	6.50	6.25	6.05	6.65	7.10	8.00	8.00	8.00	8.00	7.00
1991/92	8.00	8.40	8.70	9.00	9.00	8.90	8.50	8.65					
New York: 2/													
1980/81	11.60	12.11	12.26	12.74	12.42	12.44	12.60	12.64	12.72	12.42	12.57	12.85	12.45
1981/82	12.22	10.45	10.16	9.96	9.97	9.97	10.28	10.48	10.82	10.75	10.66	10.43	10.51
1982/83	9.91	9.75	9.60	9.74	9.78	10.07	10.52	10.82	11.35	11.32	11.58	12.06	10.54
1983/84	12.85	13.06	12.77	12.64	11.96	11.81	11.95	12.58	12.99	12.95	13.19	13.01	12.65
1984/85	12.90	12.64	11.49	11.33	11.03	11.20	11.50	11.86	11.42	11.45	11.54	11.46	11.65
1985/86	11.40	11.59	10.62	10.83	11.11	10.91	10.71	10.81	10.75	11.12	11.26	10.98	11.01
1986/87	10.30	9.84	9.85	9.84	9.46	9.40	9.20	9.42	9.60	10.02	9.97	9.48	9.70
1987/88	9.22	9.34	9.51	9.56	9.52	9.66	9.76	9.78	9.81	9.82	11.42	12.23	9.97
1988/89	11.67	11.50	11.56	11.37	11.54	11.47	11.32	11.56	11.37	11.99	11.47	11.54	11.53
1989/90	11.23	11.35	11.50	11.55	11.47	11.49	11.51	11.66	12.01	12.19	12.17	12.09	11.85
1990/91	11.83	11.61	11.62	11.63	11.60	11.61	11.71	11.70	11.78	11.52	11.39	11.29	11.61
1991/92	11.71	11.50	11.55	11.41	11.45	11.44	11.77	11.77					

March 1992 data is preliminary.

Sources: 1/ Rice Market News, Agricultural Marketing Service, USDA.
2/ Milling and Baking News.

Appendix table 16--Thailand milled rice prices, f.o.b. Bangkok 1/

Type	1987/88		1988/89		1989/90		1990/91		1991/92	
	$/metric ton									
100% 1st grade:	BOT 2/	NPQ 3/	BOT	NPQ	BOT	NPQ	BOT	NPQ	BOT	NPQ
August	270	NA	355	NA	504	NA	315	NA	353	NA
September	296	NA	355	NA	390	NA	312	NA	350	NA
October	319	NA	355	NA	374	NA	318	NA	340	NA
November	318	NA	355	NA	356	NA	314	NA	339	NA
December	312	NA	340	NA	355	NA	310	NA	328	NA
January	330	NA	335	NA	355	NA	361	NA	325	NA
February	355	NA	NQ	NA	355	NA	378	NA	325	NA
March	349	NA	324	NA	343	NA	371	NA	4/ 325	NA
April	349	NA	348	NA	341	NA	343	NA		
May	348	NA	357	NA	332	NA	341	NA		
June	351	NA	383	NA	318	NA	344	NA		
July	355	NA	410	NA	310	NA	350	NA		
Average	329	NA	356	NA	361	NA	338	NA		
100% 2nd grade:										
August	238	208	315	274	373	337	285	268	325	309
September	263	255	315	279	360	328	282	269	325	300
October	287	272	315	279	344	314	288	290	315	284
November	286	260	315	278	326	271	287	279	314	283
December	279	261	300	265	325	279	285	272	303	277
January	295	295	290	268	325	284	336	312	300	284
February	320	310	285	276	325	307	353	336	300	287
March	314	301	294	282	313	297	346	321	4/ 300	286
April	314	297	318	302	311	284	318	295		
May	308	274	327	316	304	267	328	298		
June	311	272	353	337	288	264	319	302		
July	315	279	380	357	280	NA	325	315		
Average	294	273	317	293	323	NA	313	296		
5% brokens:										
August	222	204	305	269	363	332	274	260	315	298
September	251	250	305	274	350	320	272	259	315	290
October	277	267	305	273	334	304	278	281	305	277
November	276	254	305	272	316	264	276	271	304	274
December	269	256	290	260	315	272	275	264	293	270
January	285	291	280	264	315	277	326	305	290	276
February	310	305	275	269	315	300	343	326	290	278
March	304	294	284	277	303	289	336	311	4/ 290	NA
April	304	288	308	298	301	276	308	286		
May	298	257	317	310	290	260	306	288		
June	301	266	343	331	278	NA	309	292		
July	305	273	370	351	270	NA	315	306		
Average	284	267	307	287	312	NA	301	287		

NA = Not available.
1/ Includes export premium, export tax, and cost of bags. Packed in bags of 100 kg net. 2/ Thailand's posted Board of Trade prices. 3/ Nominal price quotes, Bangkok. In mid-1984, price quotes began to vary significantly from the posted Board of Trade prices. Since then, the nominal quotes have appeared to be more representative of known actual prices than those posted by the Board of Trade for most grades of rice. 4/ Preliminary.

Appendix table 17--Milled rice: Average C & F ARAG quotations 1/

Type	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92 3/
				$/metric ton			
U.S. no. 2 milled, 4%, container, FAS:							
August	477	299	316	325	354	306	364
September	475	285	349	303	357	287	373
October	475	305	NQ	303	324	284	379
November	475	303	415	310	314	314	381
December	470	249	413	300	312	325	380
January	454	224	442	292	338	333	379
February	455	224	496	290	356	349	378
March	455	224	493	290	348	364	373
April	383	224	455	292	342	372	
May	325	240	420	317	338	380	
June	291	267	329	356	336	389	
July	286	277	355	368	333	378	
Average	418	260	408	312	338	340	
Thai SWR 100% Grade A, bulk 2/:							
August	265	303	300	380	448	401	415
September	264	297	312	380	433	395	413
October	283	292	349	378	407	402	401
November	310	275	341	375	384	395	388
December	290	260	338	375	376	400	382
January	290	260	365	360	379	418	379
February	270	262	395	360	395	439	385
March	269	276	396	360	394	428	387
April	258	282	383	365	371	398	
May	255	275	377	400	379	398	
June	280	273	366	412	396	391	
July	283	268	383	437	399	395	
Average	276	279	359	382	397	405	
Thai SWR 100% Grade B, bulk 2/:							
August	237	243	250	322	386	311	357
September	239	230	280	320	369	310	341
October	239	225	316	320	359	330	323
November	260	219	303	320	331	321	320
December	245	215	304	320	322	304	319
January	240	218	328	315	328	359	322
February	235	236	357	320	350	386	325
March	234	244	359	325	343	365	327
April	223	246	340	328	326	335	
May	222	241	340	360	309	344	
June	229	238	311	389	308	347	
July	230	235	324	402	307	350	
Average	236	232	318	337	336	339	

NQ = Not quoted.
1/ ARAG = composite of ports near Rotterdam.
2/ Thailand prices changed to bulk quote on May 15, 1985. Prior to this date Thai prices were quoted by the bag.
3/ March 1992 data is preliminary.

Source: Rice Market News, Agricultural Marketing Service, USDA.

Appendix table 18--World rice supply and utilization

Year	Area harvested	Yield 1/	--Production 2/-- Rough	Milled	Exports 3/	Total use 4/	Ending stocks 5/	Stocks-to-use ratio 6/
	Million hectares	Mt/ha	Million metric tons					Percent
1961/62	115.7	1.86	215.7	147.3	6.3	149.2	8.5	5.7
1962/63	119.6	1.91	228.2	155.2	7.3	151.3	12.4	8.2
1963/64	121.5	2.04	248.4	169.1	7.7	165.2	16.2	9.8
1964/65	125.4	2.12	265.6	180.8	8.2	179.8	17.3	9.6
1965/66	124.0	2.05	254.1	173.3	7.9	172.6	18.0	10.4
1966/67	125.7	2.09	262.5	179.3	7.8	178.7	18.6	10.4
1967/68	127.0	2.19	277.6	189.4	7.2	187.0	20.9	11.2
1968/69	128.7	2.23	286.8	195.5	7.5	191.7	24.8	12.9
1969/70	131.5	2.25	295.9	201.6	8.2	200.2	26.1	13.1
1970/71	132.7	2.36	313.4	213.6	8.6	210.9	28.8	13.6
1971/72	134.9	2.35	317.5	216.4	8.7	216.8	28.4	13.1
1972/73	132.7	2.32	307.4	209.7	8.4	214.7	23.4	10.9
1973/74	136.4	2.46	334.9	228.3	7.7	223.2	28.5	12.8
1974/75	137.9	2.41	332.3	226.5	7.3	226.8	28.2	12.4
1975/76	143.0	2.51	358.7	244.0	8.4	233.3	38.9	16.7
1976/77	141.5	2.46	348.5	237.0	10.6	238.0	37.8	15.9
1977/78	143.6	2.58	370.8	251.9	9.6	245.8	43.9	17.9
1978/79	143.8	2.69	387.4	263.7	11.9	253.5	54.1	21.3
1979/80	141.5	2.67	378.1	257.9	12.6	259.2	52.8	20.4
1980/81	144.2	2.77	399.1	271.2	13.1	276.1	48.0	17.4
1981/82	145.1	2.85	413.2	281.0	11.8	285.0	44.0	15.4
1982/83	140.6	3.00	421.7	287.1	11.9	287.3	43.8	15.3
1983/84	144.4	3.14	453.5	308.6	12.3	305.2	47.2	15.5
1984/85	144.5	3.25	469.2	319.5	11.3	310.8	56.0	18.0
1985/86	145.0	3.23	469.0	319.2	12.6	319.7	55.4	17.3
1986/87	145.4	3.22	467.9	318.3	12.9	322.3	51.4	15.9
1987/88	141.9	3.29	466.6	316.4	11.9	321.8	46.0	14.3
1988/89	145.8	3.36	490.3	332.0	15.1	329.7	48.3	14.7
1989/90	146.8	3.46	508.4	344.3	12.1	337.7	55.0	16.3
1990/91 7/	146.9	3.54	519.5	352.0	12.3	347.6	59.4	17.1
1991/92 8/	146.1	3.52	514.2	348.2	13.5	352.2	55.4	15.7

NA = Not available.
1/ Yields are based on rough production. 2/ Production is expressed on both rough and milled basis; stocks, exports, and utilization are expressed on a milled basis. 3/ Exports quoted on calendar year basis. 4/ For countries for which stock data are not available, utilization estimates represent "apparent" utilization, i.e., they include annual stock level adjustments. 5/ Stocks data are based on an aggregate of different market years and should not be construed as representing world stock levels at a fixed point in time. Stocks data are not available for all countries and exclude the former USSR, North Korea, and parts of Eastern Europe. 6/ Stocks-to-use represents the ratio of marketing year ending stocks to total utilization. 7/ Preliminary. 8/ Forecast as of April 1992.

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

Appendix table 19--World rice production and stocks: Selected countries or regions 1/

Country or region	Crop year 2/						
	1985/86	1986/87	1987/88	1988/89	1989/90	1990/91	1991/92 (as of April 1992)
	Million metric tons						
Production:							
Bangladesh	22.6	23.1	23.1	23.3	26.8	26.8	27.6
Burma	11.5	11.8	11.4	12.5	13.5	13.7	12.8
China	168.6	172.2	173.9	169.1	180.1	189.3	186.0
India	95.7	90.6	85.3	105.7	110.4	111.9	106.5
Indonesia	39.0	39.0	41.5	42.3	44.7	45.2	44.1
Japan	14.6	14.6	13.3	12.4	12.9	13.1	12.0
South Korea	7.9	7.9	7.6	8.4	8.1	7.7	7.4
Pakistan	4.4	5.2	4.9	4.8	4.8	4.9	4.8
Thailand	20.3	18.9	18.4	21.3	20.2	17.2	20.5
Subtotal	384.6	383.3	379.4	399.8	421.5	429.8	421.7
Australia	0.7	0.6	0.8	0.8	0.8	0.8	1.1
Brazil	9.8	10.6	11.8	11.0	7.2	9.5	10.8
EC-12	2.0	1.9	1.9	2.0	2.1	2.4	2.2
All others	64.7	65.4	66.8	69.4	69.7	69.9	71.2
Total non-U.S.	461.8	461.8	460.7	483.0	501.3	512.4	507.0
United States	6.1	6.0	5.9	7.3	7.0	7.1	7.2
World total	469.0	467.9	466.6	490.3	508.4	519.5	514.2
Ending stocks 3/:							
Total foreign	52.9	49.7	45.0	47.5	54.1	58.6	54.4
United States	2.5	1.7	1.0	0.9	0.9	0.8	1.0
World total	55.4	51.4	46.0	48.3	55.0	59.4	55.4

1/ Production is rough basis, but ending stocks are milled basis. 2/ World rice harvest stretches over 6-8 months. Thus, crop year represents the crop harvested in late 1990 and early 1991 in the Northern Hemisphere and the crop harvested in early 1991 in the Southern Hemisphere. 3/ Stocks are based on an aggregate of different local marketing years, and should not be construed as representing world stock levels at a fixed point in time. In addition, stocks data are not available for all countries.

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

Appendix table 20--World rice trade (milled basis): Exports and imports of selected countries or regions

Country or region	Calendar year 1987	1988	1989	1990	1991 1/	1992 2/ (as of April 1992)
	1,000 metric tons					
Exports:						
United States	2,444	2,247	2,973	2,424	2,200	2,200
Argentina	150	160	130	70	75	60
Australia	338	417	450	470	400	550
Burma	493	368	456	186	300	200
China	1,020	698	320	300	689	750
Taiwan	240	104	68	50	200	200
EC-12	981	920	963	969	990	1,100
Egypt	105	108	100	32	85	159
Guyana	69	56	26	30	30	20
India	350	200	450	420	500	600
Indonesia	100	0	104	50	0	0
North Korea	154	199	175	75	0	0
Pakistan	1,226	950	779	904	1,297	1,200
Thailand	4,355	4,791	6,036	3,937	3,993	4,300
Uruguay	190	244	251	250	250	350
Vietnam	153	97	1,400	1,500	1,000	1,200
Other	560	371	419	387	310	580
World total	12,928	11,930	15,100	12,054	12,319	13,469
Imports:						
Bangladesh	746	187	400	100	100	100
Brazil	200	64	180	405	800	500
Canada	85	135	148	130	160	170
China	554	310	1,200	142	50	100
Cuba	150	200	200	200	150	150
Eastern Europe	320	290	273	284	300	287
EC-12	1,198	1,210	1,263	1,204	1,149	1,069
India	5	650	500	0	0	0
Indonesia	155	33	412	60	200	750
Iran	1,000	400	1,000	850	565	800
Iraq	524	603	542	360	250	300
Ivory Coast	445	212	305	310	325	350
North Korea	0	0	0	0	200	200
Kuwait	90	90	90	90	90	90
Madagascar	125	70	130	155	130	200
Malaysia	280	350	360	360	400	380
Mexico	0	0	189	130	150	250
Nigeria	400	240	300	220	250	250
Peru	211	17	162	246	300	350
Philippines	0	181	195	630	0	0
Saudi Arabia	500	431	525	525	525	550
Senegal	355	360	400	390	430	400
South Africa	268	237	280	300	346	375
Sri Lanka	102	180	292	200	132	133
Syria	120	120	140	140	135	140
Turkey	110	170	200	210	200	250
U.A. Emirates	222	220	220	220	220	220
USSR	598	498	600	400	400	800
Vietnam	344	175	50	0	0	0
Other	3,338	3,788	3,691	3,617	3,493	3,395
Unaccounted 3/	483	509	853	176	869	910
World total	12,928	11,930	15,100	12,054	12,319	13,469

1/ Preliminary. 2/ Forecast. 3/ This represents exports not accounted for in reports from importing countries. Because this is recurring, it is taken into account in the assessment of the year ahead.

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

Appendix table 21--U.S. rice exports by type 1/

Crop year	Regular milled 2/	Brown	Parboiled	Rough	Brokens	Total
			1,000 metric tons			
1977/78	1,478.8	244.9	502.5	46.4	43.2	2,315.8
1978/79	1,416.5	276.0	627.3	90.5	20.8	2,431.1
1979/80	1,537.5	475.3	598.4	54.5	40.1	2,705.8
1980/81	1,011.7	1,202.5	781.7	13.5	18.0	3,027.4
1981/82	976.8	502.5	1,000.9	188.9	12.7	2,681.8
1982/83	993.2	354.3	846.5	18.7	5.9	2,218.6
1983/84	972.3	334.2	821.8	105.7	37.6	2,271.6
1984/85	1,009.3	169.6	630.8	103.1	46.8	1,959.6
1985/86	950.3	272.0	523.8	53.4	80.1	1,879.6
1986/87	1,541.2	245.1	659.7	264.0	5.7	2,715.7
1987/88	1,279.7	178.0	642.9	37.3	152.9	2,290.8
1988/89	1,421.6	319.5	834.4	127.3	81.4	2,784.2
1989/90	1,164.8	311.4	948.6	51.3	65.3	2,541.4

1/ Categories have not been converted to the same basis. 2/ Total minus sum of other categories.

Source: U.S. Bureau of the Census.

Appendix table 22--U.S. rice exports by export program

Fiscal year	PL 480	Section 416	CCC credit programs 1/	CCC African relief exports	EEP 2/	Export programs	Exports outside specified export programs	Total U.S. rice exports	Export programs as a share of total exports
				1,000 metric tons					Percent
1975	747	0	48	0	0	795	1,419	2,217	36
1976	509	0	101	0	0	610	1,340	1,953	31
1977	691	0	15	0	0	705	1,614	2,317	30
1978	530	0	50	0	0	580	1,696	2,276	25
1979	486	0	42	0	0	528	1,868	2,396	22
1980	540	0	168	0	0	708	2,247	2,955	24
1981	360	0	452	0	0	812	2,360	3,172	26
1982	374	0	14	0	0	388	2,523	2,911	13
1983	475	0	328	0	0	803	1,473	2,276	35
1984	464	0	571	49	0	1,084	1,209	2,293	47
1985	577	0	359	3/ 180	0	3/ 1,116	3/ 856	1,972	3/ 56
1986	313	0	477	0	23	813	1,569	2,382	34
1987	426	60	636	0	28	1,150	1,304	2,454	47
1988	321	29	443	0	120	913	1,220	2,173	42
1989	408	0	826	0	20	1,254	1,787	3,041	41
1990 3/	350	0	663	0	0	1,013	1,484	2,497	41
1991 4/	411	0	183	0	76	670	1,748	2,418	28

1/ Quantities and values shown are based on reports supplied by the export trade and may not completely reflect exports made under these programs. 2/ Sales calculated from Foreign Agricultural Service Press Releases. 3/ Estimated. 4/ Preliminary.

Sources: Agricultural Stabilization and Conservation Service, and Foreign Agricultural Service, USDA. Table provided by Mark Smith, ERS-CED, (202) 219-0820.

Appendix table 23--Top-10 U.S. rice export markets

Rank	FY 1991 Country	FY 1991 % of total exports 1/	FY 1990 Country	FY 1990 % of total exports	FY 1989 Country	FY 1989 % of total exports	FY 1988 Country	FY 1988 % of total exports	FY 1987 Country	FY 1987 % of total exports	FY 1986 Country	FY 1986 % of total exports
1	Saudi Arabia	11.1	Iraq	12.1	Iraq	18.8	Iraq	21.4	Iraq	22.1	Iraq	22.2
2	Brazil	8.2	Saudi Arabia	9.5	Saudi Arabia	8.7	Saudi Arabia	14.2	Saudi Arabia	13.1	Brazil	14.4
3	Canada	6.8	Mexico	7.5	Belgium-Luxembourg	5.1	Belgium-Luxembourg	6.3	Belgium-Luxembourg	6.0	Saudi Arabia	12.8
4	Haiti	6.1	Peru	6.3	Turkey	4.4	Philippines	5.9	Haiti	4.7	Belgium-Luxembourg	6.2
5	Turkey	5.7	Canada	5.4	Spain	4.3	Canada	5.3	Canada	4.4	Canada	4.9
6	Republic of South Africa	4.9	Turkey	5.3	Mexico	3.8	Republic of South Africa	4.5	Republic of South Africa	3.4	Liberia	3.2
7	Switzerland	4.1	Haiti	4.3	Canada	3.5	Haiti	3.3	Guinea	2.7	Republic of South Africa	2.8
8	Liberia	3.9	Republic of South Africa	4.1	Switzerland	3.2	Switzerland	3.0	Netherlands	2.5	Switzerland	2.2
9	Netherlands	3.5	Belgium-Luxembourg	4.1	Haiti	3.1	Jamaica	2.9	Liberia	2.4	Jamaica	2.0
10	Mexico	3.5	Jordan	3.7	Republic of South Africa	3.1	Bangladesh	2.7	Turkey	2.4	Dominican Republic	1.9
	Sub-total	57.8		62.4		58.1		69.3		63.7		72.5
						Million dollars						
Value of U.S. rice exports		749		829		955		734		551		648

1/ Percent calculated as proportion of total value of U.S. rice exports.

Sources: U.S. Bureau of the Census.
FATUS, Foreign Agricultural Trade of the U.S., USDA, various issues.

ERS-NASS VIDEO TAPES

ERS: Economic Research for American Agriculture

An historical account of the role of economic research in the success of American agriculture.

16 1/2 minutes Order No. VT001 $15.00

Today and Tomorrow

The U.S. Department of Agriculture's Outlook program analyzes the current situation for U.S. and world crops, and provides a forecast of future supplies and prices. "Today and Tomorrow" is an overview of the USDA Outlook program from its beginning in the 1920's, to the current comprehensive program of research and analysis.

23 minutes Order No. VT002 $15.00

The Need To Know

Begins with a futuristic "what if?" opening, and then proceeds to outline the history, significance, and contributions of agricultural statistics and USDA's National Agricultural Statistics Service.

23 minutes Order no. VT003 $15.00

Your Hometown

"Your Hometown" is an informative and entertaining look at small town rural America. Originally seen on public television stations nationwide, and narrated by James Whitmore, the program focuses on three rural communities where citizens use innovative thinking and teamwork to revitalize their own towns. Filmed in Utah, Nebraska, and Georgia, "Your Hometown" is a tribute to self-reliance, and the American spirit.

1 hour Order No. VT004 $15.00

Alternative Agriculture: Growing Concerns

Can U.S. farmers produce at a profit while practicing low-input, sustainable agriculture (LISA)? "Growing Concerns" investigates the benefits and drawbacks of LISA. An excellent overview, this documentary was originally seen as a five-part series on national television.

19 minutes Order No. VT005 $15.00

Ethanol: Economic and Policy Tradeoffs

Ethanol can contribute to the national goals of energy security, a clean environment, and a healthy rural economy, but there are tradeoffs.

25 minutes Order No. VT006 $15.00

American Harvest

Farming in America is not what you think it is. That's the theme of this program which investigates farms, farming and rural America, and farm families. Visit a "lifestyle" farm in Virginia, a soybean/hog operation in Illinois, and a large California farm that grows just about everything.

30 minutes Order No. VT007 $15.00

To order, call our order desk toll free, 1-800-999-6779
(8:30-5:00 E.T. in the U.S. and Canada; other areas, please call 301-725-7937)
or write: ERS-NASS, P.O. Box 1608 , Rockville, MD 20849-1608

* U.S. G.P.O.:1992-311-326:60157/ERS