United States Department of Agriculture

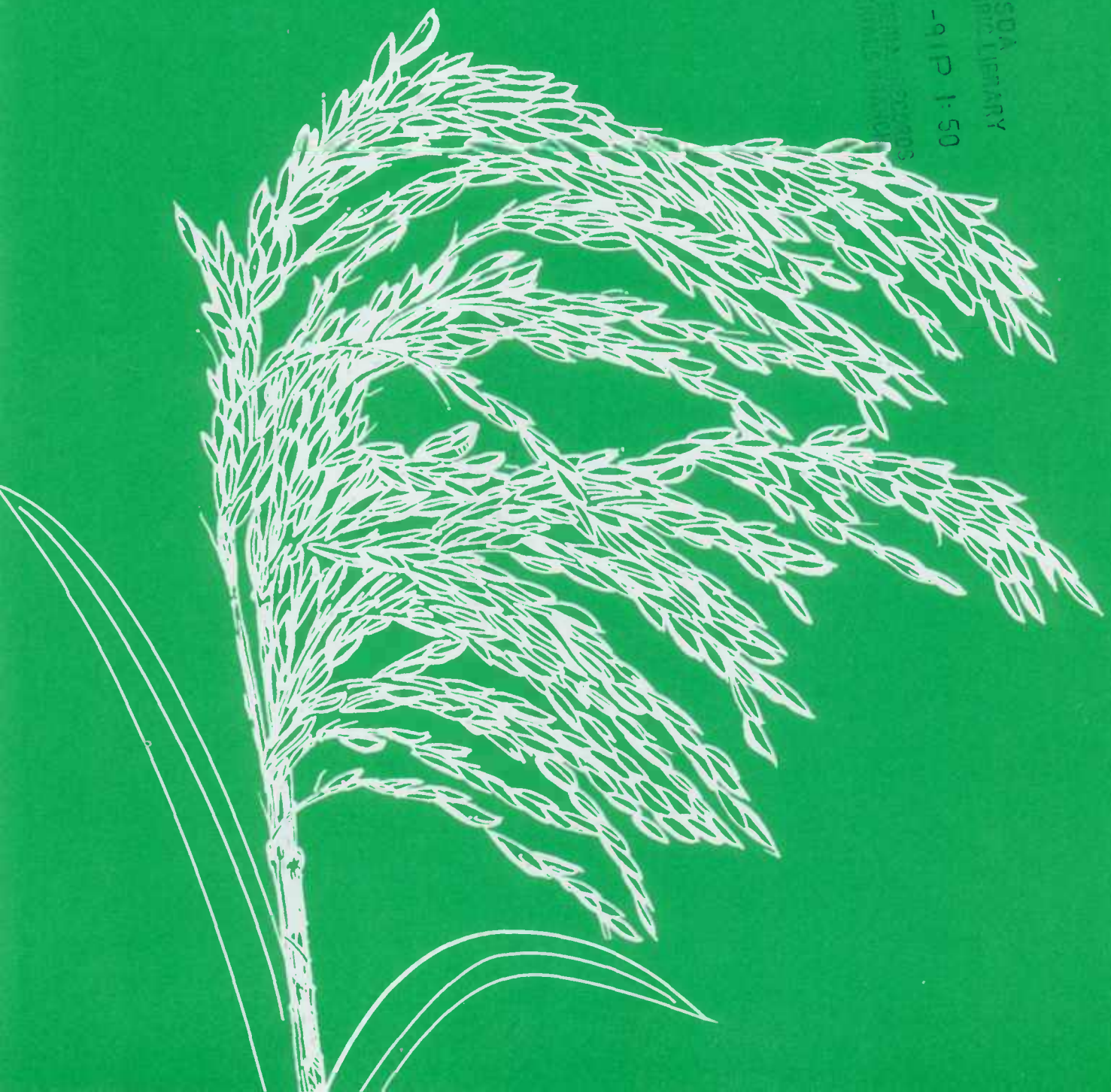
Economic Research Service

Agricultural Economic Report Number 700

# The U.S. Rice Industry

Parveen Setia
Nathan Childs
Eric Wailes
Janet Livezey





# It's Easy To Order Another Copy!

**Just dial 1-800-999-6779. Toll free in the United States and Canada. Other areas, please call 1-703-834-0125.**

Ask for *The U.S. Rice Industry* (AER-700).

The cost is $15.00 per copy ($18.75 for non-U.S. addresses, including Canada). Charge to your Visa or MasterCard, or send a check (payable to ERS-NASS) to:

ERS-NASS
341 Victory Drive
Herndon, VA 22070

# Can You Use an Electronic Database?

An electronic database containing the data in this report is available. This database is in the form of Lotus 1-2-3 (. WK1) files on DOS-compatible 3.5" diskettes.

**To order, just dial 1-800-999-6779. Toll free in the United States and Canada. Other areas, please call 1-703-834-0125.**

Ask for ***Rice Industry Basebook,*** stock #94020, $35. For non-U.S. addresses (including Canada), add 25 percent. Charge to your VISA or MasterCard or send a check to the above address. For further information on this database, write to Parveen Setia, 1301 New York Avenue, NW, Washington, DC 20005-4788 or phone 202-501-8515.

ERS electronic databases are also available on the worldwide Internet through a cooperative project between ERS and the Albert R. Mann Library at Cornell University. For access:

1. Gopher client--gopher usda.mannlib.cornell.edu 70.

2. Telnet--telnet usda.mannlib.cornell.edu and login as "usda" (no password is needed). This will connect you to the Gopher with the basic Unix client.

3. FTP--ftp usda.mannlib.cornell.edu, login as "anonymous" with your ID name or e-mail address as the passowrd, then cd usda.

For further information about Internet access methods, please write to Oya Rieger, Albert R. Mann Library, Cornell University, Ithaca, NY 14853-4301 (oyr1@cornell.edu) or phone 607-255-7960.

**The U.S. Rice Industry.** By Parveen Setia, Nathan Childs, Eric Wailes, and Janet Livezey. Commodity Economics Division, U.S. Department of Agriculture, Economic Research Service. Agricultural Economic Report No. AER-700.

## Abstract

The U.S. rice industry, which includes farmers, handlers, dryers, millers, processors, and traders, is more vertically integrated than other grain markets. The industry has over 300 years of history in the United States and has shown itself adaptable to changes in technology, regional advantage, export markets, environmental concerns, and consumer taste. Although producing only 1 to 2 percent of the world crop, the United States accounts for 16 to 17 percent of world rice trade. About half the U.S. crop is exported each year to diverse markets in Europe, the Middle East, Africa, Latin America, and Canada. Rice production accounts for less than 1 percent of field crop value in the United States. It is more capital-intensive than other grain crops and rice farms are larger than other grain farms. Production is concentrated in six States. Important factors affecting the future of the U.S. rice industry include: the opening of world markets, environmental legislation, new uses for byproducts, and greater income growth in developing countries.

**Keywords:** Rice, supply, demand, prices, quality, marketing system, trade, Government programs.

## Acknowledgments

The authors appreciate the reviews and constructive suggestions of Randall Schnepf, Michael Salassi, Sam Evans, Linwood Hoffman (all of the Economic Research Service); Andrew Aaronson (World Agricultural Outlook Board), Eugene Rosera (Agricultural Stabilization and Conservation Service), and Stanley Phillips (Foreign Agricultural Service). The authors also thank Tom McDonald and Carol Morgan (Economics Management Staff) for editorial assistance, and Lilia George, Emily Hage, and Anissa Cotton for tabulation and graphic support.

1301 New York Avenue, NW.
Washington, DC 20005-4788 September 1994

# Contents

# Summary

World demand for U.S. rice remains high, and domestic demand is rising as well. Consistent with previous years, the United States is expected to rank second among world rice exporters in 1994, behind Thailand. The United States supplies nearly 17 percent of the world market. World rice trade in 1994 is expected to total a record 15.5 million tons. Japan's decision to import rice from the United states, Thailand, and China in late 1993, after a shortfall in its production, mainly explains the large increase in world rice trade.

This report reviews all aspects of the industry, including supply, demand, prices, Government programs, rice quality, the marketing system, and trade.

In recent years, the United States has been exporting nearly half its rice crop, or 70 to 80 million cwt, with the rest used to satisfy the domestic market. By contrast, from 1960 to 1990 the U.S. rice industry exported about 60 percent of its production.

Domestic consumption now accounts for over half the crop, up from 40 percent in 1980/81. It has grown faster than the population rate, thus providing millers a viable market. Per capita consumption of rice is rising at the rate of about 1 pound per year and currently stands at more than 22 pounds.

A rise in the U.S. Asian and Hispanic populations has been a major factor in increased domestic demand for rice. Health benefits associated with increased consumption of rice, which is free from sodium, fat, and cholesterol, have played a key role in raising domestic demand as well.

The introduction of several quick cooking rice dishes, such as boil-in-the-bag items and microwavable dishes, has further encouraged domestic consumption. The rice industry has highlighted both the nutritional value and convenience of rice in its marketing efforts.

Rice use in processed food is the fastest growing category. Processed food use includes such products as breakfast cereals, pet food, package mixes, candy, soup, baby food, crackers, rice pudding, confectioneries and snack items, cooking batters, and desserts.

The shift from largely export use to the domestic market in the United States has forced millers and producers to focus on quality, grain size, brand identification, variety, and marketing.

Total acreage planted to rice in the United States varied from 1.6 million acres in 1961 to 3.8 million acres in 1981, falling to 2.9 million acres in 1993. The main rice-producing States are Arkansas, California, Louisiana, Mississippi, Missouri, and Texas.

While average prices received by rice producers have shown no long-term growth since 1980/81, and USDA rice program benefits have been essentially frozen since 1990, production costs have steadily risen. Rising prices for such items as water, fuel, wages, fertilizer, and chemicals have put strong pressure on rice producers to raise yields as the only means of maintaining returns.

With the recent successful completion of the Uruguay Round of trade negotiations, rice exports by the United States are likely to remain important, despite the challenges of stricter environmental regulations and rising costs.

# The U.S. Rice Industry

Parveen Setia, Nathan Childs, Eric Wailes, Janet Livezey

## Background

Rice is an ancient grain whose exact place of origin is not known with certainty. Wild species of rice have been found over a broad area extending south and east from India and South China across continental Asia and insular Southeast Asia. Rice produced in Asia, whose cultivated species is known as *Oryza sativa*, is believed to have evolved from an annual progenitor in a wide area stretching from the Gangetic Plain below the foothills of the Himalayas, across upper Burma, and through northern Thailand, northern Vietnam, and southern China (Chang, 1977). Archaeologists have established that rice was domesticated as early as the fifth millennium B.C. (Lu and Chang, 1980). There seems to be a consensus that cultivated rice varieties originated in the floodplains rather than in upland areas (Chang, 1976).

In addition to being considered the premium food grain in India, rice has been used in religious ceremonies and prayers there for 5,000 years. In the western world, rice is thrown at weddings as a symbol of abundance and fertility. Rice is mentioned in Chinese records as early as 2,800 B.C. In the Chinese language, the spoken character for cooked rice is "fan" which is also the word for food, and when pronounced with a different intonation is the verb "to eat."

Rice is deeply ingrained in Japanese cultural lifestyle, literature, and history, a history in which shortages of rice have led to the overthrow of local governments. From the early 17th century through the 19th century, local Japanese lords were frequently recognized in national rankings by the amount of rice produced in their territories. The larger the rice crop in a territory, the greater the economic and military reputation of the lord. To this day, rice has remained an important cultural component in Japanese life.

Rice was cultivated during the dynastic period in Egypt, as evidenced by carbonized grains found in the pyramids. Rice was traded between Rome and Egypt, and between Egypt, India, and China. The Moors introduced rice cultivation to Spain, from where rice entered Italy, probably in the 15th century, and then was soon introduced into Central America. The Portuguese carried rice to Brazil. A British sea captain brought rice to the Carolinas from Madagascar around 1685 (Dethloff, 1988).

Today, rice is produced worldwide and serves as a primary staple for more than half the world's population. About 90 percent of production and consumption of rice occurs in Asia where per capita consumption averaged 104 pounds a year in 1990, substantially above the world average of 64 pounds. By contrast, annual per capita consumption in the United States in 1990 was about 20 pounds and in Western Europe, about 10 pounds (Childs, 1991).

Although rice is produced over vast areas of the world, the physical demands for growing rice are limiting. Economically sound production of rice generally requires high average temperatures during the growing season, a plentiful supply of water applied in a timely fashion, a smooth land surface with less than 1-percent slope to facilitate uniform flooding and drainage, and a subsoil hardpan that inhibits percolation of water.

Given such strict physical requirements, only about 356 million acres of land were devoted worldwide to rice production in market year 1993/94. A larger area than that could be brought into rice production if market requirements demand. If demand rose sufficiently, most countries currently producing rice could substantially increase their area and maintain that rate of production over a long period of time (Holder and Grant, 1979).

However, physical suitability only sets an upper range on the size of the rice-producing area; it is economic factors that determine whether rice production will occur. Land will shift to rice production only if net returns from rice exceed those of competing crops or nonfarm land uses.

## Origins of the U.S. Rice Industry

Rice cultivation, milling, and marketing has over 300 years of history in the United States and is one of the Nation's oldest agribusinesses. Rice production in the United States initially expanded at a very slow pace after the grain was first introduced into the Colony of Virginia in the early 1600's. More than three-quarters of a century passed before rice was commercially produced in South Carolina around 1686 (Holder and Grant, 1979). By the end of that century, South Carolina had become an exporter of rice, with shipments of 60 tons to England in 1698 (Efferson, 1952). By 1750, rice rivaled tobacco as the principal export crop of the American colonies.

After those early efforts, it took another century before rice production gradually moved south along the eastern coastal fringe into Georgia and Florida, westward into Kentucky and Tennessee, along the gulf coast into lower Louisiana, and into the lower Mississippi Delta (fig. 1). By 1839, some rice was being produced in all of the Southeastern States and up the Mississippi River Valley as far north as Illinois (table 1).

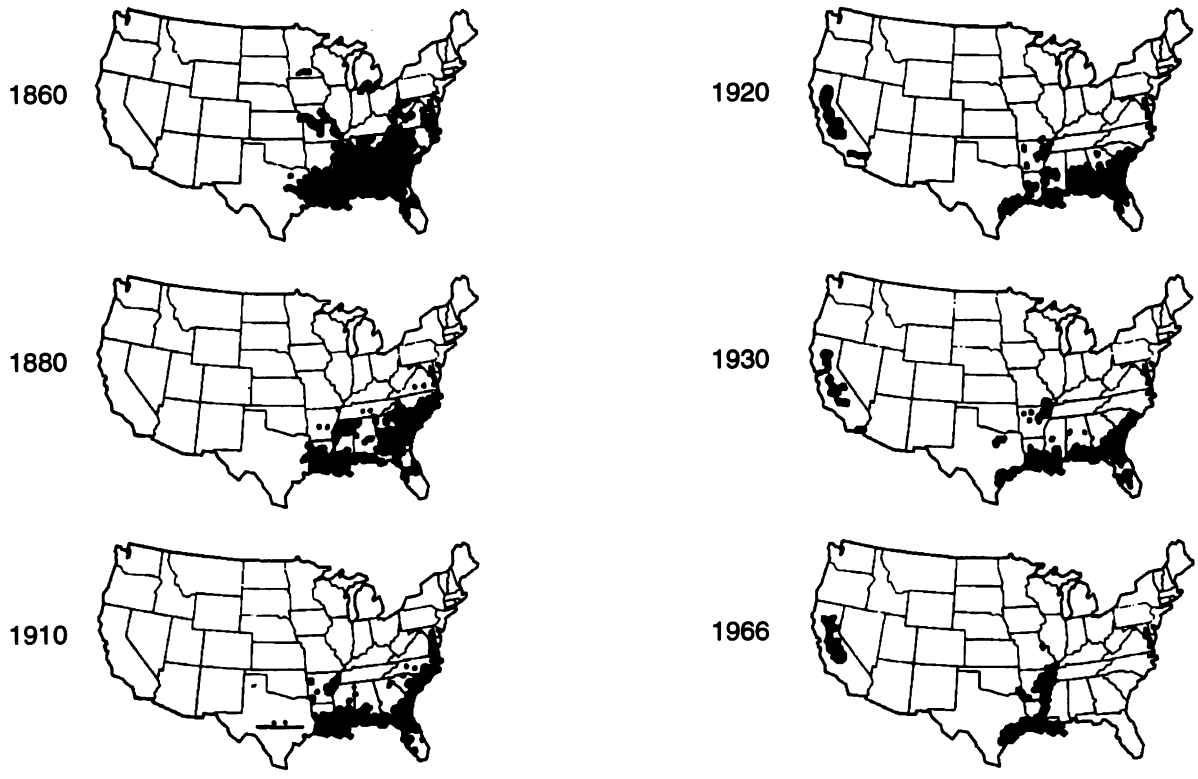
Table 1--U.S. rice production by State in 1839

| State | Production |
|---|---|
| | Pounds |
| South Carolina | 66,897,244 |
| Georgia | 13,417,209 |
| Louisiana | 3,765,541 |
| North Carolina | 3,324,123 |
| Mississippi | 861,711 |
| Florida | 495,625 |
| Alabama | 156,469 |
| Kentucky | 16,848 |
| Tennessee | 8,455 |
| Arkansas | 5,787 |
| Illinois | 3,804 |
| Virginia | 598 |
| Missouri | 65 |
| U.S. total | 88,952,768 |

Source: Efferson, 1952.

Figure 1

## The Shift of Rice Production



The distribution of U.S. rice production undertook a major shift in the late 19th century. At that time, a new, modernized, and mechanized rice industry appeared along the coastal plain of western Louisiana and immediately afterwards in neighboring eastern Texas. Although small amounts of rice had been previously produced in these two areas using traditional, labor-intensive farming practices, the rice industry that emerged in the late 19th century instead utilized farming practices similar to those used at that time by mid-western wheat farmers, who were using modern technology. This allowed the U.S. rice industry to substantially shift away from the eastern coastal area to the gulf coast. By the turn of the century, rice production had spread into Arkansas and the Mississippi River Delta.

A number of economic factors contributed to this significant change in the location of rice production in the United States in the latter part of the 19th century. They were: increased labor costs and declining yields in the older rice-producing areas in the Southeast; higher yields in the newer producing areas along the gulf coast; a number of technological developments in the form of specialized machinery, water delivery systems, and irrigation methods better suited to the flatter, larger fields along the gulf coast and Delta regions than are common along the lower Atlantic seaboard; migration of people westward; and declining rice prices as production expanded.

The expansion of rice production may seem impressive, but fewer than 100,000 acres were used to produce the Nation's rice crop in 1839 and even today rice production accounts for only a small portion of total cropland. But what has been impressive is the growth and shifting of the rice industry in response to the law of comparative advantage--the economic basis whereby each producing area discovers its own most profitable niche for production and exchange.

While South Carolina dominated U.S. rice production (75 percent of total U.S. production in 1838) for a good part of the 19th century, it was surpassed by Louisiana in 1890 (Holder and Grant, 1979). By 1900, with annual U.S. output exceeding 250 million pounds, almost no rice was produced in the Atlantic coastal States. In 1903, Louisiana and Texas produced 99 percent of the U.S. crop. Nine of the States noted in table 1, which accounted for 95 percent of U.S. rice production in 1839, have since dropped out of the rice industry altogether. But four other States, Arkansas, Louisiana, Mississippi, and Missouri, with only 5 percent of the total output in 1839, accounted for more than two-thirds of U.S. rice production by 1990. Texas and California supplied almost all the rest in 1990.

Rice production started in California in the early 20th century to serve the food needs of Japanese and Chinese immigrants. Short- and medium-grain varieties proved more profitable and were more desired by consumers than long-grain varieties in California. Mississippi began producing noticeable amounts of rice in the late 1940's largely in response to low cotton prices.

In 1938, Arkansas ranked third among the four rice-producing States of that time. By 1963, Arkansas had become the Nation's second largest rice-producing State, with 26 percent of total output. Since 1963, rice production in Arkansas has increased remarkably. While total U.S. output increased by a factor of six from 1938 to 1988, rice production in Arkansas expanded more than 1,400 percent, to make Arkansas the dominant producing State. During the 1980's, Arkansas produced between 36 percent and 42 percent of U.S. rice annually and will likely remain the dominant producer.

The current U.S. rice-producing areas, excluding California, northern Louisiana, and northwestern Mississippi, have been in continuous production since the late 1800's (fig. 2). Six States now produce almost the entire U.S. rice crop (table 2). Production is concentrated in the Arkansas Grand Prairie, northeastern Arkansas and the bootheel of Missouri, the Mississippi River Delta (in Arkansas, Mississippi, and upper Louisiana), southwestern Louisiana, the coast prairie of Texas, and the Sacramento Valley in California.

The acreage devoted to rice usually averages less than 1 percent of the total cropland harvested in the United States. In 1993, total area devoted to rice in the United States was 3 million acres with a historical high of 3.8 million in 1981. The total value of rice output is relatively small compared with other grains, usually ranking sixth in cash receipts behind corn, wheat, soybeans, sorghum, and barley.

American rice exports rose from an average of 3 million pounds per year in the early 1700's, to 128 million pounds in 1835, valued at a quarter of a million dollars. In that same year, cotton exports netted about $75 million. Between 1820 and 1860, the value of U.S. rice exports averaged $1.5 to $2.5 million annually. Until the 1990's, the United States exported over half the rice it produced and has maintained a world rice market share of 16-20 percent in recent

Table 2--U.S. Rice production by State

| State | 1938 | 1960 | 1993 |
|---|---|---|---|
| | | 1,000 cwt | |
| Arkansas | 4,372 | 13,536 | 62,094 |
| California | 3,769 | 13,752 | 36,271 |
| Louisiana | 9,337 | 13,053 | 24,108 |
| Texas | 6,151 | 12,823 | 16,095 |
| Mississippi | 0 | 1,298 | 12,985 |
| Missouri | 0 | 129 | 4,557 |
| U.S. total | 23,628 | 54,591 | 156,110 |

Source: Rice Situation and Outlook, USDA/ERS, various issues.

years. Export sales currently exceed $1 billion annually, even though the United States accounts for only 1.5 to 2 percent of world production.

## Characteristics of U.S. Rice Farming

Data from censuses of agriculture indicate interesting changes in the characteristics of U.S. rice farms and operators in the 1980's. In both the 1982 and 1987 censuses, Arkansas had the highest and Missouri the lowest share of U.S. rice farms among the six rice-producing States. Rice farms accounted for 0.6 percent of the total number of crop farms in 1987, up from 1982.

Based on the value of annual sales, the largest number of rice farms were in the $100,000 to $249,999 category in both 1987 and 1982 (table 3). On the other hand, the number of farms having sales of $250,000 or more decreased over 20 percent between 1982 and 1987. Payment limitations contained in the 1985 Farm Act likely contributed to the reduction in rice farms found in the highest sales category. During the same time, all U.S. farms in this sales category increased about 8 percent.

Rice is especially important to the farm economies of Arkansas and Louisiana, accounting for 29 and 14 percent, respectively, of their total value of crop production in 1987 (table 4). In comparison, rice contributed 7.6 percent in Mississippi, 3.7 percent in Texas, and less than 2 percent in California and Missouri to the total value of crop production in 1987.

### Characteristics of U.S. Rice Farms

Since many other commodities compete with rice for land, labor, capital, and management resources, one must compare changes in rice farms with changes in farms producing other agricultural commodities. Between 1982 and 1987, the number of all-grain farms and total farms decreased while the number of rice farms increased (table 5 and fig. 3).

The average size of U.S. rice farms (see box, p. 12, for definition of a rice farm) decreased from 283 acres in 1982 to 202 acres in 1987 (table 6 and fig. 4). Though a decline during this period is consistent with other field crops, it was largest for rice (29 percent). In comparison, the average farm size declined 19 percent for sorghum, 12 percent for oats, 11 percent for cotton, 6.4 percent for barley, 5.6 percent for wheat, and 4 percent for corn. The smallest decline (1.6 percent) was for soybeans.

In contrast to rice farms, the average size for all U.S. farms increased from 416 acres in 1982 to 462 acres in 1987, an increase of 11 percent. Higher set-aside (ARP) requirements in 1987 may have influenced the decline in rice farm size. For example, an increase in the set-aside could reduce the proportion of sales from wheat, thereby changing the classification of some farms and thus the distribution of farm size.

While the average rice farm has declined in size, the State rankings have remained unchanged. In both 1987 and 1982, the average rice-farm sizes in Arkansas, Louisiana, and Missouri were below the national average, while in California, Mississippi, and Texas they exceeded the national average. Table 7 shows the size distribution of rice farms as a percent of the total for each rice-producing State and for the United States in 1987 and 1982. Of the total rice farms in the United States, about 80 percent were 260 acres or more. Mississippi had the highest percent (23.3 per-

Table 3--Distribution of U.S. rice farms by value of agricultural poducts sold

| Value of sales | Arkansas | | California | | Louisiana | | Mississippi | | Missouri | | Texas | | United States | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 |
| Less than $2,500 | 18 | 15 | 6 | 8 | 44 | 30 | 0 | 2 | 0 | 0 | 2 | 3 | 70 | 58 |
| $2,500-$4,999 | 58 | 50 | 12 | 13 | 71 | 53 | 3 | 1 | 5 | 0 | 5 | 5 | 154 | 122 |
| $5,000-$9,999 | 162 | 127 | 34 | 37 | 142 | 143 | 3 | 4 | 11 | 3 | 12 | 9 | 364 | 323 |
| $10,000-$19,999 | 316 | 242 | 68 | 73 | 219 | 200 | 9 | 10 | 22 | 12 | 41 | 26 | 675 | 563 |
| $20,000-$39,999 | 530 | 580 | 134 | 112 | 308 | 318 | 35 | 26 | 59 | 35 | 112 | 84 | 1,178 | 1,155 |
| $40,000-$99,999 | 1,410 | 1,360 | 476 | 237 | 701 | 753 | 163 | 76 | 144 | 91 | 447 | 249 | 3,341 | 2,766 |
| $100,000-$249,999 | 2,066 | 1,874 | 529 | 354 | 592 | 725 | 295 | 227 | 155 | 112 | 426 | 425 | 4,063 | 3,717 |
| $250,000-$499,999 | 800 | 870 | 214 | 237 | 141 | 216 | 173 | 215 | 44 | 35 | 126 | 241 | 1,499 | 1,814 |
| More than $500,000 | 253 | 313 | 181 | 248 | 55 | 67 | 122 | 153 | 9 | 15 | 41 | 112 | 669 | 913 |
| All producers | 5,613 | 5,431 | 1,654 | 1,319 | 2,273 | 2,505 | 803 | 714 | 449 | 303 | 1,212 | 1,154 | 12,013 | 11,431 |

Source: Census of Agriculture, U.S. Department of Commerce.

Table 4--Acres of total cropland and rice harvested and the value of production

| Item | Arkansas | | California | | Louisiana | | Mississippi | | Missouri | | Texas | | United States | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 |
| Total harvested cropland | | | | | | | | | | | | | | |
| Farms | 32,248 | 34,725 | 59,259 | 59,048 | 18,644 | 21,991 | 24,305 | 31,122 | 80,396 | 86,837 | 110,358 | 110,341 | 1,643,633 | 1,809,756 |
| Acres (thousand) | 6,477 | 7,484 | 7,676 | 8,765 | 3,600 | 4,699 | 4,273 | 5,800 | 11,655 | 12,725 | 16,521 | 20,761 | 282,224 | 326,306 |
| Value (million $) | 1,339 | 1,505 | 9,609 | 8,317 | 989 | 1,033 | 1,040 | 1,222 | 1,865 | 2,059 | 3,512 | 3,352 | 68,850 | 76,044 |
| Rice | | | | | | | | | | | | | | |
| Farms | 5,613 | 5,431 | 1,654 | 1,319 | 2,273 | 2,508 | 803 | 714 | 449 | 303 | 1,212 | 1,154 | 12,013 | 11,431 |
| Acres (thousand) | 1,041 | 1,263 | 399 | 567 | 417 | 573 | 196 | 240 | 67 | 66 | 299 | 521 | 2,425 | 3,231 |
| Production (thousand cwt) | 54,663 | 56,861 | 28,566 | 36,668 | 17,970 | 23,488 | 10,467 | 10,106 | 3,421 | 3,002 | 16,345 | 24,702 | 131,716 | 154,882 |
| Value (million $) | 385 | 463 | 174 | 235 | 138 | 191 | 79 | 80 | 23 | 25 | 131 | 224 | 933 | 1,219 |
| Yield per acre (cwt) | 52.5 | 45 | 71.6 | 64.7 | 43.1 | 41 | 53.5 | 42.1 | 51.3 | 45.7 | 54.6 | 47.4 | 54.3 | 47.9 |

Source: Census of Agriculture, U.S. Department of Commerce.

Figure 2

## Major rice production areas

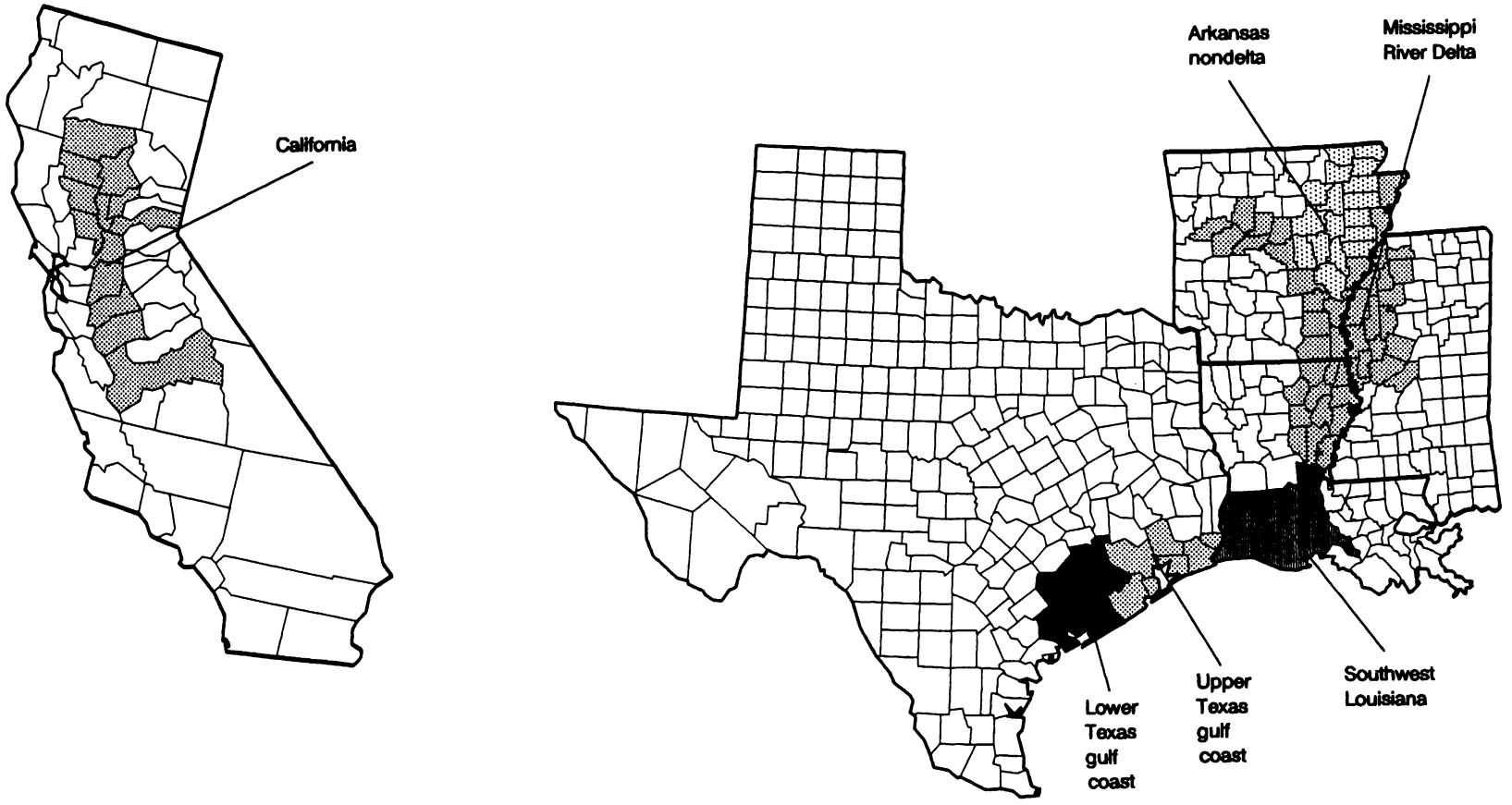


Table 5--Number of rice farms in relation to farms producing other agricultural commodities, selected by States

| Item | Arkansas | | California | | Louisiana | | Mississippi | | Missouri | | Texas | | United States | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 |
| All Farms | 48,242 | 50,504 | 83,217 | 82,383 | 27,350 | 31,558 | 34,074 | 42,393 | 106,105 | 112,419 | 188,788 | 184,945 | 2,087,759 | 2,239,300 |
| Rice | 5,613 | 5,431 | 1,654 | 1,319 | 2,273 | 2,505 | 803 | 714 | 449 | 303 | 1,212 | 1,154 | 12,013 | 11,431 |
| Percent of State total | 11.6 | 10.8 | 2.0 | 1.6 | 8.3 | 7.9 | 2.4 | 1.7 | 0.4 | 0.3 | 0.6 | 0.6 | 0.6 | 0.5 |
| All grains (incl. rice) | 8,107 | 10,711 | 2,624 | 3,308 | 4,795 | 7,362 | 4,274 | 8,774 | 24,024 | 28,550 | 11,767 | 20,946 | 458,396 | 576,369 |
| Percent of State total | 16.8 | 21.2 | 3.2 | 4.0 | 17.5 | 23.3 | 12.5 | 20.7 | 22.6 | 25.4 | 6.2 | 11.3 | 22.0 | 25.7 |
| Other field crops | 3,214 | 2,119 | 5,267 | 4,947 | 4,015 | 3,563 | 4,518 | 3,876 | 6,091 | 4,140 | 21,065 | 17,391 | 243,628 | 253,093 |
| Percent of State total | 6.7 | 4.2 | 6.3 | 6.0 | 14.7 | 11.3 | 13.3 | 9.1 | 5.7 | 3.7 | 11.2 | 9.4 | 11.7 | 11.3 |
| Livestock | 26,719 | 27,679 | 18,836 | 21,192 | 13,384 | 15,556 | 19,441 | 23,238 | 63,827 | 67,520 | 129,600 | 123,166 | 892,267 | 905,963 |
| Percent of State total | 55.4 | 54.8 | 22.6 | 25.7 | 48.9 | 49.3 | 57.1 | 54.8 | 60.2 | 60.1 | 68.6 | 66.6 | 42.7 | 40.5 |
| Dairy | 957 | 1,265 | 2,532 | 2,708 | 856 | 1,059 | 818 | 1,136 | 4,165 | 4,923 | 2,402 | 2,773 | 138,311 | 164,472 |
| Percent of State total | 2.0 | 2.5 | 3.0 | 3.3 | 3.1 | 3.4 | 2.4 | 2.7 | 3.9 | 4.4 | 1.3 | 1.5 | 6.6 | 7.3 |
| Poultry | 5,470 | 5,290 | 1,201 | 1,472 | 488 | 587 | 1,470 | 1,659 | 959 | 1,082 | 1,817 | 1,831 | 38,494 | 41,953 |
| Percent of State total | 11.3 | 10.5 | 1.4 | 1.8 | 1.8 | 1.9 | 4.3 | 3.9 | 0.9 | 1.0 | 1.0 | 1.0 | 1.8 | 1.9 |
| Others | 3,775 | 3,440 | 52,757 | 48,756 | 3,812 | 3,431 | 3,553 | 3,710 | 7,039 | 6,204 | 22,137 | 18,838 | 316,663 | 297,450 |
| Percent of State total | 7.8 | 6.8 | 63.4 | 59.2 | 13.9 | 10.9 | 10.4 | 8.8 | 6.6 | 5.5 | 11.7 | 10.2 | 15.2 | 13.3 |

Source: Census of Agriculture, U.S. Department of Commerce.

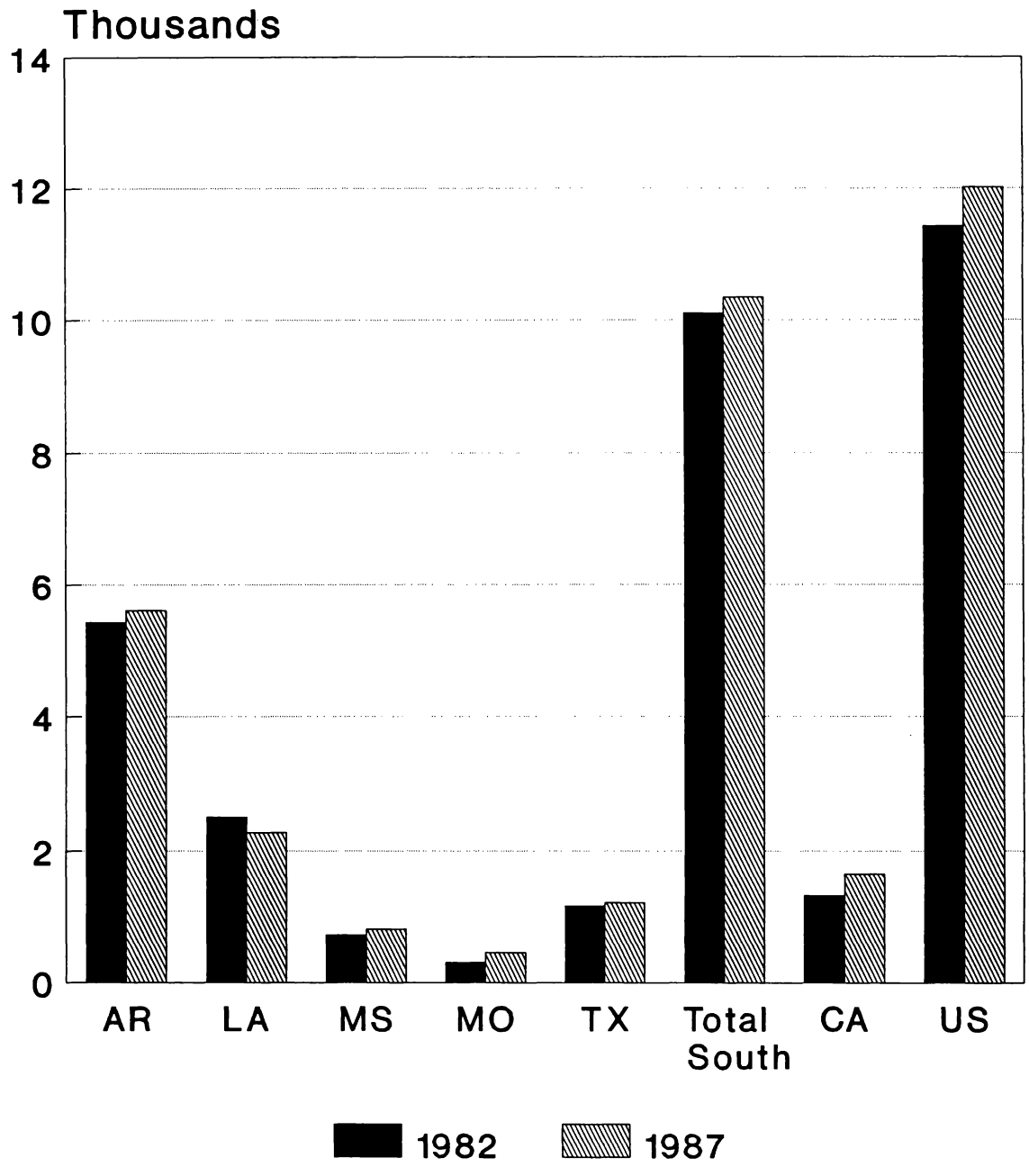
Table 6--Size distribution of U.S. rice farms

| Size (acres) | Arkansas | | California | | Louisiana | | Mississippi | | Missouri | | Texas | | United States | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 |
| | Number of farms | | | | | | | | | | | | | |
| 1-9 | 1 | 6 | 3 | 11 | 6 | 14 | 0 | 0 | 1 | 0 | 0 | 3 | 11 | 34 |
| 10-49 | 96 | 116 | 51 | 89 | 123 | 137 | 1 | 5 | 4 | 7 | 9 | 20 | 284 | 374 |
| 50-69 | 51 | 72 | 30 | 41 | 63 | 83 | 0 | 3 | 2 | 0 | 10 | 8 | 156 | 207 |
| 70-99 | 133 | 139 | 47 | 54 | 73 | 89 | 3 | 3 | 9 | 7 | 16 | 14 | 281 | 306 |
| 100-139 | 152 | 137 | 81 | 57 | 119 | 118 | 10 | 12 | 14 | 7 | 30 | 18 | 406 | 349 |
| 140-179 | 157 | 187 | 143 | 71 | 105 | 105 | 8 | 9 | 13 | 10 | 47 | 22 | 473 | 404 |
| 180-219 | 150 | 132 | 127 | 51 | 74 | 86 | 9 | 9 | 11 | 6 | 53 | 40 | 424 | 324 |
| 220-259 | 154 | 162 | 112 | 47 | 81 | 86 | 6 | 13 | 24 | 9 | 39 | 28 | 416 | 345 |
| 260-499 | 969 | 1063 | 456 | 252 | 456 | 576 | 91 | 53 | 103 | 74 | 233 | 168 | 2,309 | 2,186 |
| 500-999 | 1844 | 1679 | 307 | 266 | 643 | 675 | 259 | 147 | 154 | 114 | 310 | 317 | 3,517 | 3,198 |
| 1,000-1,999 | 1376 | 1204 | 185 | 204 | 392 | 383 | 229 | 273 | 96 | 51 | 251 | 261 | 2,530 | 2,378 |
| 2,000 + | 530 | 532 | 112 | 176 | 138 | 153 | 187 | 187 | 18 | 18 | 214 | 255 | 1,206 | 1,326 |
| Total | 5,613 | 5,431 | 1,654 | 1,319 | 2,273 | 2505 | 803 | 714 | 449 | 303 | 1,212 | 1,154 | 12,013 | 11,431 |
| Average farm size | 186 | 232 | 241 | 430 | 184 | 229 | 243 | 337 | 148 | 217 | 247 | 451 | 202 | 283 |

Source: Census of Agriculture, U.S. Department of Commerce.

Figure 3

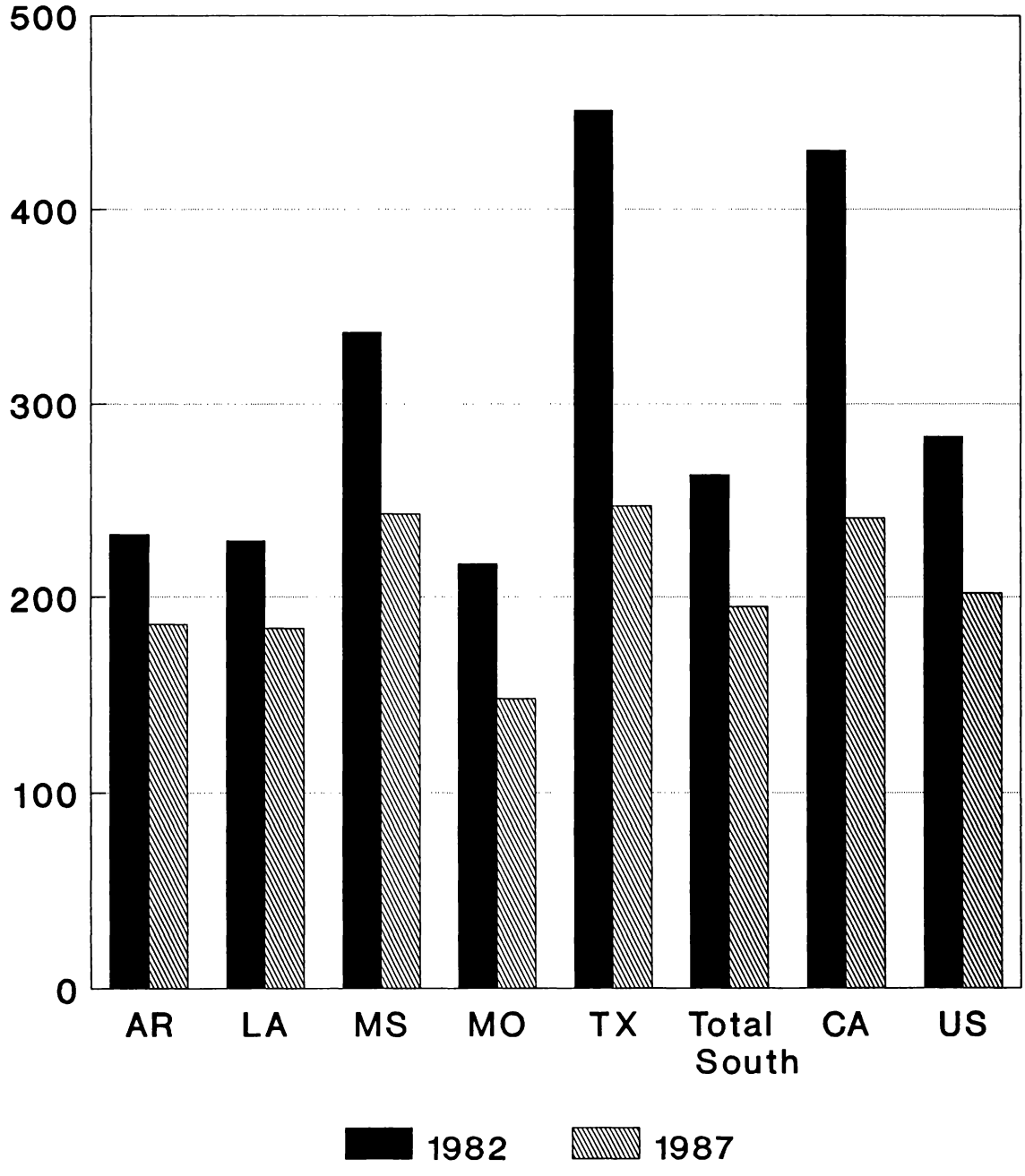
# Number of rice farms




Source: Census of Agriculture, U.S. Department of Commerce.

Figure 4

## Average rice acreage per farm by State




Source: Census of Agriculture, U.S. Department of Commerce.

Table 7--Size distribution of U.S. rice farms by State and U.S. total

| Size (acres) | Arkansas | | California | | Louisiana | | Mississippi | | Missouri | | Texas | | United States | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 |
| | Percent | | | | | | | | | | | | | |
| 1-9 | 0.02 | 0.11 | 0.2 | 0.8 | 0.3 | 0.6 | 0.0 | 0.0 | 0.2 | 0.0 | 0.0 | 0.3 | 0.1 | 0.3 |
| 10-49 | 1.7 | 2.1 | 3.1 | 6.7 | 5.4 | 5.5 | 0.1 | 0.7 | 0.9 | 2.3 | 0.7 | 1.7 | 2.4 | 3.3 |
| 50-69 | 0.9 | 1.3 | 1.8 | 3.1 | 2.8 | 3.3 | 0.0 | 0.4 | 0.4 | 0.0 | 0.8 | 0.7 | 1.3 | 1.8 |
| 70-99 | 2.4 | 2.6 | 2.8 | 4.1 | 3.2 | 3.6 | 0.4 | 0.4 | 2.0 | 2.3 | 1.3 | 1.2 | 2.3 | 2.7 |
| 100-139 | 2.7 | 2.5 | 4.9 | 4.3 | 5.2 | 4.7 | 1.2 | 1.7 | 3.1 | 2.3 | 2.5 | 1.6 | 3.4 | 3.1 |
| 140-179 | 2.8 | 3.4 | 8.6 | 5.4 | 4.6 | 4.2 | 1.0 | 1.3 | 2.9 | 3.3 | 3.9 | 1.9 | 3.9 | 3.5 |
| 180-219 | 2.7 | 2.4 | 7.7 | 3.9 | 3.3 | 3.4 | 1.1 | 1.3 | 2.4 | 2.0 | 4.4 | 3.5 | 3.5 | 2.8 |
| 220-259 | 2.7 | 3.0 | 6.8 | 3.6 | 3.6 | 3.4 | 0.7 | 1.8 | 5.3 | 3.0 | 3.2 | 2.4 | 3.5 | 3.0 |
| 260-499 | 17.3 | 19.6 | 27.6 | 19.1 | 20.1 | 23.0 | 11.3 | 7.4 | 22.9 | 24.4 | 19.2 | 14.6 | 19.2 | 19.1 |
| 500-999 | 32.9 | 30.9 | 18.6 | 20.2 | 28.3 | 26.9 | 32.3 | 20.6 | 34.3 | 37.6 | 25.6 | 27.5 | 29.3 | 28.0 |
| 1000-1999 | 24.5 | 22.2 | 11.2 | 15.5 | 17.2 | 15.3 | 28.5 | 38.2 | 21.4 | 16.8 | 20.7 | 22.6 | 21.1 | 20.8 |
| 2000 + | 9.4 | 9.8 | 6.8 | 13.3 | 6.1 | 6.1 | 23.3 | 26.2 | 4.0 | 5.9 | 17.7 | 22.1 | 10.0 | 11.6 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

Source: Census of Agriculture, U.S. Department of Commerce.

## The Census of Agriculture

**Farm Definition**

In the Census of Agriculture, a farm is defined as any place where $1,000 or more of agricultural products are produced and sold, or normally would be sold, during a year. Farms are classified as rice farms when rice accounts for 50 percent (or more) of the value of agricultural products sold during the year.

**Background**

The Census of Agriculture provides a periodic statistical picture of the Nation's farming, ranching, and related activities. It is the principal source of consistent, comparable data at the county, State, and national levels. Many Federal and State programs are designed and evaluated on the basis of data obtained through the Census of Agriculture, and the private sector uses census data for many activities as well.

The first agricultural census was taken in 1840 as part of the sixth decennial census of population. From 1840 to 1950, an agriculture census was taken as part of each decennial census. From 1954 to 1974, a census of agriculture was taken for the years ending with digits 4 and 9. Title 13, United States Code, sections 142(a) and 191, stipulates that the census must be taken in 1979, 1983, and every fifth year after 1983.

The current dollar amounts have not been adjusted for inflation. Because the census data indicate the situation at a given point in time, care should be taken in making inferences regarding trends.

cent) and Missouri the lowest percent (4.0 percent) of farms in the category of 2,000 acres or more.

At the other end of the size distribution spectrum, rice farms with fewer than 100 acres accounted for less than 8 percent of the national total in 1987 and 1982. Only two States, California and Louisiana, had a higher percentage of small farms (less than 100 acres) than the national average. Mississippi had the smallest percentage of farms with less than 100 acres in 1987 and 1982.

Though the size of rice farms as a percent of U.S. rice farms changed, the State rankings were the same in both 1987 and 1982 (table 8). The average farm size for rice producers was the largest in Arkansas followed by Louisiana and California. Missouri had the smallest average farm size. Between 1982 and 1987, average rice farm size decreased in Arkansas and Louisiana while it increased in California, Mississippi, and Missouri. In Texas, there was no change in average rice farm size between 1982 and 1987. Nationwide, more than half of all rice farms with 500-1,999 acres were in Arkansas. Louisiana had the largest proportion of rice farms 1-9 acres in size.

In 1987, the largest number of U.S. rice farms (over 40 percent) harvested rice on 100 to 249 acres (figs. 5A and 5B). In contrast, the largest number of rice farms in 1982 (38.7 percent) harvested rice on farms exceeding 250 acres. According to both censuses, less than 7 percent of the U.S. rice farms harvested rice on under 25 acres.

### Characteristics of U.S. Rice Producers

The census data also indicate that characteristics of rice producers changed between 1982 and 1987 (figs. 6A and 6B). The decline in the proportion of full owners (those who operate only land they own) producing rice was similar to the decline of full owners of other field crops such as corn, wheat, sorghum, barley, soybeans, and cotton. However, the change in tenure for part owners (those who operate land they own and also rent from others) was mixed. The proportion of part owners declined for rice, cotton, sorghum, and oats, while it increased for corn, soybeans, barley, and wheat.

The change in the proportion of tenants (those who operate only land they rent from others or work on shares for others) was much more pronounced. Between the two censuses, the proportion of tenants operating rice farms increased 37 percent. The increase in the proportion of tenants was larger for rice than for any other field crop. The proportion of tenants on oats farms actually decreased 44 percent during this period. However, an examination of tenure for all U.S. farms indicates that the proportions for full owners, part owners, and tenants were similar in 1982 and 1987.

Table 8--Size distribution of U.S. rice farms as a share of U.S. total

| Size (acres) | Arkansas | | California | | Louisiana | | Mississippi | | Missouri | | Texas | | United States | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 |
| | Percent | | | | | | | | | | | | | |
| 1-9 | 9.1 | 17.6 | 27.3 | 32.4 | 54.5 | 41.2 | 0.0 | 0.0 | 9.1 | 0.0 | 0.0 | 8.8 | 100.0 | 100.0 |
| 10-49 | 33.8 | 31.0 | 18.0 | 23.8 | 43.3 | 36.6 | 0.4 | 1.3 | 1.4 | 1.9 | 3.2 | 5.3 | 100.0 | 100.0 |
| 50-69 | 32.7 | 34.8 | 19.2 | 19.8 | 40.4 | 40.1 | 0.0 | 1.4 | 1.3 | 0.0 | 6.4 | 3.9 | 100.0 | 100.0 |
| 70-99 | 47.3 | 45.4 | 16.7 | 17.6 | 26.0 | 29.1 | 1.1 | 1.0 | 3.2 | 2.3 | 5.7 | 4.6 | 100.0 | 100.0 |
| 100-139 | 37.4 | 39.3 | 20.0 | 16.3 | 29.3 | 33.8 | 2.5 | 3.4 | 3.4 | 2.0 | 7.4 | 5.2 | 100.0 | 100.0 |
| 140-179 | 33.2 | 46.3 | 30.2 | 17.6 | 22.2 | 26.0 | 1.7 | 2.2 | 2.7 | 2.5 | 9.9 | 5.4 | 100.0 | 100.0 |
| 180-219 | 35.4 | 40.7 | 30.0 | 15.7 | 17.5 | 26.5 | 2.1 | 2.8 | 2.6 | 1.9 | 12.5 | 12.3 | 100.0 | 100.0 |
| 220-259 | 37.0 | 47.0 | 26.9 | 13.6 | 19.5 | 24.9 | 1.4 | 3.8 | 5.8 | 2.6 | 9.4 | 8.1 | 100.0 | 100.0 |
| 260-499 | 42.0 | 48.6 | 19.7 | 11.5 | 19.7 | 26.3 | 3.9 | 2.4 | 4.5 | 3.4 | 10.1 | 7.7 | 100.0 | 100.0 |
| 500-999 | 52.4 | 52.5 | 8.7 | 8.3 | 18.3 | 21.1 | 7.4 | 4.6 | 4.4 | 3.6 | 8.8 | 9.9 | 100.0 | 100.0 |
| 1000-1999 | 54.4 | 50.6 | 7.3 | 8.6 | 15.5 | 16.1 | 9.1 | 11.5 | 3.8 | 2.1 | 9.9 | 11.0 | 100.0 | 100.0 |
| 2000 + | 43.9 | 40.1 | 9.3 | 13.3 | 11.4 | 11.5 | 15.5 | 14.1 | 1.5 | 1.4 | 17.7 | 19.2 | 100.0 | 100.0 |
| Total | 46.7 | 47.5 | 13.8 | 11.5 | 18.9 | 21.9 | 6.7 | 6.2 | 3.7 | 2.7 | 10.1 | 10.1 | 100.0 | 100.0 |

Source: Census of Agriculture, U.S. Department of Commerce.

Figure 5A

## Distribution of U.S. rice farms by acres harvested, 1987

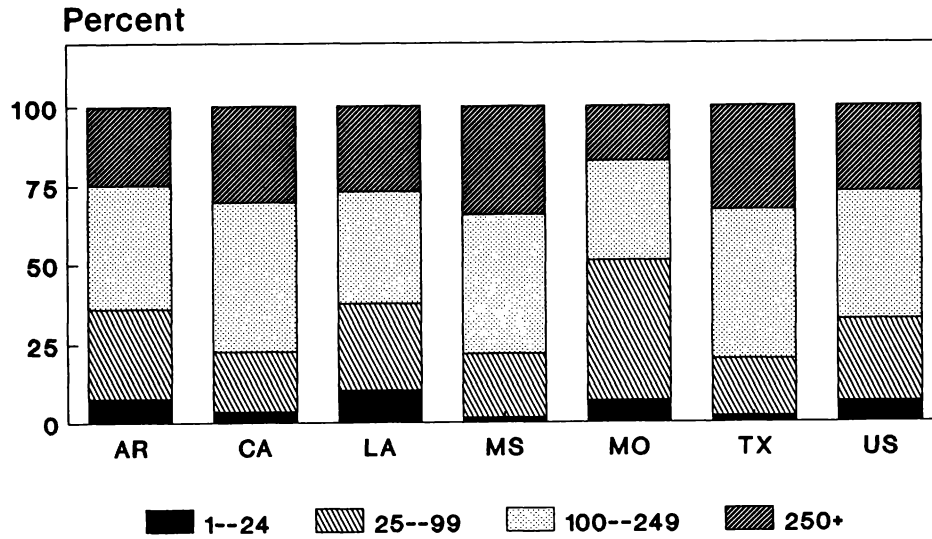
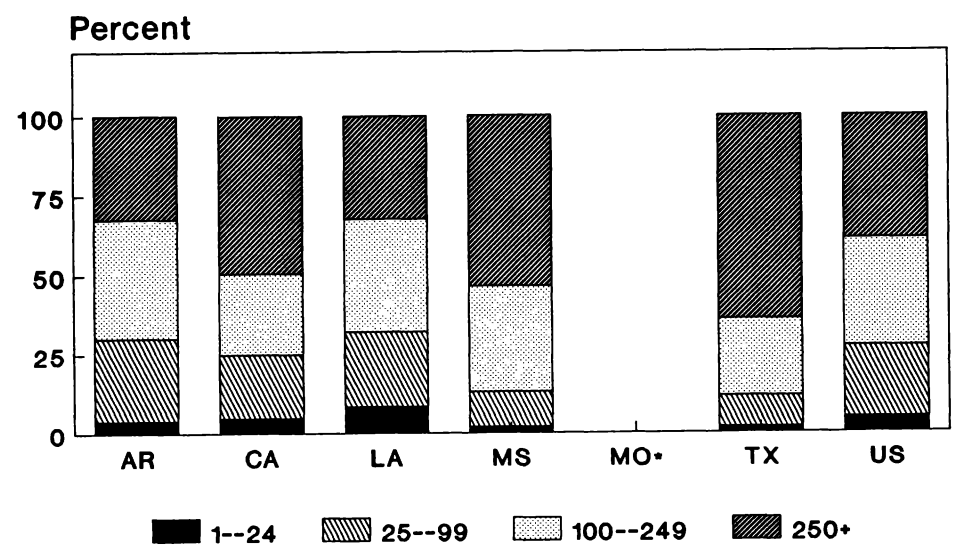



Figure 5B

## Distribution of U.S. rice farms by acres harvested, 1982




*The data for Missouri were not available.
Source: Census of Agriculture, U.S. Department of Commerce.

Figure 6A

## Distribution of U.S. rice farms by tenure, 1987

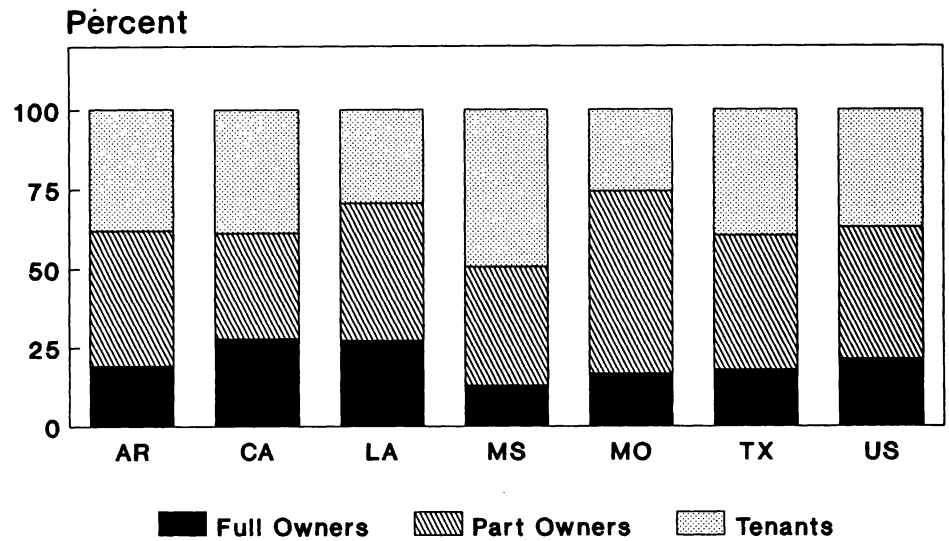
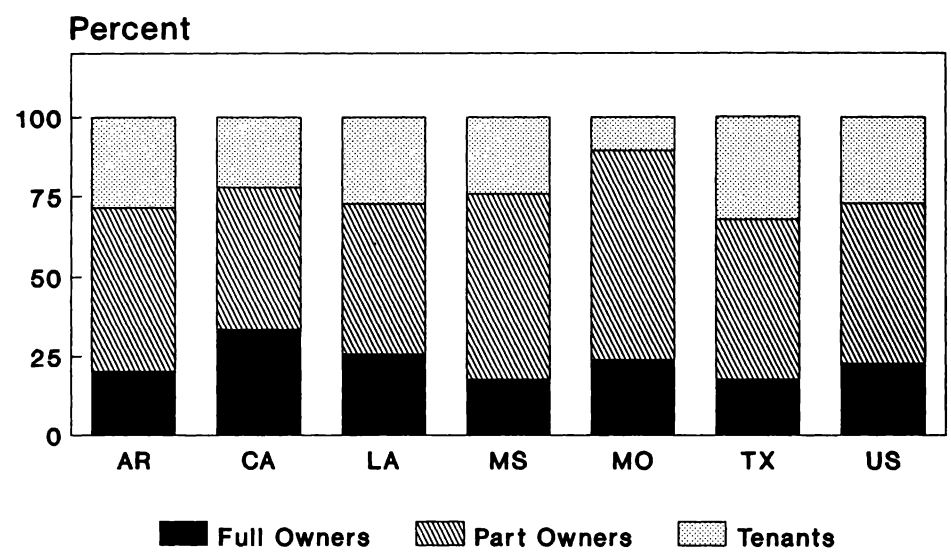



Figure 6B

## Distribution of U.S. rice farms by tenure, 1982




Source: Census of Agriculture, U.S. Department of Commerce.

In 1987, the highest proportion of rice farms operated by tenants (about 49.3 percent) was in Mississippi, but in 1982 the highest proportion (32 percent) was in Texas. Given the large financial outlays necessary to produce rice, the change in tenure may have been due to changes in Government programs and economic conditions in the 1980's. Information on racial and gender mix in both censuses indicates that more than 98 percent of U.S. rice operators were white and more than 97 percent of rice farms were operated by men.

Distribution data on rice producers by principal occupation indicate that more than 88 percent were categorized as farmers (the operator spent 50 percent or more of his/her work time in farming or ranching) (table 9) in 1982 and 1987. The proportion of rice producers in other occupations (50 percent or more of their work time spent in nonfarming occupations) was highest in California.

Finally, the census revealed that the number of farms operated by rice producers 35 to 44 years old was the largest (23.5 percent) age category in 1987. In 1982, the age group 45 to 54 years old dominated (figs. 7A and 7B). However, the number of farms operated by individuals over 65 years old rose 3 percent between 1982 and 1987, suggesting an increase in the average age of operators that is in line with producers of other crops.

However, only rice farms operated by producers 35 years old and younger increased (by less than 1 percent) during this period, whereas the number of other crop farms and total U.S. farms operated by this age group declined. Thus, entrants found rice farming still an attractive option. The largest decline (29 percent of total) in operators 35 years old and younger was for sorghum and the smallest (1.4 percent of total) decline was for cotton. All U.S. farms operated by individuals 35 years old and younger declined by 2.6 percent between 1982 and 1987. Overall, a comparison of data on U.S. rice farms with data on all other farms suggests that rice farms still represent a small, but dynamic sector of U.S. agriculture.

## Production Characteristics

Respondents to the most recently completed Economic Research Service's Farm Costs and Returns Survey (FCRS) (1988) accounted for 121.6 million cwt of rice (78 percent of U.S. rice-planted acreage and production) harvested on about 2.25 million acres by 7,899 farmers (Salassi, 1992b).

Producers plant rice between March and May and harvest between late July and late October (Dismukes, 1988). Almost all rice production operations are mechanized, performed either by the farm operator with owned machinery or by custom-hired labor. The extent of each field operation is measured in times-over (table 10).[1] Times-over indicates the operations on an average rice field. Generally, tillage constitutes about 70 percent of the times-over for all field operations in each producing region. Total times-over for tillage, including use of plows, disks, field cultivators, harrows, bedders and shapers, soil packers, and other tillage implements is the highest on the lower gulf coast of Texas, more than double the amount in southwest Louisiana. Most of the differences among regions in the amount of tillage center on disking, harrowing, and packing. ERS's Farm Costs and Returns Survey indicates that producers are currently tilling less than they did in the late 1970's.

Rice seeding is done either from airplanes or from ground equipment. Airplanes must be used when farmers flood fields before seeding. This method (water seeding) is usually chosen if a red rice problem exists. Red rice is a weed that competes with rice for nutrients, deteriorates the quality, and persists in the field. However, it cannot grow through standing water, while the seeded rice sprouts and grows out of water. Water seeding generally requires a ridged seedbed surface to minimize seedling drift and the use of presprouted seeds to get the seedling off to a quick start (Salassi, 1992b). Seed drills or broadcast seeders (ground applications) may be used when seeding precedes flooding and red rice is not a problem.

Aerial seeding is almost always a custom-hired operation and is most common in California, southwest Louisiana, and the upper coast of Texas. Rice farmers in Arkansas use air seeding the least. Seeding rates vary by both planting method and production region. For example, according to the 1988 survey, average seed rates were generally lower for aerial-dryland and drilled planting methods, ranging from 99 to 130 pounds per acre, than for other planting methods (table 11). Seeding rates were 140 pounds per acre for broadcast rice in the non-Delta area of Arkansas and 164 pounds per acre for water-seeded rice in California.

Like seeding, fertilizer can also be applied to rice fields from airplanes or from ground equipment, depending upon whether the field is flooded at the time. The initial application, usually coinciding with seeding, may be handled by ground equipment if the field

[1]Times-over is defined as the acreage covered in the operation divided by the acreage planted to rice.

Table 9--Principal occupation and age distribution of U.S. rice producers

| Occupation | Arkansas | | California | | Louisiana | | Mississippi | | Missouri | | Texas | | United States | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 | 1987 | 1982 |
| All producers | 5,613 | 5,431 | 1,654 | 1,319 | 2,273 | 2,505 | 803 | 714 | 449 | 303 | 1,212 | 1,154 | 12,013 | 11,431 |
| Percent of national total | 46.7 | 47.5 | 13.8 | 11.5 | 18.9 | 21.9 | 6.7 | 6.2 | 3.7 | 2.7 | 10.1 | 10.1 | 100 | 100 |
| Full-time farming | 5,034 | 5,049 | 1,394 | 1,173 | 1,963 | 2,186 | 742 | 673 | 392 | 279 | 1,078 | 1,063 | 10,610 | 10,427 |
| Percent of State total | 89.7 | 93.0 | 84.3 | 88.9 | 86.4 | 87.3 | 92.4 | 94.3 | 87.3 | 92.1 | 88.9 | 92.1 | 88.3 | 91.2 |
| Other occupations | 579 | 382 | 260 | 146 | 310 | 319 | 61 | 41 | 57 | 24 | 134 | 91 | 1,403 | 1,004 |
| Percent of State total | 10.3 | 7.0 | 15.7 | 11.1 | 13.6 | 12.7 | 7.6 | 5.7 | 12.7 | 7.9 | 11.1 | 7.9 | 11.7 | 8.8 |

Source: Census of Agriculture, U.S. Department of Commerce.

Table 10--Field operations on planted rice acreage

| Item | Arkansas non-Delta | California | Mississippi River Delta | Southwest Louisiana | Upper Texas gulf coast | Lower Texas gulf coast |
|---|---|---|---|---|---|---|
| | | | Times-over | | | |
| Tillage | 5.31 | 3.82 | 4.79 | 2.91 | 6.73 | 7.27 |
| Plowing | 0.07 | 1.68 | * | 0.40 | * | 0.15 |
| Disking | 2.10 | 1.34 | 2.17 | 1.71 | 3.38 | 2.60 |
| Cultivating | 0.60 | * | 1.00 | 0.16 | 1.05 | 2.00 |
| Harrowing | 0.72 | 0.30 | 0.87 | 0.37 | 1.45 | 1.94 |
| Bedding | * | * | * | * | * | * |
| Soil packing | 0.54 | 0.31 | 0.26 | 0.07 | 0.26 | 0.45 |
| Other tillage | 1.20 | 0.09 | 0.34 | 0.20 | 0.33 | * |
| Fertilizer and pesticides | 0.17 | 0.70 | 0.11 | 0.15 | 0.18 | 0.09 |
| Planting | 1.10 | * | 1.06 | 0.05 | 0.28 | 0.83 |
| Harvesting | 0.98 | 0.85 | 0.85 | 0.98 | 1.00 | 1.46 |
| All field operations | 7.57 | 5.40 | 6.82 | 4.10 | 8.19 | 9.64 |

* Insufficient data for disclosure.

Source: Salassi, 1992b.

Figure 7A

## Age distribution of U.S. rice producers, 1987

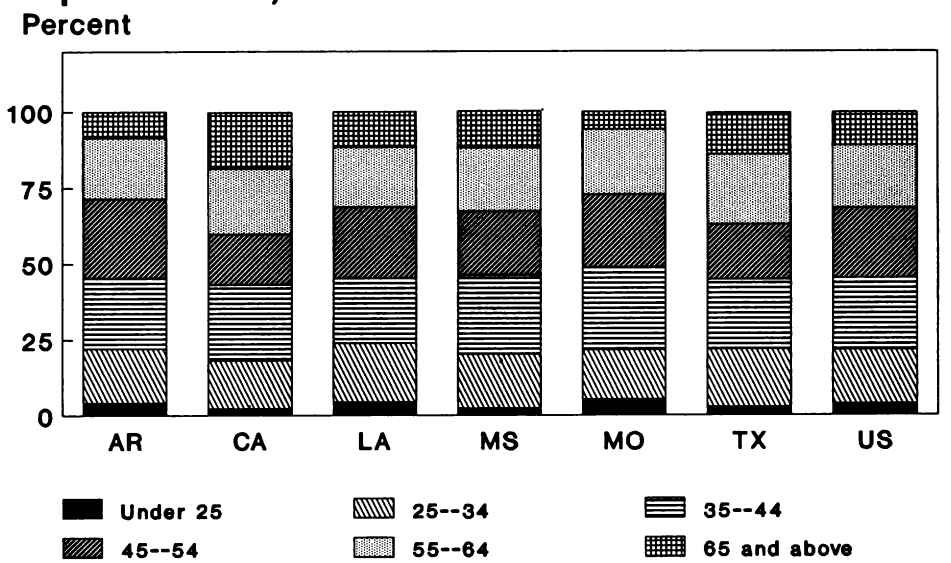
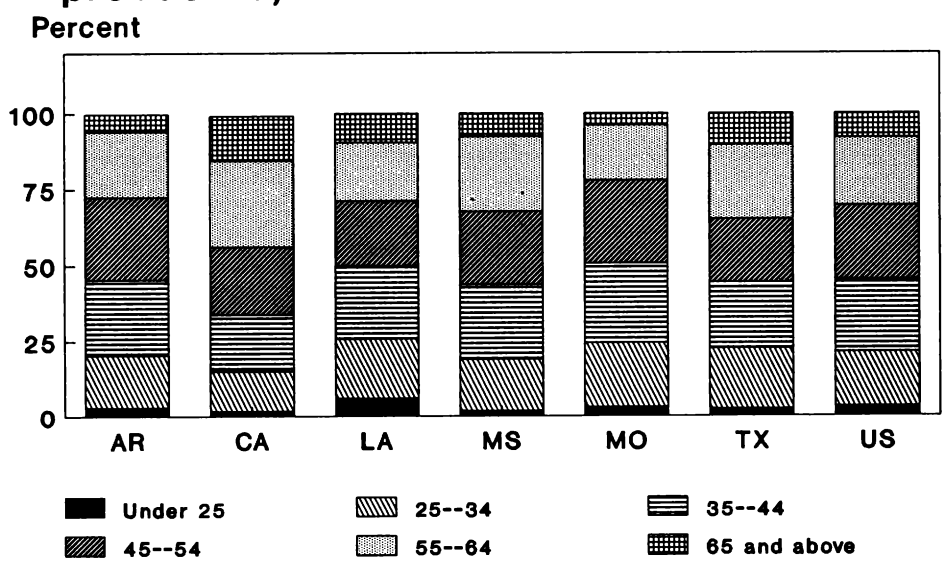



Figure 7B

## Age distribution of U.S. rice producers, 1982




Source: Census of Agriculture, U.S. Department of Commerce.

Table 11--Rice production practices in the United States, 1988

| Item | Arkansas non-Delta | California | Mississippi River Delta | Southwest Louisiana | Upper Texas gulf coast | Lower Texas gulf coast |
|---|---|---|---|---|---|---|
| | | | Pounds per acre | | | |
| Seeding rate: | | | | | | |
| Aerial-- | | | | 133.3 | | |
| Flooded land | * | 164.1 | 124.1 | 127.0 | 114.5 | 0.0 |
| Dryland | 108.9 | * | 120.0 | 129.8 | 109.0 | 109.4 |
| Drilled | 115.4 | 0.0 | 110.5 | 0.0 | 106.2 | 98.6 |
| Broadcast | 140.2 | 0.0 | 121.8 | | 101.9 | 0.0 |
| | | | Pounds per acre | 107.5 | | |
| Fertilization rate: | | | | | | |
| Nitrogen | 132.1 | 101.8 | 151.0 | 47.0 | 176.0 | 200.1 |
| Phosphorus | 8.7 | 39.1 | 2.6 | 44.6 | 48.6 | 46.5 |
| Potash | 23.8 | 5.1 | 0.7 | | 24.7 | 26.9 |
| | | | Percent | 54.9 | | |
| Acres treated: | | | | | | |
| Insecticides | * | 64.8 | 35.7 | 40.2 | 103.7 | 119.7 |
| Fungicides | 37.5 | 0.0 | 64.0 | 164.1 | 58.9 | 50.8 |
| Herbicides | 196.2 | 258.7 | 268.4 | | 249.6 | 203.2 |
| | | | Percent of acres | 53.7 | | |
| Water source: | | | | | | |
| Well | 91.6 | 14.7 | 84.7 | 3.5 | * | 52.3 |
| Purchased | 0.0 | 75.5 | 0.0 | 40.9 | 66.1 | 37.9 |
| Surface | 8.4 | 7.5 | 14.4 | * | 28.5 | 9.8 |
| Other | 0.0 | 2.3 | 0.9 | | * | 0.0 |
| | | | Hours of annual use | 435 | | |
| Tractor use: | | | | | | |
| Two-wheel | 491 | 318 | 640 | 459 | 444 | 542 |
| TWA 1/ | 381 | 536 | 519 | 482 | 402 | * |
| Four-wheel | 571 | 426 | 653 | * | 582 | 695 |
| Crawler | * | 433 | * | | * | * |
| | | | Miles per truck per farm | 13,599 | | |
| Annual truck use: | | | | | | |
| Pickups | 13,882 | 15,318 | 17,028 | 3,019 | 16,560 | 20,465 |
| Single axle | 2,227 | 2,473 | 2,967 | 1,953 | 2,965 | 2,449 |
| Tandem axle | 2,269 | 5,622 | 3,135 | 10,190 | 3,892 | 2,705 |
| Semi | 2,622 | 3,219 | 2,192 | | * | 4,013 |
| | | | Percent of production | 32.5 | | |
| Rice drying: | | | | | | |
| Onfarm | 25.0 | 13.2 | 53.5 | 58.5 | 55.8 | 6.0 |
| Commercial | 44.6 | 85.9 | 37.9 | 9.0 | 44.2 | 93.1 |
| Sold green | 30.4 | * | 8.6 | | 0.0 | * |
| | | | | 20.4 | | |
| Starting moisture (%) | 19.2 | 22.7 | 19.2 | | 19.2 | 19.5 |

* Insufficient data for disclosure.

1/ Two-wheel drive assist.

Source: Salassi, 1992b.

has not yet been flooded. Subsequent applications on flooded fields are usually done by airplanes. Similarly, pesticides may be applied to rice seeds or sprayed on rice paddies, irrigation ditches, and levees from the air. Chemicals are used primarily for pest and weed control.

Though rice production in the United States is highly mechanized, some hand labor is required. More than 75 percent of hand labor in every region except California is used for irrigation-related activities, primarily flooding fields and walking the levees to attend to water. The land is flooded at, or soon after planting, and the flood is maintained throughout the growing season until the field is drained just prior to harvest.

All rice acreage in the United States is irrigated and the water comes from three general sources--wells, canals, and surface areas (lakes and rivers). The main water source differs from region to region. Water from onfarm wells is the major source of irrigation water in the Arkansas non-Delta and Mississippi River Delta and, to a lesser extent, in southwest Louisiana and the lower Texas gulf coast. In California and the upper coast of Texas, most rice acreage receives water purchased from canal companies, associations, or irrigation districts. On the lower coast of Texas, half of the acreage is irrigated with purchased water and half with water from wells. Nonpurchased surface irrigation water from on the farm was the most prevalent source in southwest Louisiana.

Rice producers use tractors mainly to build levees and ditches and to prepare the land for seeding. Producers harvest the crop with combines and transport the grain from the combine to trucks using rice buggies.

Postharvest operations include drying and hauling. Growers harvest rice when the moisture content of the rough rice is between 18 and 23 percent and then dry it to 12-13 percent moisture content. Drying may take place in onfarm dryers or in commercial dryers. Most of the rice crop is dried by commercial dryers even though onfarm drying facilities are common in some areas. Onfarm drying is most prevalent in the Mississippi River Delta and along the upper gulf coast of Texas. In 1988, more than 50 percent of the production in these areas was dried by onfarm facilities.

Most rice in California and along the lower gulf coast of Texas is commercially dried. In the Arkansas non-Delta producing area, 30 percent of the production was sold as green (undried) rice (Salassi, 1992b).

Liquefied petroleum (LP) gas is the most popular fuel for drying in all areas except California, where natural air is used in most drying operations. Normally, all rice dried onfarm is hauled by farmer-owned trucks, except along the lower coast of Texas and in California, where more than half the commercially dried crop is custom-hauled.

## Production Costs

Estimates of rice per acre and per cwt cost of production from 1975 to 1990 are presented in tables 12 and 13. The estimates were calculated using the Oklahoma State University (FEDS) budget generator for 1975 to 1987, and by farm-level cost models for 1988 through 1990 (Salassi, 1992b). Costs are divided into cash and noncash expenses and summed to obtain total economic costs. Cash expenses (out-of-pocket costs incurred during production) are divided into variable and fixed expenses.

Variable cash expenses are money spent on seed; fertilizer; chemicals; custom operations; fuel, lubricants, and electricity; repairs; hired labor; drying; technical services; and miscellaneous items. Fixed-cash expenses include general farm overhead, taxes and insurance, and interest expenses on operating loans and real estate. Cash expenses provide a reasonable picture of shortrun profitability of producing rice while total economic costs measure longrun resource allocation. Economic costs consist of cash expenses, except interest payments, plus imputed values for capital, land, and the farmer's own labor. The economic returns to management are a residual equal to the difference between economic costs and cash receipts.

According to ERS's Farm Costs and Returns Survey of 1988, 25 percent of rice farms had variable cash expenses of $4.67 per cwt or less. These low-cost producers accounted for 30 percent of total rice production. High-cost producers, with variable cash expenses of more than $6.59 per cwt, accounted for 16 percent of total rice production. Other important findings of the FCRS survey are:

(1) About 52 percent of the low-cost producers were located in the Arkansas non-Delta region, while 66 percent of the high-cost producers were located in the Mississippi River Delta and gulf coast regions.

(2) Although low-cost producers made greater use of partnership and corporate organization arrangements, sole proprietorship was the most common type of farm organization in general.

Table 12—Rice production costs per planted acre, 1975–91

| Item | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Dollars per planted acre | | | | | | | | | |
| Arkansas (non–Delta): | | | | | | | | | | | | | | | | | |
| Variable costs | 179.66 | 176.52 | 158.43 | 171.25 | 184.29 | 222.54 | 246.25 | 240.79 | 237.15 | 224.34 | 229.67 | 249.23 | 257.87 | 262.90 | 277.63 | 287.15 | 295.03 |
| Fixed costs | 81.57 | 80.89 | 81.66 | 86.34 | 92.97 | 97.92 | 89.35 | 81.70 | 61.27 | 74.21 | 88.28 | 62.37 | 54.35 | 57.37 | 58.31 | 64.00 | 60.88 |
| Total cash costs | 261.23 | 257.41 | 240.09 | 257.59 | 277.27 | 320.46 | 335.60 | 322.49 | 298.42 | 298.55 | 317.95 | 311.60 | 312.22 | 320.27 | 335.94 | 351.15 | 355.91 |
| Noncash costs | 87.52 | 74.26 | 78.6 | 78.67 | 100.94 | 89.59 | 104.42 | 70.31 | 104.51 | 125.75 | 137.32 | 74.75 | 97.06 | 121.61 | 140.21 | 113.46 | 141.56 |
| Total economic costs | 348.75 | 331.67 | 318.69 | 336.26 | 378.21 | 410.05 | 440.02 | 392.80 | 402.93 | 424.30 | 455.27 | 386.35 | 409.28 | 441.88 | 476.15 | 464.61 | 497.47 |
| California: | | | | | | | | | | | | | | | | | |
| Variable costs | 198.81 | 194.15 | 198.30 | 203.13 | 223.36 | 256.56 | 286.69 | 305.03 | 300.80 | 299.82 | 304.73 | 337.64 | 336.74 | 346.49 | 371.84 | 378.04 | 393.68 |
| Fixed costs | 122.82 | 122.31 | 123.41 | 129.59 | 143.95 | 160.24 | 144.86 | 153.00 | 190.93 | 186.43 | 153.99 | 118.81 | 101.01 | 99.16 | 100.74 | 111.52 | 105.08 |
| Total cash costs | 321.63 | 316.46 | 321.71 | 332.73 | 367.31 | 416.80 | 431.55 | 458.03 | 491.73 | 486.25 | 458.72 | 456.45 | 437.75 | 445.65 | 472.58 | 489.56 | 498.76 |
| Noncash costs | 64.28 | 52.01 | 78.15 | 49.87 | 127.54 | 127.04 | 137.99 | 96.19 | 84.94 | 108.14 | 123.42 | 88.76 | 118.27 | 183.38 | 214.21 | 182.70 | 193.35 |
| Total economic costs | 385.91 | 368.47 | 399.86 | 382.60 | 494.85 | 543.84 | 569.54 | 554.22 | 576.67 | 594.39 | 582.14 | 545.21 | 556.02 | 629.03 | 686.79 | 672.26 | 692.11 |
| Delta (AR,MS,LA): | | | | | | | | | | | | | | | | | |
| Variable costs | 167.56 | 175.98 | 166.29 | 171.85 | 186.80 | 212.76 | 238.04 | 232.53 | 235.13 | 243.17 | 252.32 | 266.30 | 268.00 | 299.07 | 315.00 | 329.66 | 336.77 |
| Fixed costs | 63.01 | 61.98 | 63.03 | 68.59 | 75.10 | 81.46 | 82.08 | 76.44 | 57.91 | 68.28 | 79.03 | 54.36 | 47.55 | 47.26 | 47.36 | 52.08 | 49.22 |
| Total cash costs | 230.57 | 237.96 | 229.33 | 240.44 | 261.89 | 294.22 | 320.12 | 308.97 | 293.04 | 311.45 | 331.35 | 320.66 | 315.55 | 346.33 | 362.36 | 381.74 | 385.99 |
| Noncash costs | 64.33 | 63.77 | 80.07 | 66.92 | 87.79 | 72.13 | 90.66 | 51.98 | 81.25 | 82.28 | 82.42 | 65.21 | 76.33 | 124.51 | 143.24 | 124.07 | 140.31 |
| Total economic costs | 294.90 | 301.73 | 309.40 | 307.36 | 349.68 | 366.35 | 410.78 | 360.95 | 374.29 | 393.73 | 413.77 | 385.87 | 391.88 | 470.84 | 505.60 | 505.81 | 526.30 |
| Gulf Coast (TX,LA): | | | | | | | | | | | | | | | | | |
| Variable costs | 200.99 | 194.52 | 167.58 | 186.01 | 211.87 | 247.61 | 272.70 | 318.81 | 310.74 | 299.43 | 313.01 | 302.91 | 302.07 | 310.13 | 319.03 | 329.55 | 342.72 |
| Fixed costs | 65.55 | 65.66 | 67.32 | 69.43 | 74.79 | 83.80 | 92.17 | 79.72 | 71.13 | 73.46 | 70.39 | 56.75 | 48.99 | 52.86 | 52.49 | 57.55 | 54.24 |
| Total cash costs | 266.53 | 260.18 | 234.90 | 255.44 | 286.66 | 331.41 | 364.87 | 398.53 | 381.87 | 372.89 | 383.40 | 359.66 | 351.06 | 362.99 | 371.52 | 387.10 | 396.96 |
| Noncash costs | 64.75 | 54.56 | 61.20 | 80.14 | 106.60 | 96.30 | 101.41 | 75.40 | 90.13 | 87.74 | 90.91 | 53.02 | 70.19 | 119.88 | 132.35 | 125.91 | 141.06 |
| Total economic costs | 331.28 | 314.74 | 296.10 | 335.58 | 393.26 | 427.71 | 466.28 | 473.93 | 472.00 | 460.63 | 474.31 | 412.68 | 421.25 | 482.87 | 503.87 | 513.01 | 538.02 |
| U.S. average: | | | | | | | | | | | | | | | | | |
| Variable costs | 189.25 | 185.84 | 171.06 | 181.71 | 201.64 | 234.46 | 258.27 | 272.55 | 268.39 | 264.58 | 271.41 | 287.21 | 285.93 | 292.26 | 306.80 | 316.54 | 330.31 |
| Fixed costs | 78.21 | 77.74 | 78.98 | 84.15 | 92.30 | 100.36 | 97.11 | 91.59 | 82.93 | 89.95 | 91.69 | 67.11 | 58.35 | 58.32 | 59.15 | 64.34 | 61.58 |
| Total cash costs | 267.46 | 263.58 | 250.03 | 265.86 | 293.94 | 334.82 | 355.38 | 364.14 | 351.32 | 354.53 | 363.10 | 354.32 | 344.28 | 350.58 | 365.95 | 380.88 | 391.89 |
| Noncash costs | 69.31 | 59.43 | 72.91 | 71.14 | 102.36 | 94.47 | 105.48 | 71.85 | 92.10 | 100.17 | 109.11 | 67.04 | 89.66 | 128.41 | 147.19 | 125.85 | 147.34 |
| Total economic costs | 336.77 | 323.01 | 322.94 | 337.00 | 396.30 | 429.29 | 460.86 | 435.99 | 443.42 | 454.70 | 472.21 | 421.36 | 433.94 | 478.99 | 513.14 | 506.73 | 539.23 |

Source: USDA/ERS, 1991 (Report No. ECIFS 9–5) and 1992 (Report No. ECIFS 10–4).

Table 13--Total unit cost of production (rough rice basis), 1975-91

| Region | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Dollars/cwt | | | | | | | | | |
| Arkansas (non-Delta) | 7.37 | 6.92 | 7.36 | 7.55 | 8.78 | 9.91 | 9.71 | 9.11 | 9.44 | 9.17 | 8.75 | 7.16 | 7.64 | 8.26 | 8.52 | 9.40 | 9.57 |
| California | 6.73 | 6.62 | 6.92 | 7.37 | 7.64 | 8.50 | 8.35 | 8.17 | 8.24 | 8.48 | 8.08 | 7.14 | 7.90 | 9.07 | 8.80 | 8.96 | 9.01 |
| Delta | 7.54 | 6.89 | 7.48 | 7.24 | 8.51 | 9.97 | 9.70 | 9.00 | 9.38 | 9.17 | 8.25 | 7.44 | 8.13 | 9.29 | 9.53 | 10.16 | 10.81 |
| Gulf Coast | 7.96 | 7.23 | 7.41 | 7.97 | 9.76 | 11.14 | 10.64 | 10.67 | 11.66 | 10.20 | 9.81 | 7.84 | 8.32 | 9.54 | 10.47 | 9.84 | 10.32 |
| U.S. average | 7.40 | 6.90 | 7.34 | 7.57 | 8.67 | 9.93 | 9.65 | 9.30 | 9.74 | 9.30 | 8.78 | 7.40 | 7.94 | 8.90 | 9.20 | 9.61 | 9.94 |

Source: USDA/ERS, 1991 (ECIFS 9-5) and 1992 (ECIFS 10-4).

Table 14--Official U.S. rice designations

| Classes | Rough | | Brown | | Milled | | Broken kernels |
|---|---|---|---|---|---|---|---|
| Subclasses | Long<br>Medium<br>Short<br>Mixed | | Long<br>Medium<br>Short<br>Mixed | | Long<br>Medium<br>Short<br>Mixed | | Second heads<br>Screenings<br>Brewers |
| Grades | Special | U.S. number | Special | U.S. number | Special | U.S. number | U.S. number |
| | Parboiled<br>Smutty<br>Weevily | 1<br>2<br>3<br>4<br>5<br>6<br>Sample | Parboiled<br>Smutty | 1<br>2<br>3<br>4<br>5<br>Sample | Parboiled<br>Coated<br>Undermilled<br>Granulated<br>Brewers | 1<br>2<br>3<br>4<br>5<br>6<br>Sample | 1<br>2<br>3<br>4<br>5<br>Sample |

Source: Holder and Grant, 1979.

(3) Low-cost producers had the highest average level of total farm sales, Government payments, net cash income, and net farm income.

(4) Average farm debt levels were similar for all respondents, but high-cost producers reported lower values for total farm assets, leading to somewhat higher debt-to-asset ratios.

### Changes in Production Costs

On a per acre basis, variable cash expenses rose from $189 in 1975 to $317 in 1990. Much of the increase has been due to rising fuel costs and higher wages. Seed and fertilizer expenses have actually dropped since 1975. In contrast, fixed cash expenses have declined from $100 per acre in 1980 to $64 per acre in 1990, largely due to lower interest expenses. Because variable cash expenses are much larger than fixed cash expenses, total cash expenses rose from $267 per acre in 1975 to $381 in 1990.

However, due to increasing yields during most of this time, expenses per cwt have risen much more slowly than on a per acre basis. Total cash expenses per cwt rose from $5.87 in 1975 to $7.77 in 1982, but were under $7.00 until 1990, when they rose to $7.23. Total expenses per acre have shown a similar movement, rising from $7.40 per cwt in 1975 to a peak of $9.93 in 1980 and were $9.61 in 1990. In comparison, the season-average farm price was $8.27 per cwt in 1975, peaking at $10.64 in 1981, then dropping to $6.27 in 1990. Thus, U.S. rice farmers, on average, have been unable to pay the full economic cost of production without Government assistance since 1981.

Cost of production data on a per acre basis is reported by region for southern rice-producing States and for California. In 1990, the lowest per acre total cost of production, $465, was reported by the Arkansas non-Delta region, while the highest, $672, was reported by California. The gulf coast had the second highest per acre total cost of production, $513, and the Mississippi Delta ranked third at $505. The national average per acre of production cost was $507 in 1990, with cash expenses accounting for 75 percent of total costs.

California's per acre cost exceeded national average costs due to higher expenses for purchased irrigation water, drying, hired labor, chemicals, and fertilizers. The Arkansas non-Delta's lower than national average total per acre costs were due to smaller expenses for chemicals, fuel, and drying. In addition, Arkansas producers do not use purchased irrigation water. The gulf coast has higher than average costs due to larger drying and purchased irrigation water expenses. The Mississippi Delta had higher than average expenses for chemicals, custom operations, and hired labor, and much lower than average expenses for purchased irrigation water.

When production costs are examined on a per cwt basis, a different ranking emerges. California reported the lowest total expenses in 1990, $8.96 per cwt, due to the higher yields achieved in the State. Except for 1978 when average yields in the State dropped, California achieved the lowest total production cost per cwt every year from 1975 to 1990. The Mississippi Delta reported the highest in 1990, $10.16 per cwt, largely due to a drop in average yields that year. However, from 1978 to 1989, the gulf coast reported the highest total production cost per cwt, largely explaining declining rice acreage in this region. The gulf coast region had the highest per acre production cost among southern producing regions.

## Supply

### Production

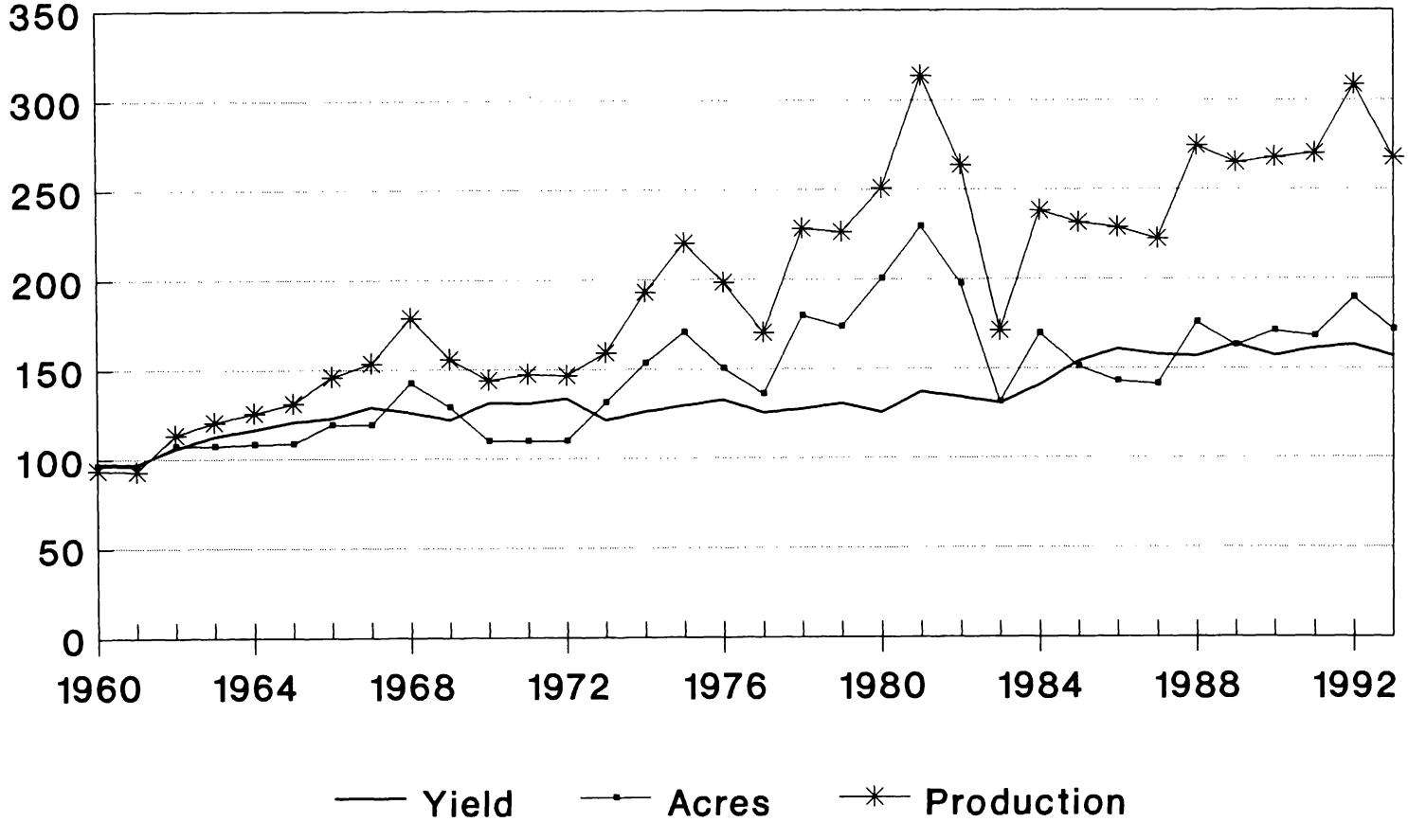
Total area planted to rice in the United States since 1960 has varied from 1.6 million acres in 1961 to 3.8 million acres in 1981, and fell to 2.9 million acres in 1993 (app. table 1). Plantings were restricted by Government programs in most of those years before 1974. During the 1970's, U.S. exports surged in response to a growing world market, prompting a suspension in marketing quotas after 1973 and resulting in a sharp rise in national acreage. While rice acreage expanded dramatically in some regions with the suspension of marketing quotas, acreage in other regions changed very little. Figure 8 shows the trend of U.S. rice acreage, yield, and production during 1960-93.

Rice acreage more than doubled in northeast Arkansas from 1973 to 1978, and more than quadrupled in the Mississippi River Delta. The Sacramento Valley of California had a 25-percent increase, while a moderate decrease occurred in the Grand Prairie of Arkansas. Southwest Louisiana and the gulf coast of Texas had the least change. The 1973-78 expansion was due to the increased profitability of rice compared with alternative enterprises, availability of land that could be brought into rice production easily, and production-enhancing features of Government programs.

A more market-oriented farm program was passed in 1975 that shifted emphasis away from Government supply control. While provisions of the program did

Figure 8

# Indexes of U.S. rice acreage, yield, and production, 1960-93




Source: Rice Situation and Outlook Reports, ERS/USDA

not restrict acreage in the United States, declining prices reduced it to 2.5 million acres in 1976. Prices recovered during the 1977/78 marketing year, and acreage expanded in 1978. U.S. rice production and acreage peaked in marketing year 1981/82.

The large acreage expansion in 1981, along with a decline in exports, precipitated a sharp rise in carryover stocks, which remained burdensome throughout the early 1980's. To restore the balance between use and production, acreage reduction programs (ARPs) were implemented in 1982/83 and, except for 1992/93 and 1994/95, have been continued. From 1989 to 1992, the ARP requirements were reduced or eliminated because of lower stocks. Although the ARP was set at zero for 1992, it was raised to 5 percent of the crop base for 1993, but reduced again to zero in 1994. Between 1984 and 1992, planted area varied from 2.4 to 3.2 million acres.

If world rice trade should suddenly surge or world supplies falter, spurring a resurgence in U.S. exports, the United States could greatly increase rice acreage. Rice cultivation requires level land suitable for irrigation with poor internal drainage to hold the irrigation water. Holder and Grant (1979) estimated that there are about 10 million acres of land suitable to produce rice in the United States. But only about half of this land could be used to produce rice due to insufficient irrigation water and crop rotational constraints.

### *Trends in Yield*

Between the mid-1950's and the mid-1970's, increases in yield per acre were responsible for most of the steady rise in production. In the 1950's, average rice yields were 2,800 pounds per acre. By the next decade, yields had risen to more than 4,000 pounds. From the mid-1970's through the beginning of the 1980's, acreage and yields rose (fig. 8) and yields averaged 4,819 pounds per acre in 1981.

During the mid-1980's, substantial yield increases occurred when new, higher-yielding varieties were adopted, slowing a drop in production due to acreage decreases. A record average yield of 5,749 pounds per acre was attained in 1989. Unfortunately, some of the new varieties were quite susceptible to diseases such as blast, which can cause severe yield loss.

Additional higher-yielding varieties that are more resistant to disease were introduced in the late 1980's. Shorter-season varieties were also developed to avoid yield loss associated with weather delays at planting and harvest. California growers do not have problems with red rice because of drier weather and a long history of zero tolerance of red rice in their seed supply. A record-high yield of 8,400 pounds per acre was achieved in California in 1992.

U.S. rice yields are not subject to as many of the weather-related swings that affect other U.S. crops, because the entire crop is irrigated and fertilized. Hence, rice production exhibits both higher and more stable yields than many other crops. Yields per acre during 1983/92 averaged 5,411 pounds per acre, with annual variations of about 5 percent (254 pounds).

### *Classes of Rice*

In the United States, rice is referred to by length of grain: long, medium, or short.[2] Indica rice is long grain, while japonica refers to the shorter grains. The United States produces mostly indica, or long-grain rice. Arkansas, Mississippi, Louisiana, Texas, and Missouri produce most of the long-grain rice. California produces the bulk of the U.S. medium- and short-grain rice. Arkansas and Louisiana also produce medium- and short-grain rice and can adjust acreage among types based on market conditions. California medium- and short-grain rice is considered to be of a higher quality than southern medium-grain rice for table use. Some long-grain, aromatic rice varieties and glutinous rice varieties are also grown in small quantities in the United States.

In 1993, 66.1 percent of the total U.S. rice crop was long grain and 33.9 percent was medium and short grain. The short-grain crop has declined considerably in importance since the 1950's due to the loss of the Japanese market, when short-grain typically made up over 20 percent of the total rice crop. In addition, Puerto Rico has recently been substituting lower priced southern medium-grain rice for California short-grain.

Medium grain's share of U.S. rice production has wavered over the past 30 years, settling at 25-35 percent of the total crop since the mid-1980's. Long-grain rice has increased from less than half the total crop in 1950, to more than 65 percent currently. The long-term shifts in production by class partly reflect changes in domestic demand but, more important, have been due to changes in world trade where indica, or long grain, is currently the preferred rice. By the early 1980's, substantial world medium-grain buyers, particularly South Korea and Indonesia, were no

[2]USDA's Federal Grain Inspection Service uses the length-to-width ratio of the grain in determining whether rice should be classified as long, medium, or short.

longer importing much rice, causing U.S. medium-grain exports to plummet.

### Stocks

During the 1970's, U.S. supplies were tight and stocks-to-use ratios were small. U.S. rice exports had increased sharply in response to a surge in export demand related to crop shortfalls abroad. Also, growing demand for parboiled rice (at the time the United States was the major supplier) and a sudden increase in the wealth of countries belonging to the Organization of Petroleum Exporting Countries contributed to rapid escalation in U.S. rice exports. In addition, restrictive acreage allotments had been used in the United States since 1955 to keep stocks from building.

Between 1980 and 1986, U.S. rice stocks soared due to an imbalance between supply and use caused by a rapid decline in U.S. rice exports. The United States had become uncompetitive in many international rice markets because its loan and purchase program kept domestic prices higher than world prices. However, since 1985, the rice marketing loan program has allowed U.S. prices to move closer to world prices, thereby spurring an increase in U.S. exports. More competitively priced U.S. exports, strong growth in domestic use, limited acreage expansion, and a slowdown in yield growth have reduced U.S. stocks to relatively low levels in recent years (table 15).

### Imports

Rice imports in 1990 were double their 1985 level and were 22 times greater than in 1980. Analysis of the growth in imports shows that from 1988 to 1990, 22 of every additional 100 pounds of domestic food use of rice was imported (Wailes and Livezey, 1991). Regular milled rice, mostly aromatic Thai jasmine, has accounted for the largest volume. Thailand provides nearly 90 percent of U.S. rice imports, and India and Pakistan account for most of the remainder.

Jasmine rice from Thailand and basmati rice from India are aromatic varieties; most U.S. consumption of these varieties is by Americans of Asian, Hispanic, and Indian descent. Much of the growth in these imports is associated with the large influx of Asian, Hispanic, and Indian immigrants during the 1980's.

## Factors Influencing Supply

### *Yields*

Weather conditions during planting and harvest have a major effect on rice yields. Rice planting dates are critical for the varieties grown in the United States. The distribution and amount of rainfall during March, April, and May can affect seeding and crop development in the early stages. Delay in seeding pushes critical stages of plant development beyond the period of maximum day length and sunlight during late June and tends to reduce yield. Since rice yields are positively related to the amount of sunlight, a higher percent of sky cover is generally detrimental to yields during the reproductive stage. Excessive rainfall during harvest causes shattering and lodging of plants and usually reduces yield.

### *Acreage Response*

Rice acreage changes when expected net returns from producing rice change relative to returns from other crops. Changes in acreage also affect average yields because, as prices change, less productive land is brought into rice production or withdrawn from it and adjustments are made in input use.

Using 1982 data, Grant, Beach, and Lin (1984) estimated that each 100,000-acre increase or decrease in rice acreage results in an opposite change in rice yields by 30-40 pounds per acre. Yields in Arkansas and Texas were estimated to be more responsive to acreage changes than yields in the other rice-producing States, which were found to be almost nonresponsive to acreage changes.

Grant, Beach, and Lin used 1950-82 data and found that a $1.00 per cwt change in the price of rice (14 percent of the 1987 farm price), adjusted for any offsetting change in cost of production, caused farmers to change harvested area in the same direction by about 44,000 acres (1.8 percent of the 1987 area).

Sustained high or low prices over several years would likely result in even larger acreage shifts than short-term price changes. Farmers might be able to adjust resources that could not be changed in a single season, perhaps by preparing land for irrigation or acquiring equipment (irrigation, combines, and rice driers) or finding alternative uses for idled land and machinery. Support prices and acreage reduction programs make producers less responsive to price changes. And the lack of perfect substitutability among crops and rice farming's high entry costs likely cause the response of rice acreage to price changes to be less than that for other major field crops.

### *Stocks-to-Use Ratio*

The stocks-to-use ratio is a measure of the ability to fulfill market needs, especially if there is an unexpected surge in demand or reduction in supply. This

Table 15--December 1 rough rice stocks, all positions 1989-93

| State | Farms | | | | | | Mills | | | | | | Warehouses | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
| | Million cwt. | | | | | | | | | | | | | | | | | |
| Arkansas | 15.8 | 17.5 | 16.8 | 16.8 | 20.5 | 12.0 | 4.3 | 3.7 | 4.5 | 4.5 | 8.9 | 7.2 | 33.6 | 26.5 | 24.6 | 24.6 | 27.9 | 24.0 |
| California | 3.0 | 3.0 | 2.8 | 2.8 | 2.5 | 1.8 | 4.5 | 3.4 | 1.9 | 1.9 | 1.5 | 2.0 | 22.4 | 24.0 | 26.1 | 26.5 | 30.3 | 32.4 |
| Louisiana | 7.6 | 6.0 | 6.0 | 6.0 | 5.0 | 3.5 | 1.0 | 0.9 | 1.7 | 1.7 | 1.9 | 2.4 | 6.6 | 5.1 | 4.8 | 4.8 | 6.4 | 5.2 |
| Texas | 3.8 | 3.9 | 4.0 | 4.0 | 3.4 | 1.6 | 2.6 | 1.7 | 1.2 | 1.2 | 1.4 | 1.5 | 12.1 | 7.2 | 7.8 | 7.8 | 7.3 | 5.7 |
| Unallocated * | 9.5 | 9.7 | 7.6 | 7.6 | 8.7 | 5.3 | 0.4 | 0.4 | 0.3 | 0.3 | 0.8 | 0.5 | 4.6 | 3.4 | 3.9 | 3.2 | 5.1 | 3.5 |
| U.S. total | 39.6 | 40.0 | 37.2 | 37.2 | 40.0 | 24.2 | 12.7 | 10.1 | 9.6 | 9.6 | 14.4 | 13.6 | 79.2 | 66.2 | 67.1 | 66.9 | 76.9 | 70.8 |

* Includes stocks held in Mississippi and Missouri.

Source: USDA/NASS. Rice Stocks, various issues.

ratio is the statutory basis for determining if an ARP is needed, and if so, at what level. Over the past 20 years, the stocks-to-use ratio has varied from a low of 5.5 percent for 1972/73 to a high of 62.1 percent for 1985/86. After 1985/86, the ratio dropped precipitously, reaching 15.1 percent in 1990/91. During this same period, the ARP was reduced from 35 to 5 percent of the crop base.

According to the 1990 farm legislation, if the Secretary of Agriculture establishes an ARP, it must be at such a level as to achieve an ending stocks-to-use ratio between 16.5 and 20 percent. This ratio is calculated as the ending stocks of the current year divided by the average total use of the previous 3 years.

Figure 9 summarizes the disposition of the U.S. rice crop from 1960 to 1990. One of the marked differences in disposition is in the domestic use and residual category. In the past decade, domestic use has gained greater market share at the expense of exports. This change makes the domestic, high-quality market more important to suppliers.

## Types of Rice

**Rough Rice** Also called paddy rice, is harvested, whole-kernel rice with the hull remaining. Rough rice is sold to mills for dehulling and polishing.

**Brown Rice** Whole or broken kernels of rice from which only the hull has been removed. Brown rice may be eaten as is, or may be milled into regular-milled white rice. Cooked brown rice has a slightly chewy texture and a nutty flavor. The light brown color is caused by the presence of seven bran layers, which are very rich in minerals and vitamins--especially the B-complex group.

**Regular-Milled White Rice** The rice product produced after the hull, bran layers, and germ have been removed.

**Head Rice** Whole kernels of milled rice. To categorize as head rice, the length of the kernel must be at least three-fourths the length of a whole kernel.

**Brokens** Kernels of rice that are less than three-fourths of the length of the whole kernels. Brokens are used in beer, processed foods, and pet foods.

**Second Heads** Fragments of grains broken during milling, which are at least one-half as long as whole kernel but less than three-fourths. This is the largest size of broken rice.

**Brewers' Rice** Broken kernels of milled rice that will pass readily through a 5 1/2 /64 inch sieve. Refers to the smallest size of broken rice fragments. Used in making pet foods and as a source of carbohydrates in brewing.

**Aromatic Rice** These scented rices include basmati and jasmine rice.

Basmati rice has a distinctive odor when cooked, has a desirable taste, doubles its grain length, and the grains remain completely separate. Basmati rice is grown mostly in the Punjab area of central Pakistan and northern India, and is mainly bought by higher income Middle Eastern countries and the United States. Basmati rice is sold at prices roughly double those for long-grain rice.

Also includes jasmine rice, which is a fragrant rice preferred by much of the Asian community in the United States. Jasmine rice cooks soft, moist, and clingy. Almost all jasmine rice imports are from Thailand.

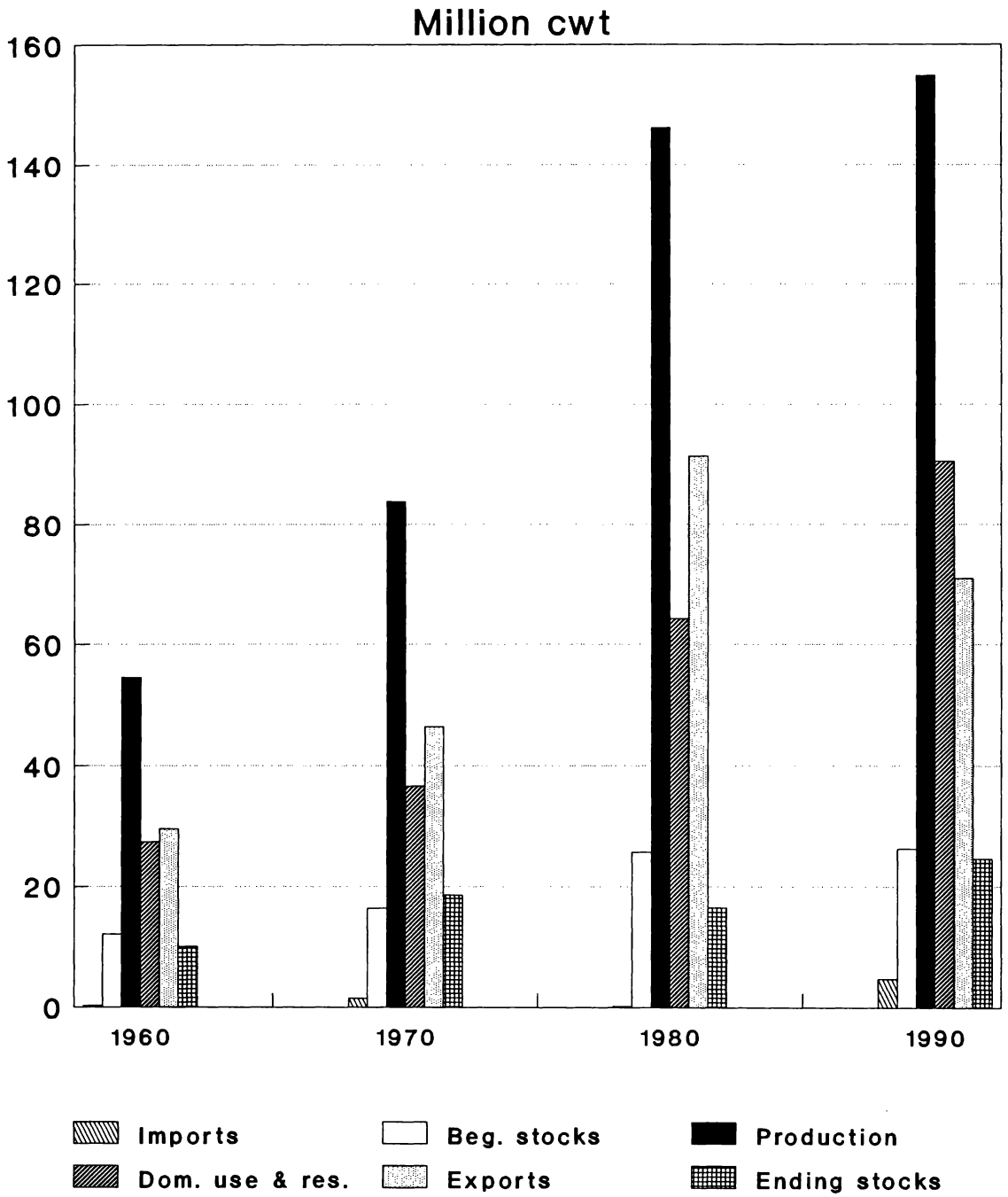
**Parboiled Rice** Rough rice soaked in warm water under pressure, steamed, and dried before milling. Parboiled rice cooks up fluffier and sticks together less than does regular milled white rice. Desired by consumers who like a chewy and wholesome taste, but takes longer to cook than regular milled white rice.

**Precooked Rice** Rice that has been cooked and dehydrated after milling. This reduces the time required for cooking. This includes quick-cooking rices, instant rices, and boil-in-the-bag rices.

**Rice Bran** The outer cuticle layers and germ directly beneath the hull. This is removed during the milling process. Rice bran is rich in protein and natural B-vitamins.

Figure 9

# U.S. rice crop disposition




Source: USDA/ERS

## Domestic Demand

The domestic rice market, which more than doubled from 1977/78 to 1990/91, now accounts for over half of U.S. rice use, up from about 40 percent in 1980/81. Over 8 percent of rice consumed domestically is currently satisfied by imports. U.S. per capita rice use is increasing at about 1 pound per year. Domestic demand is for high quality rice, whether eaten as table rice, used in processed foods and beer, or as an ingredient in pet food (fig. 10). Production and varietal decisions have been modified to reflect the increased demand for high quality rice.

Domestic use of rice increased from about 28 million cwt (rough basis) in market year 1962/63 to almost 90 million in 1993/94 (app. table 43). Domestic use of rice is small compared with other grains. Very little rough and no milled rice is used as a livestock or poultry feed. However, rice byproducts such as rice bran and hulls have limited use in animal feed. In addition, recent health and nutrition information have contributed to consumer demand for stabilized rice bran and rice bran oil.

Direct food use, processed foods (including pet foods), and beer comprise the domestic outlets for rice (table 16). Direct food use is the largest domestic outlet, accounting for around 59 percent of total domestic use in the early 1990's. Processed foods and beer account for about 21 and 19 percent of domestic use, respectively, and use mostly shorter grains and broken kernels. Processed food use of rice has been the fastest growing domestic outlet for U.S. rice since the early 1980's, while brewers' use has stagnated since the late 1980's.

### Direct Food Use

Direct food use is the consumption of whole kernel milled rice without further processing, often referred to as table rice. This use category includes regular milled white rice as well as the various specialty rices, such as parboiled, precooked, precooked-parboiled, brown rice, and aromatic rice. About 72 percent of the direct food use in the United States in 1990/91 was long-grain rice, and most of the remainder was medium grain.

Direct food use of milled rice, including imports, grew from 8 million cwt in 1955/56 to over 31 million in 1990/91. And direct food use of rice has more than doubled since 1978/79. Specialty rice's share of direct food use has risen from about 18 percent in 1969/70 to around 21 percent in 1990/91. Parboiled rice, including precooked-parboiled, and brown rice accounted for most of this growth.

The largest domestic markets for direct food use are the Pacific, Middle Atlantic, and South Atlantic regions. These regions also have the highest per capita rice consumption in the United States and have seen their share of U.S. consumption expand since 1980/81. These three regions accounted for nearly 70 percent of direct food shipments in 1990/91, up from 62 percent a decade earlier. However, survey data indicate that direct food use of rice was slightly more uniform across the United States in 1990/91. This indicates that a broader spectrum of people were using rice than before, when consumption was concentrated more heavily in specific regions that contained ethnic groups with historically high per capita rice use.

Shipments of specialty rices (parboiled, precooked, precooked-parboiled, brown, and aromatic) reported for direct food use were nearly 6 million cwt in 1990/91, about the same as 2 years earlier, but more than double reported shipments in 1978/79 (table 17). The southern rice-producing States supply all parboiled and precooked rice, which is exclusively long-grain. California supplied over half the brown rice and the rest was about evenly divided among the other major rice-producing States.

In 1990/91, parboiled rice shipments totaled almost 3.4 million cwt, double shipments than in 1978/79. However, precooked-parboiled rice has captured most of the growth in parboiled rice shipments since the late 1980's. This product combines cooking convenience with a high-quality rice. Precooked-parboiled rice shipments reached 804,000 cwt in 1990/91, more than double that 2 years earlier.

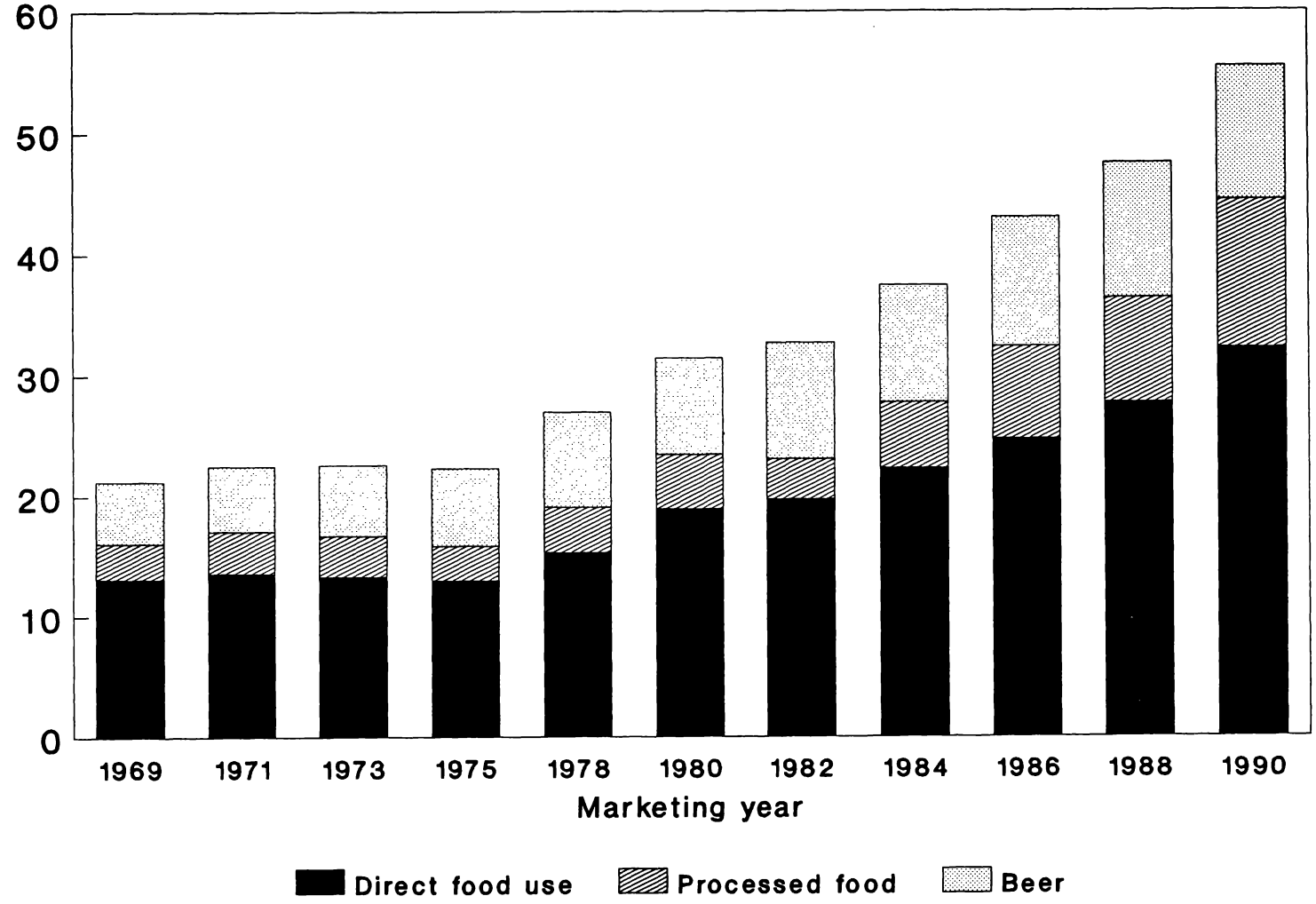
Brown rice shipments were nearly 700,000 cwt in 1990/91, more than double shipments in 1978/79. Additional quantities of brown rice were used in various processed foods, adding to the growth and importance of rice bran in consumer diets. Health attributes associated with rice bran and greater amounts of nutrients in brown rice than in regular milled white rice help explain the decade-long increase in brown rice use. All three grain types can be made into brown rice.

In contrast, precooked regular milled white rice shipments have shown no long-term growth since 1980/81 and were 870,000 cwt in 1990/91. Precooked rice has declined as a share of specialty rice and total rice use since 1980/81 when precooked rice shipments exceeded 1 million cwt. However, use of precooked-parboiled rice has expanded rapidly in recent years,

Figure 10

# Domestic rice use, selected years

Million cwt (milled)




Source: USDA/ERS

Table 16--Shipments of milled rice by outlet, crop years 1978/79 to 1990/91

| Outlet | 1978/79 | 80/81 | 82/83 | 84/85 | 86/87 | 88/89 | 90/91 |
|---|---|---|---|---|---|---|---|
| | | | | Million cwt | | | |
| Direct food 1/ | 15.29 | 18.94 | 19.67 | 22.31 | 24.72 | 27.70 | 31.00 |
| Processed foods | 3.72 | 4.49 | 3.34 | 5.44 | 7.63 | 8.62 | 11.50 |
| Beer 2/ | 7.92 | 7.98 | 9.61 | 9.67 | 10.68 | 11.15 | 11.00 |
| Total domestic 3/ | 26.93 | 31.40 | 32.62 | 37.43 | 43.03 | 47.47 | 53.50 |
| Territories | 3.85 | 3.43 | 3.58 | 3.62 | 3.81 | 3.32 | 3.25 |

1/ Includes imports.
2/ U.S. Treasury Department.
3/ Totals may not add due to rounding.
Source: USDA/ERS's biannual milled rice distribution survey.

Table 17--Specialty rice shipments, crop years 1978/79 to 1990/91 1/

| Rice type | 1978/79 | 80/81 | 82/83 | 84/85 | 86/87 | 88/89 | 90/91 |
|---|---|---|---|---|---|---|---|
| | | | | 1,000 cwt | | | |
| Parboiled | 1,779 | 1,989 | 3,120 | 3,639 | 3,293 | 4,383 | 3,400 |
| Precooked | 936 | 1,029 | 870 | 953 | 662 | 547 | 870 |
| Precooked-parboiled | N/A | N/A | N/A | N/A | 72 | 323 | 804 |
| Brown rice | 237 | 375 | 216 | 270 | 407 | 729 | 666 |
| Other 2/ | 6 | 16 | 140 | 24 | 22 | 23 | 100 |
| Total | 2,958 | 3,408 | 4,345 | 4,887 | 4,887 | 5,967 | 5,840 |

1/ Includes shipments to U.S. territories.
2/ Principally aromatic rice.
N/A = not available.
Source: USDA/ERS's biannual milled rice distribution surveys, various years.

capturing any potential growth in regular precooked rice. Precooked-parboiled rice has superior cooking and eating qualities compared with regular, milled, precooked rice.

Domestic aromatic rice shipments totaled over 100,000 cwt in 1990/91, up from around 25,000 in 1988/89 years earlier. These rices have unique cooking and processing qualities compared with typical southern, long-grain varieties. Additionally, many consumers find their taste and aroma superior to southern long-grain rice. An additional small amount of aromatic rice is Della rice from Arkansas. The Della types are a scented (aromatic) long grain that give off an aroma when cooked much like that of popcorn or roasted nuts and have a flavorful nutty taste similar to basmati rice from Pakistan and India.

Domestic jasmine rice varieties (aromatic) have recently been introduced in the United States as a potential substitute for imported Thai jasmine rice. These domestic varieties have similar taste and aroma to Della rice, but are softer and more clingy in texture. Consumers have yet to accept domestic jasmine rice as a substitute for imported Thai jasmine rice. Aromatic varieties sell at a premium, compared with regular milled white rice, and are often sold in small packages. Much research attention is devoted to developing rice varieties that can effectively compete with imported jasmine rice from Thailand.

Long-grain rice accounted for almost 72 percent of the total reported direct food use shipments in 1990/91. However, eight of the nine geographic regions had a long-grain use proportional share above the U.S. average. The Pacific region was the only region with a long-grain rice share less than the national average. The Pacific region consumed the largest quantity of medium-grain rice for direct food use, and the Middle Atlantic region ranked a distant second. The Pacific region consumed the largest amount of short-grain rice for direct food use.

## Processed Food Use

Rice used in processed food is estimated to have been 12.2 million cwt in 1990/91, more than double the 1984/85 volume (table 18). Processed food use accounted for over 21 percent of total domestic demand for milled rice in 1990/91, up from 15 percent in 1984/85. Rice used in processed food is the fastest growing category of domestic use. Over 30 percent of the total growth in domestic rice consumption since 1980/81 has come from increased use by food processors.

Processed food use is the consumption of rice after other ingredients have been added or changes have been made in the composition of the kernels for such specific products as breakfast cereals, pet foods, package mixes, candy, soup, baby food, crackers, other snack items, rice cakes, rice pudding, and certain confectioneries, cooking batters, and desserts.

Many food processors (and most brewers) usually purchase medium-grain, short-grain, and broken kernels rather than the higher priced, long-grain rice. Cereal, rice cakes, and candy uses mostly medium- and short-grain rice. Since the starch content of rice is an important factor, such users tend to use the shorter, stickier grains. Baby food uses almost exclusively rice flour and pet foods use mostly broken kernels.

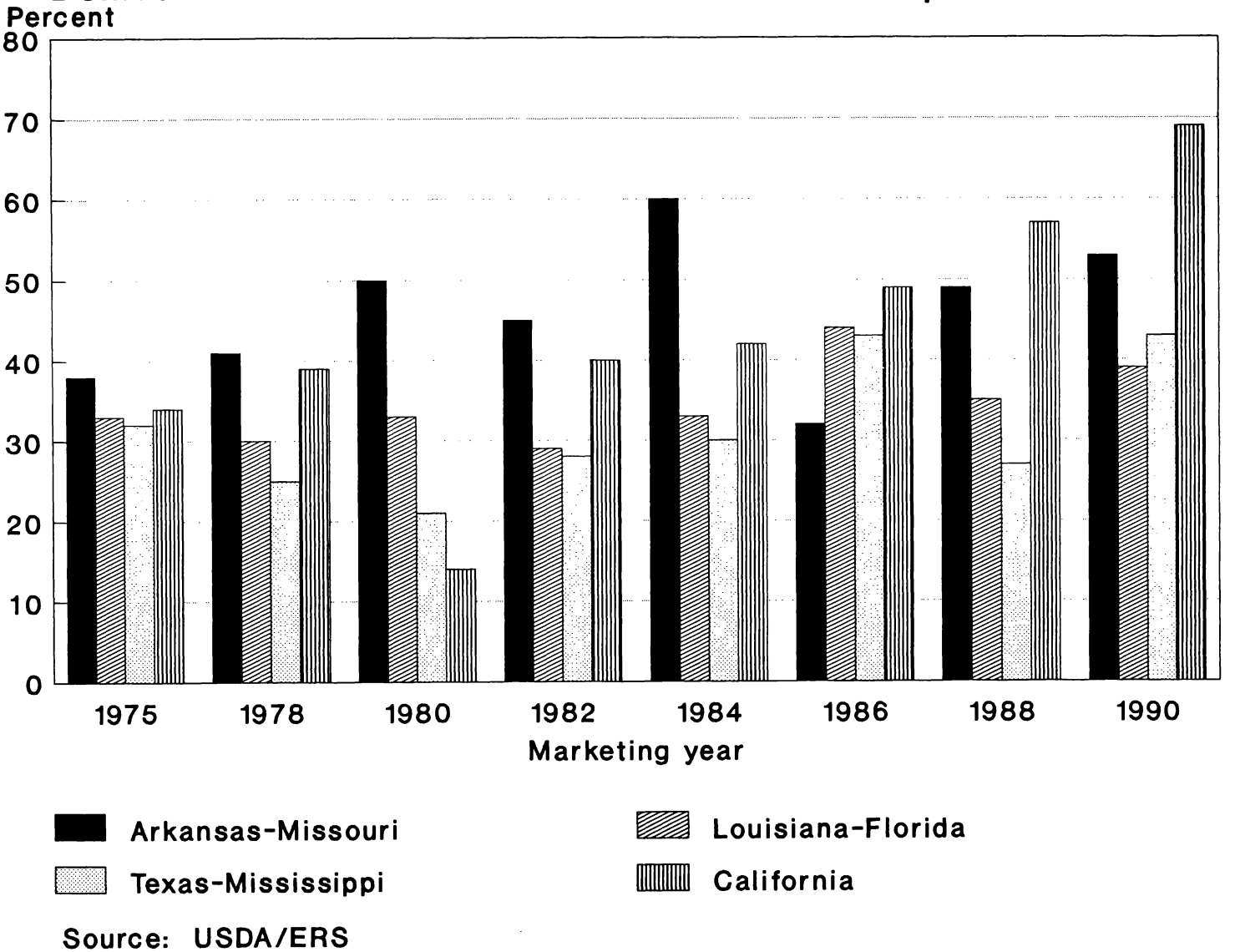
Soups, package mixes, and frozen dinners, however, use long-grain rice almost exclusively. Appearance of the rice grain is important for these three products. In addition, about one-third of rice used in cereals and about one-fourth of the rice used in rice cakes and candy is long grain.

Cereal accounted for most of the growth in processed food use during the early and mid-1980's. Use of rice in cereal, which was nearly 4.4 million cwt in 1990/91, still accounts for the largest share of processed food use, about 35 percent. Medium- and long-grain head rice accounted for two-thirds of rice used in cereals in 1990/91. The rest was mostly short-grain rice and broken kernels from California.

Since 1988/89, most of the increase in processed food use has been by package mixes and pet foods, and to a much lesser extent, baby food and frozen dinners. While total processed food use of rice rose 2.9 million cwt in 1990/91 from 2 years earlier, package mixes alone expanded over 1.6 million cwt and pet foods were up 584,000 cwt from 1988/89.

Various flavored package mixes are the second largest processed food use of rice, reaching almost 3.3 million cwt in 1990/91 and representing the largest growth of any processed food category. Shipments of packaged rice mixes rose from 221,000 cwt in 1982/83 to 1.7 million cwt in 1988/89. Almost all rice used in package mixes is high-quality, southern, long grain. Shipments by the Arkansas-Missouri milling area to processors and direct shipments of package mixes by mills in the Texas-Mississippi area account for almost all of the rice in this processed food category.

Figure 11
## Domestic market as a share of direct food shipments




Source: USDA/ERS

Table 18--Principal processed food use of rice, 1978/79 to 1990/91

| Rice use | 1978/79 | 80/81 | 82/83 | 84/85 | 86/87 | 88/89 | 90/91 |
|---|---|---|---|---|---|---|---|
| | | | | 1,000 cwt | | | |
| Cereal | 2,090 | 2,588 | 2,503 | 3,577 | 4,800 | 3,937 | 4,415 |
| Soup | 157 | 147 | 176 | 241 | 76 | 119 | 117 |
| Baby food | 157 | 133 | 152 | 316 | 233 | 172 | 445 |
| Rice cakes | N/A | N/A | N/A | N/A | 288 | 707 | 411 |
| Package mixes 1/ | 1,096 | 1,366 | 221 | 567 | 1,505 | 1,705 | 3,172 |
| Frozen dinners | N/A | N/A | N/A | N/A | 61 | 89 | 240 |
| Candy | N/A | N/A | N/A | N/A | 147 | 220 | 105 |
| Pet food | N/A | N/A | N/A | N/A | 431 | 1,338 | 2,065 |
| Other | 217 | 257 | 290 | 738 | 9 | 335 | 1,224 |
| Total 2/ | 3,717 | 4,491 | 3,342 | 5,438 | 7,630 | 8,821 | 12,194 |

1/ Includes package mixes shipped directly by mills.
2/ Totals may not add due to rounding.
N/A = Not applicable. Categories not included in surveys prior to 1986/87.
Source: USDA/ERS's biannual milled rice distribution survey.

Pet foods are the third largest (excluding beer) processed use of rice, exceeding 2 million cwt in 1990/91, up from 431,000 cwt in 1986/87. Broken kernels made up 75 percent of rice used in pet foods, with the rest being mostly rice flour and short-grain rice. Rice is considered a high-quality ingredient for dog food, with important digestive and elimination attributes. Significant use of rice in pet food began in the mid-1980's.

Rice cakes used 411,000 cwt of rice in 1990/91, up from 287,000 cwt in 1986/87. Rice cakes are a low-fat, low-sodium, and low-calorie snack. Many new flavors have been added in the 1990's to enhance the desirability of rice cakes. Also, smaller rice cakes as well as popcorn cakes have been developed to meet market needs. Nacho cheese, caramel, and corn have been added to many rice cakes to enhance flavor. Thus, the growth in total consumption of rice cakes has exceeded the growth in the amount of rice used in rice cakes. Most rice used in rice cakes comes from California. Neither pet food nor rice cakes were a large enough product category to track separately before the 1986/87 survey.

Baby food is a traditional use of rice that has shown substantial growth in the 1990's. Baby food, which mostly uses rice flour from Arkansas and California, used 445,000 cwt of rice in 1990/91, more than double the use in 1988/89. Rice use in baby food showed no long-term growth from the 1950's through the 1980's.

Rice use in soup in 1990/91, at 117,000 cwt, was virtually unchanged from 1988/89. All rice used in soup is long grain. Rice use in soup has shown no real growth in the last two decades. Rice use in candy was under 100,000 cwt in 1990/91. Broken kernels from California made up about 50 percent of the rice used in candy, and medium-grain rice and broken kernels from the southern rice milling area made up the rest. Rice used in frozen dinners more than tripled to 240,000 cwt in 1990/91 from 2 years earlier and was all long-grain rice. Some parboiled rice is used in frozen dinners.

## Per Capita Use

The average American in 1991 consumed 137 pounds of wheat flour, over 130 pounds of potatoes, and 17 pounds of rice for food use. However, this represents a more than a doubling in per capita food use of rice since 1978. Including brewers' use of rice in the per capita calculation increases the total to nearly 22 pounds in 1992. If present trends continue, per capita use will likely reach 25 pounds by 1995. Although the rice industry has much competition in the domestic food grain market, its current low market share indicates substantial room for expansion.

Per capita direct food use of rice, including imports, was 12.8 pounds in 1990/91, up nearly 14 percent from 2 years earlier. Adding the rice used in processed foods and used by brewers gives a per capita consumption of nearly 22 pounds. This is almost 15 percent higher than 2 years earlier. Total per capita consumption was about 10.5 pounds in 1969/70 and did not exceed 12 pounds until the late 1970's.

Per capita consumption of rice varies greatly among regions and between States within regions. The Middle Atlantic region had the highest per capita direct food use in 1990/91, over 20 pounds, up almost 3 pounds from 1988/89. The Pacific region followed the Middle Atlantic region with a per capita direct food use of 17.3 pounds in 1988/89, up from 16.7 in 1988/89. The South Atlantic, at 12.4 pounds in 1990/91, was up 1.5 pounds from 1988/89 and ranked fourth in per capita direct food use. The West South Central region reported the third highest per capita direct food use, 14.8 pounds, in 1990/91. Per capita consumption was well below the national average in all other regions in 1990/91, with New England, at 7.6 pounds, the highest among the remaining regions.

## Package Size

Of the total direct food use shipments reported for 1990/91, packages of 25- to 100-pounds accounted for 39 percent, and those less than 5 pounds accounted for 25 percent. Package sizes of 10-24 pounds and 5-9 pounds accounted for 23 percent and 11 percent of total direct food use shipments. Bulk shipments accounted for just 3 percent of direct food use shipments. Overall, since the 1960's, the share of small-range package sizes has declined for domestic direct food shipments, while the share of larger package sizes has increased. The share accounted for by the medium-range package size category has remained approximately the same. Larger package sizes are responsive to greater per capita consumption and more restaurant and institutional purposes.

Between 1969/70 and 1990/91, the share of domestic direct food shipments in small packages (under 5 pounds) declined from about 51 percent to 25 percent. Most of this decrease occurred in the late 1970's, when direct food use started expanding after almost two decades of little or no growth. Between 1969/70 and 1990/91, larger package sizes, those 25 pounds or greater, nearly doubled their share, from 21 percent to 39 percent. Over the same time period, the share ac-

counted for by medium-sized packages, over 5 pounds but under 25 pounds, rose from 28.5 percent to 33 percent.

## Brewers' Use

Brewers used about 11 million cwt of milled rice in 1990/91, about the same as a year earlier. This category of rice accounted for most of the growth in domestic rice use from the early 1960's until the late 1970's, a period when growth in food use was quite slow. However, brewers' use of rice peaked at nearly 11.2 million cwt in 1988/89 and has stagnated at around 11 million cwt since.

The recent stagnation of brewers' demand for rice is due to several factors. After expanding during the 1980's, total demand for beer did not expand in 1990 and has dropped slightly in the early 1990's. And after peaking in 1980, per capita beer use has been dropping since. This has been due to the aging of the U.S. population, competition from other beverages, and some potential health concerns related to alcohol consumption. In addition, beers using rice are considered premium domestic brands, and consumption of these beers was been hindered more by recession and slow economic growth than demand for lower priced or bargain beers. Also, light beers, which have grown in popularity in recent years, use less rice than do regular beers.

Brewers typically use broken kernels, short-grain, and medium-grain rice rather than higher priced, long-grain rice. Medium- and short-grain rice has increased as a share of brewers' use of rice since the mid-1980's, when broken kernels made up over 80 percent of brewers' use. Head rice currently accounts for over 40 percent of rice used in beer. In the fall of 1991, the major domestic brewer using rice specified higher quality standards for rice used in beer, thus heavily tilting demand toward the better quality broken kernels (sorted second heads) and greater use of medium-grain rice, since some broken rice is regarded unfit for beer use.

## Byproducts

Byproducts from rice milling include rice hulls (about 20 percent of rough rice weight), bran, polish, and germ (about 8 percent in aggregate of the rough rice weight or 10 percent of the brown rice weight after removing the hulls). The material removed from brown rice by milling is about 80 percent rice bran and about 20 percent polish of the starchy endosperm. Rice bran oil can be extracted from rice bran.

The feed market is the traditional destination for rice bran. Raw rice bran is typically sold for cash in bulk form at mill locations. Rice bran is also mixed with ground rice hulls and sold as mill feed. Rice mill feed is commonly priced one-third to one-half the price of rice bran, as it normally contains only one-third rice bran and two-thirds ground rice hulls. New potential markets for rice byproducts include stabilized rice bran for consumers in the food market, use of rice bran oil for cooking, and increased utilization of rice hulls for combustion.

Rice bran has traditionally been used for livestock feed rather than for human consumption because the removal of bran from the grain mixes an enzyme with oil in the bran that hydrolyzes rapidly and can produce a high level of free, long-chain fatty acids within hours. These fatty acids can produce an acid bite and a soapy taste. Conversely, the oil can be oxidized, which causes the typical rancid odors and flavors. Free, long-chain fatty acids do not reduce feed quality.

Technology has recently been developed to stabilize rice bran for food use by heating in an extrusion cooker, thereby preventing enzymatic hydrolysis of the oil in the bran. The commercial extrusion cooking process has been further refined and proven to be an effective, economically feasible method to process rice bran for the food market. Extrusion equipment has been installed by many large milling companies, and stabilized bran can now be used directly as a food ingredient if produced under sanitary conditions (Young and coauthors, 1991).

Various consumer products with rice bran have been introduced in the last few years, including a variety of breads, muffins, fruit bars, cookies, granola bars, graham crackers, and cereals. However, the amount of rice used in these products and sales volumes has been quite small. The market for rice bran as a food has been limited, compared to its use in the feed market. As a result, mills with bran stabilizers have thus far experienced low utilization of this equipment (Young and coauthors, 1991).

Prospects for greater use of rice bran in the food market are of major interest to millers because the established price reported by industry sources for stabilized rice bran in 1990 was about 10 times the price of raw feed bran and over twice the price of most milled rice at that time. Research indicates that rice bran is equal to oat bran for reducing cholesterol and could be easily substituted for oat bran as an ingredient in baking and cereal products. Compared with oat bran, stabilized rice bran has a cost advantage because

in the raw state it is a relatively inexpensive and abundant byproduct of milling (Young, Cramer, and Wailes, 1991).

The cholesterol-reduction benefit of rice bran has been recently attributed to the oil component of the bran. This health benefit was attributed to the soluble fiber content in the case of oat bran, fruits, and vegetable fiber. The information on rice bran oil is based mostly on the work of Dr. Nicolosi and coauthors at the University of Massachusetts at Lowell (1990). Two mills in California and one each in Arkansas and Louisiana have recently conducted tests on extracting rice bran oil (about 20 percent of rice bran) for sale through health food stores and as a food ingredient in bakery products and other food preparations.

This new development may have a major effect on the demand for rice bran oil if the oil becomes popular. The major supply source of rice bran oil in the United States is Japan. Plans to produce and market such oil in Arkansas were recently announced by Riceland Foods, a rice-producing cooperative headquartered in Stuttgart, Arkansas.

Most of the stabilized rice bran currently produced by mills is distributed to food processors for use in such products as frozen dough and bread mixes. The companies that manufacture bread mixes and frozen dough for retail and in- store bakeries were among the first to test rice bran. The second major food market for stabilized bran is breakfast cereal. As in the case of the bakery market, the growth of the breakfast cereal market for rice bran ingredient use has been very limited.

Except for California and Louisiana, there is limited utilization of rice hulls generated in the first step in milling; consequently, rice hulls currently present a disposal problem for most rice mills. About two-thirds of the hulls in California and about half in Louisiana are used for broiler fuel to supply two electrical generation plants. In addition, rice hulls are used for drying and parboiling by one mill in Texas and one in Arkansas. Rice hull ash, a byproduct of burning hulls under controlled conditions, is marketed in Louisiana, Texas, and Arkansas. Other uses of rice hulls include broiler house bedding, mill feed when mixed with rice bran, potting mix for plant nurseries, and as an aid in pressing fruit juice. Because of limited utilization, mill owners have received little income from sale of rice hulls except in California and Louisiana.

### Seed Use

Demand for seed rice is largely a function of acreage planted. Since 1987/88, annual use of rice for seed has totaled 3.4 to 4.2 million cwt, while planted acreage has ranged from 2.4 to 3.4 million acres. Seed rice use was 5.1 million cwt in 1980/81 and planted acreage exceeded 3.8 million acres, a record.

The seed-rice sector is composed of researchers, breeders, producers, and dealers, all of whom function to develop, produce, and market improved rice seeds. Through their linkages with other rice research systems worldwide, U.S. research programs have made significant advances in their rice breeding objectives. Increases in rice yields have resulted from the development of high-yielding varieties (HYVs) that have improved resistance to disease and pests. Research

### Byproducts of Rice

**Rice Hulls** The outer woody covering of the rice kernel. A very fine abrasive for certain polishing operations is made from rice hulls. They are used in the manufacture of certain other products such as hand soap and furfural, a product used in making synthetic rubber, rayon, and many other synthetic materials. Thousands of tons of rice hulls are also used as conditioners for commercial fertilizers, and as fuel.

**Rice Bran** This is the outer cuticle layer and the germ of the rice grain which is removed in the milling process.

**Rice Polish** Rice polish is produced during the final stages of the milling process. It consists of the inner layer of the grain plus small quantities of the outer layer of the kernel. It is highly digestible and has a high vitamin content.

**Rice Flour** Milled rice is ground into flour. This flour can be used in place of wheat flour.

**Rice Straw** After rice harvesting is completed, the remaining straw is often baled and used as a roughage feed and bedding for cattle and other livestock.

**Screenings** Broken kernels of milled rice that are about one-fourth to one-half as long as a whole kernel.

has also helped to continue and strengthen the superior quality of U.S.-produced rice. Quality milled rice, with the desired size, shape, appearance, and nutritional and cooking quality, has allowed the United States to remain competitive in world export markets.

The relatively small size of the domestic rice industry limits the amount of certified seed that can be produced and marketed as compared to other grains. Private research into varietal development has been limited, due to the high cost of such research and limited prospects for recovery of such investments. To compensate for this, most rice cultivars are developed by cooperative programs between USDA and the State experiment stations.

Each State has growers who produce seed--mainly certified seed--for rice producers. Most of the seed is provided under contract with a seed company that is registered with the governing agency of that State, licensing them to sell seed in that State. Any grower may produce seed rice, but in order to sell that seed to a certified seed company, the grower must pass both field and laboratory inspections and be licensed to sell seed rice.

The costs of growing seed rice are greater than those for producing rice for direct food consumption. To offset higher costs, seed companies purchase the commercial seed production at a premium. Since seed rice is grown chiefly under contract with a specified seed company, the varietal type of seed produced is usually a mutual decision between the seed contractor and seed producer.

### Factors Affecting Domestic Demand

Total domestic demand for rice is very stable. Food demand changes very little in response to changes in farm and retail rice prices. Statistical analysis indicates that a 10-percent change in retail rice price is associated with a change of about 1.8 percent, in the opposite direction, in food use (Grant, Beach, and Lin, 1984). The demand response to changes in farm prices is also very low. Changes in prices of potatoes, corn, and wheat products have been estimated to have almost no effect on domestic rice demand.

Population, ethnic mix, consumer awareness, health and nutrition attributes, and income are more important than price in determining food demand for rice. A 5-percent increase in U.S. per capita income has been estimated to cause per capita food use of rice to rise about 3 percent (Grant, Beach, Lin, 1984). An increase in the Asian, and to a lesser extent Hispanic, population in the United States has been a major factor in the upward trend of rice consumption. Health and nutritional benefits associated with increased consumption of rice, which has no sodium, fat, or cholesterol, have also led to increased per capita consumption of rice in the United States. Finally, the introduction of several quick cooking rice dishes, such as boil-in-the bag items and microwavable dishes, has encouraged consumption. The rice industry has highlighted the nutritional benefits of rice, as well as its convenience, in its marketing efforts.

There are several other reasons for this stable domestic rice market, including a simple marketing process and the lack of much exposure to volatile feed markets. Moreover, slowly changing tastes and preferences probably have more influence on the demand for rice than price. Rice consumption is very much influenced by demographics. Per capita rice consumption is highest in the Pacific region (primarily California) and the Middle Atlantic region (primarily New York and New Jersey), both areas of high Hispanic and Asian concentrations. Per capita consumption is also high in Florida and certain areas along the gulf coast, both of which have substantial Hispanic-American populations, and areas of the South that have a large African-American population.

## Prices

### Farm Prices

Farm prices have accounted for 12-15 percent of the retail price of regular milled long-grain rice since 1990. Milled rice prices have typically been about double farm prices, thus accounting for one-fourth to one-third the retail price of regular, milled, long-grain white rice. Although all three prices tend to move together, changes in farm prices have only minor effects on retail prices.

Government programs have had a major impact on U.S. rice prices since 1950. Farm support prices were above world trading prices from 1955 to 1972, and again from 1981 to 1986. This phenomenon had the effect of isolating domestic prices from factors affecting the world market and making U.S. rice uncompetitive in some export markets. A marketing loan provision was included in the 1985 farm bill in order to decouple the selling price from the support price. This provision resulted in more competitive U.S. prices in both domestic and export markets, but increased total Federal outlays to rice farmers.

The seasonal pattern of farm prices for rice is depicted in figures 12-16. Figure 12 is based on a

Figure 12
U.S. rough rice seasonal price index, 1960-92 crop years

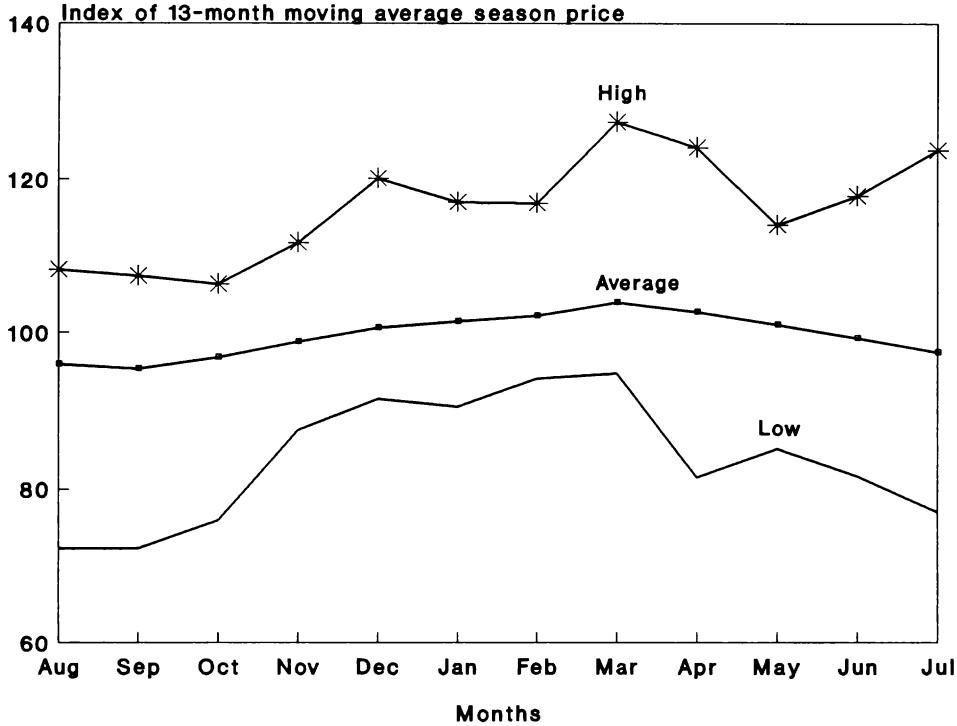



Figure 13
U.S. rough rice seasonal price index, 1960-72 crop years

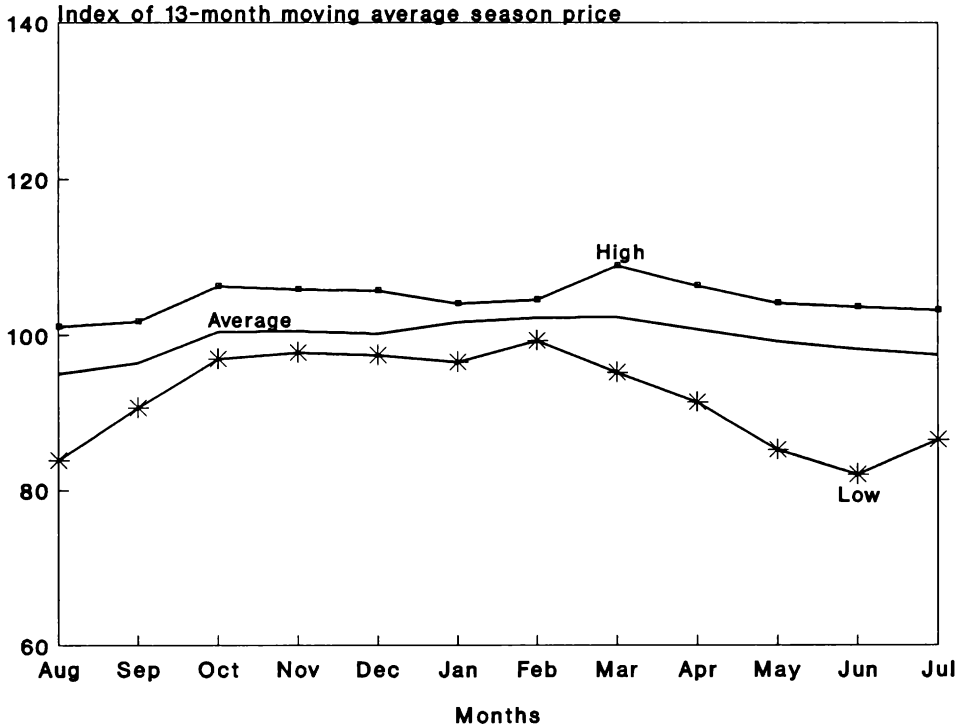


Figure 14
U.S. rough rice seasonal price index, 1972-81 crop years

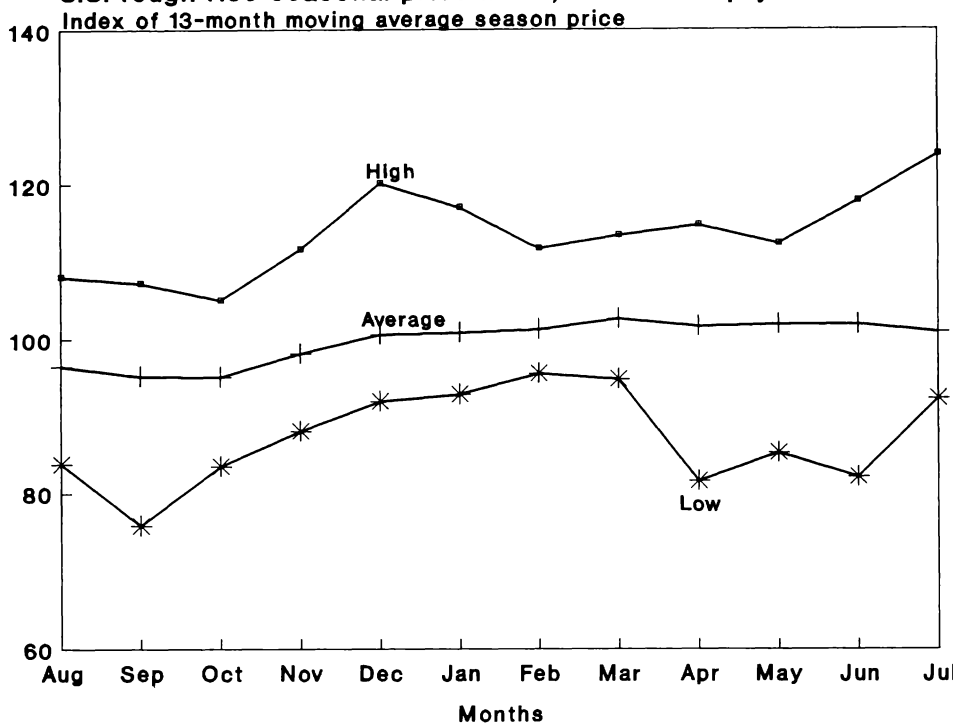



Figure 15
U.S. rough rice seasonal price index, 1981-86 crop years

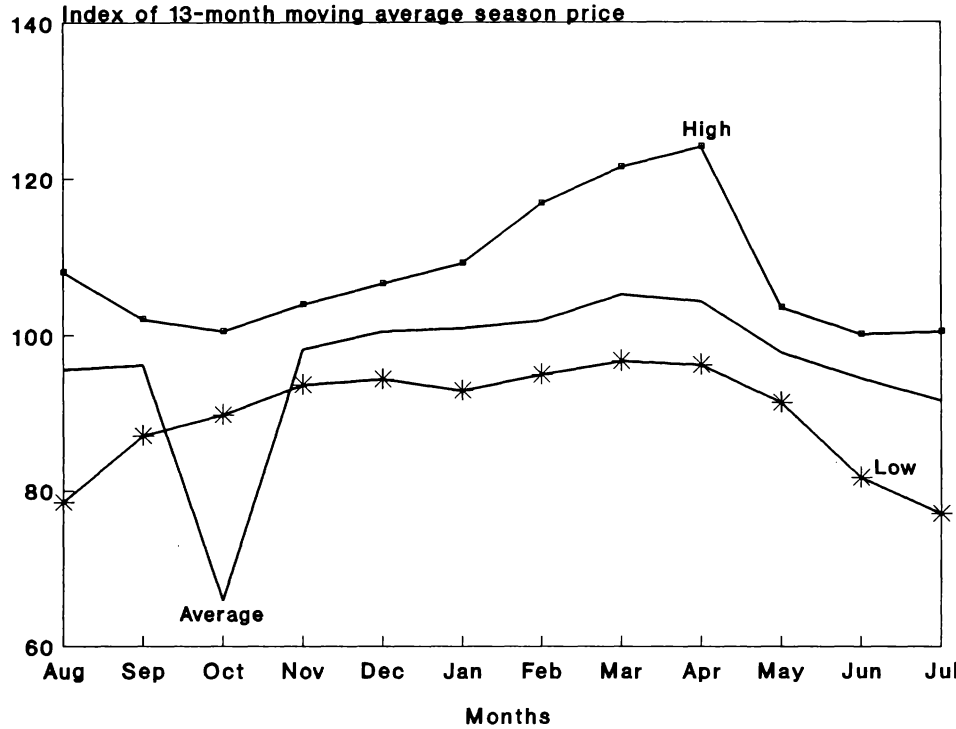


Figure 16
U.S. rough rice seasonal price index, 1986-92 crop years

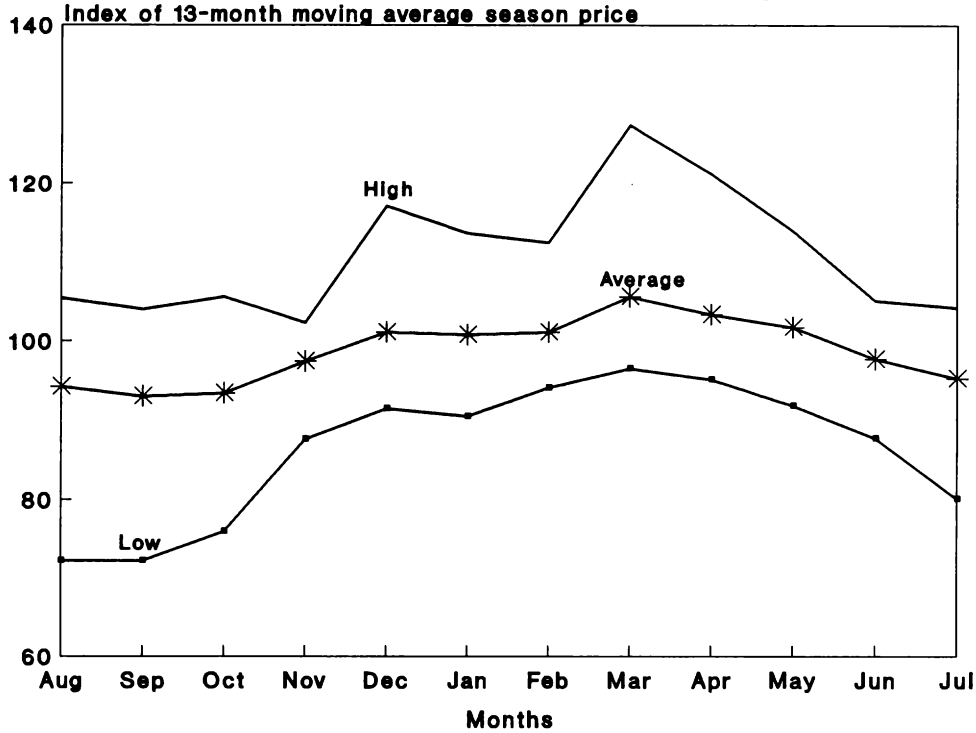



Table 19--Relative price and yields of long- and medium-grain rough rice

| Crop year | Long to medium rice U.S. price ratios | Long-to-medium rough rice yield ratios | |
|---|---|---|---|
| | | Arkansas | California |
| 1981 | 1.20 | 0.89 | NA |
| 1982 | 1.24 | 0.86 | 0.88 |
| 1983 | 1.31 | 0.88 | 0.84 |
| 1984 | 1.30 | 0.86 | 0.98 |
| 1985 | 1.15 | 0.95 | 0.98 |
| 1986 | 1.08 | 0.98 | 0.99 |
| 1987 | 1.22 | 0.89 | 0.94 |
| 1988 | 1.07 | 0.99 | 1.00 |
| 1989 | 1.13 | 0.96 | 0.92 |
| 1990 | 1.12 | 0.92 | 0.94 |
| 1991 | 1.12 | 0.93 | 0.90 |
| 1992 | 0.99 | 0.91 | 0.94 |
| 1993 | NA | 0.99 | 0.98 |

Source: Rice Situation and Outlook Report, USDA/ERS, various issues.

13-month moving average index from 1960 to 1992. The mean high and low deviations from the average are also indicated. On average, prices increase after the harvest low in August and September, and rise to a peak in February and March. There has been a tendency for somewhat greater volatility between November and March.

As relative prices change to reflect changing consumer preferences, the price system provides a strong signal to producers to adjust operations. Since 1980, the price of long-grain, rough rice has exceeded that of medium grain by an average of 17 percent (table 19). This price difference has compensated for long grain's yield disadvantage. Yields of long-grain rice averaged 92 percent of yields of medium grain in Arkansas and 94 percent of yields in California. Even though the rough rice yield differential favors long grain in California, a higher milling yield for medium-grain rice keeps medium grain more profitable.

Long-grain rice usually receives a premium over medium and short grain, and whole kernels are always worth more than broken kernels. Parboiled rice ordinarily sells at a premium, compared to white rice, since it is usually processed for specific high-quality domestic and export markets. Discounts and premiums are also applied to reflect the presence or absence of certain quality characteristics (such as smut or peck) in the rough or milled rice.

## Milled Rice Prices

Monthly U.S. No. 2 long-grain, milled-rice prices in Texas have varied from a low of $9.20 per cwt in September 1960 to a high of $34.50 in November 1973 (app. table 35). However, Texas mill prices were relatively stable during much of that time, a period when U.S. support prices were above the world trading prices.

Monthly medium-grain mill prices are usually slightly below long-grain prices, and short-medium grain prices are usually below medium. All three, however, tend to move together (app. tables 33-39). The degree of association between Southern and California seasonal average mill prices is not as great as the degree of association between long- and medium-grain prices in the South. Nor is it as great as the association between medium- and short-grain prices in California. This difference is partly due to a lag reaction of California prices to changes in Southern prices and to differences in marketing structures.

## Byproduct Prices

Monthly price series dating back to the 1960's are available for second heads (a category of rice), bran and millfeed, but not for screenings, hulls, and polish. Second-head price quotations for Louisiana long-grain rice ranged from a low of $5.50 per cwt in February and March 1960, to a high of $16 per cwt in the spring of 1974 (app. table 40). Monthly average bran prices in southwest Louisiana have varied from a low of $16.25 per ton in August 1986 to a high of $120.85 per ton in December 1983 (app. table 41). The pattern of monthly bran prices is related to prices of other rice products and feed substitute prices. Prices for rice millfeed, a mixture of polish, bran, and ground hulls, are not highly correlated with milled rice prices, but are influenced more by competing feed ingredients (app. table 42).

## The Marketing Loan

The implementation of a marketing loan for rice under the 1985 Farm Bill revitalized the U.S. rice industry at a time when its future looked bleak. The rice marketing loan went into effect on April 15, 1986, and its impact on U.S. exports and stocks was immediate and dramatic. Its continuation under the 1990 Farm Bill helped to make U.S. rice more competitive in the world market (Livezey, 1993).

The 1985 Farm Bill and succeeding legislation shifted the Government's role in agriculture from one of primarily providing price and income support and controlling supply, to one of maintaining U.S. price competitiveness in the world market. Price and income supports were lowered to better reflect world market conditions and to discourage surplus domestic production. Although the U.S. loan rate was reduced in 1985/86, legislation required that the loan rate not fall below $6.50, still high enough to price most U.S. rice out of the world market at that time.

To make U.S. rice more competitive in world markets, producers are allowed to repay their crop loans at a rate based on the world price when the world price is below the loan rate. This marketing loan outlay is absorbed by the Government. Thus, exporters and domestic users can purchase U.S. rice at a price closer to its world market value while farmers continue to receive the total loan value.

While the marketing loan program helped to revive U.S. exports and, along with strong domestic demand, successfully eliminated burdensome stocks, the program has not always kept U.S. prices fully in line

with world prices. In many years a substantial premium (the amount that the price received by producers exceeds the world price) has developed and U.S. export growth has been hindered.

U.S. prices normally average somewhat above the world price, reflecting a premium paid to growers to entice them to repay loans and sell rice rather than forfeiting the grain to the Government. From 1986/87 through 1992/93, the annual premium was between 25 cents and $1.73 per cwt.[3]

Government stocks, for which there is no premium needed for redemption, were virtually depleted by 1987/88, and the increasing tightness of supply (brought about by constrained production and growing domestic demand) was reflected in the rapidly declining stocks-to-use ratio. Between 1985/86 and 1990/91, the ratio plummeted from 62 to 15 percent. In 1991/92, the ratio edged up slightly to 17 percent. Statistical analysis has shown that there is a strong inverse relationship between the stocks-to-use ratio and the level of the premium.

Since 1985, U.S. rice prices have become more responsive to world market conditions and thus more variable, less predictable, and have more downside potential. Knowledge of markets, especially international markets, has become more important. The marketing loan has kept the industry operating at a higher volume than it would have under earlier legislation, but industry participants are required to make riskier decisions in uncertain markets.

## Rice Quality

### Measurement of Quality

Milling, processing, cooking, and nutritional characteristics are of great importance in measuring rice quality. Quality determination is based upon both objective and subjective criteria, with the relative importance of each depending upon the end use. Even for the same use, very different tastes and preferences exist in terms of grain size, stickiness, and flavor based on cultural and ethnic characteristics of consumers. Because most rice, unlike other cereals, is consumed as a whole grain, such physical characteristics as shape, size, uniformity, color, and general appearance are the most important attributes for rice (Webb, 1985).

Rice quality is influenced by both genetic and environmental factors. Unlike other grains and cereals produced in the United States, private rice breeding and seed companies have only a very minor share of the breeding and seed market. Their small share is due to the relatively small size of the market for rice seed (approximately 3 million acres) compared with other grains, the high cost of developing hybridized rice seed, and the efficiency of State-Federal breeding programs, which, in collaboration with State seed foundation programs, work closely with the rice industry in producing varieties with desirable end-use qualities. This system is enhanced by USDA's National Rice Quality Laboratory at Beaumont, Texas, which assesses cooking and processing qualities of developmental varieties.

Environmental factors affecting rice quality include weather and cultural practices during the field growth of the rice plant as well as timing, duration, purity of harvest, and post-harvest operations, including drying and storage, handling and transportation, milling, and packaging.

The most important quality characteristics, common to all rice users, are (1) milling qualities, which include: milling yield, size, shape, weight, uniformity, and general appearance (translucence and color), and (2) cooking and processing qualities, the most important being the percentage of amylose and the alkali spread (Webb, 1985). Milling qualities include physical characteristics which, in the United States, differentiate rice into long-, medium-, and short-grain varieties. The milling yield is important since it is a measure of the head (full grain) and total (full grain plus brokens) yield of rice. Because most rice is consumed as a whole grain, a premium is attached to rice varieties that yield a higher percentage of whole grains.

Milling yields are influenced by many factors, including a high degree of heritability. Physical abnormalities such as chalky color, peck (insect damage), heat damage, and so forth all typically lower both milling yield and grade. Varieties with low milling yields are typically demanded by brewers and makers of rice flour. Higher milling yield generally increases the cost of brewers' rice and flour,

[3]The producer premium for each crop year (August-July) is calculated by subtracting an average world market price (WMP) (August-July) for all classes of rice (long, medium, short) from the annual average price for rough rice received by producers for all classes of rice. The average price for rough rice for each crop year is reported by NASS (app. table 31). The average WMP is computed by calculating a simple average (August-July) of the weekly announced prices for each class and weighting each average price by that class's level of total U.S. production (app. table 1) for the respective crop year.

which both use mostly brokens. Varieties with higher milling yields produce relatively fewer broken kernels.

Cooking and processing qualities, which are important for all users, include texture and stickiness. Distinct preferences for dry, fluffy, separate-grained rice compared to moist, clingy, sticky rice are found in the United States and the rest of the world. The two most important quality indicators for these characteristics are the percent amylose, which is a predictor of stickiness, and alkali spreading value, which is used to classify rice by gelatinization temperature. In the United States, these chemical characteristics tend to be distinctly different by type of rice. Specifically, the long-grain types tend to have higher amylose and lower alkali spreading values, resulting in dryer, fluffier, and less sticky rice. The medium- and short-grain varieties typically have lower amylose and higher alkali spreading values, resulting in moister, stickier rice.

Numerous other quality characteristics are important to selected end-users. Hull color, for instance, is important for parboiled rice, since a darker golden hull color will stain the endosperm, making it a darker color during the parboiling process. Since buyers generally prefer a lighter stain, a lighter hull color is desired for rice that is to be parboiled.

Bran color has a similar staining effect on parboiled rice. However, bran color is also an important quality characteristic for regular milled rice, since removal of darker brans generally requires higher milling pressure resulting typically in lower milling yields (higher breakage).

Translucence is an important quality characteristic for all types of rice, except glutinous varieties that are opaque. This type of rice has extremely low amylose and very high amylopectin, resulting in a highly gelatinous rice used in desserts in the United States.

Test weight is an important predictor of total milled rice yield and is a useful quality characteristic for determining weight and volume relationships in drying and storage of rough rice. The U.S. standard is 45 pounds per bushel. The average for long grain, however, is 42-45 pounds while the medium and short grains average 44 to 48 pounds per bushel (Webb, 1985).

Selective cooking and processing qualities are important to a few industries. In breweries, the use of rice is enhanced by lower lipids, which means that the rice must be well-milled, since most of the rice oil is in the bran layer. A high lipid or oil content in the rice adjunct can give beer an off-flavor, reduce fermentation efficiency, and decrease foam formation and retention of the finished product (Yoshizawa and Kishi, 1985). Particle size of broken rice is typically set within a permissible range by the brewery. Finally, rice with a higher gel temperature and viscosity (typical in long-grain varieties) reduces brewing efficiency. On the other hand, certain long-grain characteristics such a higher amylose percent, are desired for grains used in canned rice, precooked, and parboiled rice.

A relatively new quality characteristic demanded by some U.S. consumers is aroma. Traditional and well-established Asian varieties such as basmati (Pakistan and India) and jasmine (Thailand) are popular aromatic varieties in world markets. Numerous aromatic varieties have been available in the United States for several years, and the growth in demand for this type of rice has been relatively rapid.

## Measurement Technology

Measurement technology for various quality factors in rice has not changed substantially in recent years. Due to the importance of appearance, many factors tend to have a high degree of subjectivity. Rice inspectors, both Federal and independent, attempt to minimize this by submitting graded samples to another inspection office for review. In addition, various attempts to develop more objective grading procedures are being made. Manufacturers in Japan are attempting to introduce equipment capable of simultaneously measuring a wide set of quality factors. Researchers in the United States are attempting to measure grain fissuring before the grain is dried, thus enhancing the ability to sort and store rough rice by potential milling yield earlier in the market channel.

## Quality Control

Quality control in rice is initiated when the producer selects a variety for planting. Cultural practices, including insect and weed control, are essential in preventing pecky rice, red rice, and numerous other quality-degrading factors from contaminating harvested rice. Rice quality at harvest is affected by the moisture content of the harvested grain and harvest operations such as rewetting field-dried rice, cylinder speed of the combine, and the amount of foreign matter transferred into the grain bin. Harvesting at too high a moisture level not only causes lower milling yields, but is also known to result in chalky rice (Webb, 1985). On the other hand, rice harvesting at

less than 16 percent moisture may increase stress cracking and mechanical injury. In general, the slower the cylinder speed of the combine, the higher the milling yield.

While many factors during drying and storage contribute to quality changes, the most important is the rate at which the rice is dried. Drying too fast at too high a temperature will generally lead to a lower milling yield due to stress cracking (Kunze and Calderwood, 1980). Storage conditions, including cleanliness, insect control, and adequate aeration, are important quality-control activities at this stage.

Quality control of U.S. rice occurs at all stages of its processing and marketing. Rough rice from the farm is typically sampled for moisture and grouped by grade and variety to be cleaned, dried, and stored. A dried sample is then sent to the quality control lab of the mill where the milling yield and grade is measured. When rough rice is eventually purchased, similar samples are available to buyers for inspection. Rice to be exported is graded by Federal Grain Inspection Service (FGIS). Official grades of the USDA are used essentially as minimum standards in the U.S. rice trade. Because of the many different uses and requirements by processors, rice mills typically have more specific quality requirements not reflected fully in the grade classification.

## Grades and Standards

An official lot inspection certificate can be obtained if the Federal Grain Inspection Service (FGIS) takes the sample from a lot of rice and inspects and grades that sample. Federal inspection is offered, but it is not mandatory. However, an inspection certificate that has been issued after a Federal lot inspection is a safeguard for both buyers and sellers. Federal inspection is used primarily for rice that is being exported (grades and grade requirements for classes of rough rice, brown rice and milled rice are provided in appendix tables 62-64 (USDA, 1982 and 1983).

While the grade standards have not changed significantly since their introduction, some adjustments have occurred regarding procedures of inspection and standards for specialty rices. With the growing importance of specialty rice, standards have been provided so that specialty rices do not necessarily grade as sample grade. Waxy (glutinous) rice, for example, has an opaque white appearance that would make only sample grade under the usual milled rice standard. Its appearance is not easily distinguishable from chalky kernels. Waxy rice can be graded with specific standards so that it is not downgraded by its appearance. Similarly, aromatic rice is graded like most long-grain varieties currently grown in the United States. However, mills do not want to get aromatic varieties mixed into their milling lots since the aroma can contaminate the equipment as well as the nonaromatic rice. The current procedure to grade aromatic is to require a special designation, "aromatic," along with the regular milled rice grade requirements. If the rice is inspected without a declaration of "aromatic," and a natural aroma is detected, then it is graded as sample grade.

## Issues and Problems

The research dealing with the estimation of price and quality relationships in rice is limited. Results of hedonic price studies found the percentage of whole grain rice produced from a given amount of rough rice, reflected in price premiums, to be the most important quality characteristic. Important discount factors consistent with grade standards were seeds, peck, and red rice. A study by Brorsen, Grant, and Rister (1984) found that the rough rice grades inadequately represented the value of rough rice. Their study specifically shows that in addition to the rough rice grade, head yield, mill yield, and test weight strongly influenced the value.

There has been little examination of price and quantity relationships. Brorsen, Grant, and Rister (1984) reported that the size of the shipment influenced acceptance price behavior by producers. Specifically, the larger the shipment, the less likely a given bid price would be accepted. Producers with small lot sizes were more likely to accept a given bid pricerather than hold out for a higher bid. Cooperatives have traditionally not discriminated in price based on size of delivery.

If quality control is implemented throughout the market channel, hedonic price models for rough and milled rice prices can provide a framework to identify the benefits of improving a given quality factor. Such information in the hedonic price models, however, tends to show that the economic returns to quality control vary from year to year and are a function of supply and demand forces (Brorsen, Grant, and Rister, 1988).

The U.S. rice industry has had a worldwide reputation for offering high-quality rice. It owes its reputation to careful breeding programs, improved cultural practices, and modern, sophisticated rice drying, storage, and milling facilities. Thus, the United States has had a dominant market share of the high quality European

and Middle East rice markets. However, two factors have contributed to a loss of U.S. market share in recent years: (1) export competitors, specifically Thailand, have made substantial improvements in rice quality and thus cut into U.S. market shares, and (2) the high-quality segment of the world market has grown more slowly than the lower-quality segment. Two factors account for this uneven growth, first, low-quality markets tend to be much more price competitive than high-quality markets and second, most low-quality sales are government-to-government sales. In order for the United States to compete in low-quality markets, it has been necessary to rely on Government export programs.

### Information Dissemination

Information on rice prices, quantity, and quality is available for only a relatively small proportion of total U.S. rice sales, because producer cooperatives dominate rice marketing, and contract pricing is prevalent. However, a small amount of the U.S. crop is sold through public auctions in Texas, Louisiana, and Arkansas. These auctions provide information on bids and acceptance prices, but their data are not widely published. The *Rice Market News* (USDA) typically reports representative Louisiana rough rice sales by lot size, grade, variety, head and total milling yield and price. Milled rice price data are typically reported by grade and percent broken kernels. The *Rice Market News* also reports offering prices for rice produced in the United States, Thailand, Argentina, Uruguay, Surinam, Guyana, Italy, Brazil, and Australia.

### Promotional Activities

The U.S. Government supports foreign market development through the Market Promotion Program (MPP) administered by the Foreign Agricultural Service of the U.S. Department of Agriculture. Although The United States promotes rice heavily in traditional importing countries, it promotes it in countries which maintain significant trade barriers. Because rice is a staple crop in most Asian countries, changes in rice policy are politically sensitive. Trade protection and substantial import restrictions are common.

The Rice Council in Houston, Texas, is responsible for industry promotion and development for domestic and export markets. Since there is no international rice grading system, the Rice Council initiated a study in the 1980's to evaluate world rice varieties and types. USDA and Rice Council representatives throughout the world collect rice samples used in their studies. These samples are graded by FGIS according to the *U.S. Standards for Rice.*

### Anticipated Changes

Changes in taste preferences due to increased domestic consumption of rice could challenge the quality requirements for the industry in the future. Relatively new and growing uses include rice flour, where quality control of microbial activity is important. The growth in the demand for ready-to-eat and easy-to-cook rices may require new varieties for which the current standards are inadequate.

With trade liberalization of rice, as concluded in the Uruguay Round, the United States would be able to export rice to countries, such as Japan and South Korea, with very rigid quality requirements. Similarly, specialty rice imports into the United States increased 20-fold during the 1980's (Wailes and Livezey, 1991). The growth of market niches may give rise to domestically produced substitutes for these imports.

Production changes regarding quality are most influenced by choice of variety, location, and cultural requirements. The development and maintenance of a national germ plasm collection can provide the basis for continued improvement of quality characteristics. The current geographic specialization of indica-type long and medium grain in the Southern States and japonica-types in California is unlikely to change rapidly. However, shifts in preferences for rice types and varieties in world and domestic markets will challenge breeders, producers, and processors to adjust and develop qualities of rice that meet the end-use demand.

Finally, more research on how to measure quality and the economic value of quality characteristics is needed. The growth in the specialty rice markets will require new techniques and tests for texture, taste, and flavor. New technology poses the opportunity for improved grading, conducted earlier in the market channel so that pricing and technical aspects of processing can be more efficient.

## Marketing System

Nearly all rice is marketed in some processed form. Thus, it is important to distinguish between rough or paddy, and milled rice. Physical characteristics, demand, and prices vary considerably between the two.

Rough, or paddy, rice contains the white endosperm, hull, and bran. Depending on the extent of the mill-

ing process, four different products can be produced from rough rice: hulls, bran, whole-kernel milled rice, and broken-kernel milled rice.[4] In addition, rough rice may be parboiled, a process of soaking and pressure-cooking rough rice which causes the bran to blend with the inner kernel. In general, only long-grain rice is parboiled because it is less gummy for milling. Whether the rice is parboiled or not, the next stage of milling is removing the hull. This produces an intermediate product called brown rice. The final stage of milling removes the bran, leaving milled white rice.

Some of the kernels are broken during milling. These broken kernels are classified and priced according to their length: second heads (the longest), screenings, and brewers (the shortest). Broken kernels are generally used in processed foods, primarily cereal and pet food, or in brewing beer, where length of grain and appearance are less important than in direct food use.

There are four general categories of milled rice: parboiled, brown, milled, and broken rice. Rice is usually described on the basis of the length of grain and the milling process: long-grain parboiled, medium brown, or short milled, and so on. However, broken kernels lose their class identity and are often sold simply as brewers or screenings.

The rice industry is the total of all value-adding operations that are performed during the production and marketing stages. Each sector of the rice industry makes decisions regarding input supply, production, transportation, processing, and marketing. Figure 17 illustrates the rice marketing system in the United States from farm production to the final consumer.

## Drying and Storage Sector

Beyond supplying space to store the grain prior to milling, storage facilities also provide the drying process in order to maintain grain quality during extended storage periods. Rice is different from other cash grain crops (for example, in the case of wheat the bulk of consumption is in terms of flour) because nearly all rice is consumed in kernel form. Thus, care must be exercised through all stages prior to milling to minimize the number of broken kernels. Exposure to rapid moistening or drying can cause cracks or fissures in the rice kernel (Kunze and Calderwood, 1980), which can have a dramatic effect on the milling quality of the grain. Cracks caused by faulty harvesting or drying methods can cause broken kernels during the milling process, resulting in lower prices and lost profits for farmers, drying facility owners, and millers.

### *Onfarm Drying and Storage*

Onfarm storage is one way rice producers can integrate their operations into a second stage of the marketing channel after drying. Some producers may be able to improve their returns by investing in onfarm drying and storage facilities. Improved returns from such an investment can result if onfarm costs of drying and storage are lower than commercial rates or if farmers take greater care in handling of the rice, thus leading to higher quality and a better price.

One study has shown that, if producers are willing to accept greater price uncertainty, they can increase the price of rice up to 16 cents a cwt by providing onfarm drying and storage facilities (Elam and Holder, 1985). The risks associated with postharvest storage could lead to a variation of plus or minus 22 cents per cwt.

Onfarm storage and drying facilities are located in every major rice-producing State, but no data are available on the number of farms with facilities or the total capacity of existing onfarm facilities. In 1982, farm-stored quantities reached a record high (48.4 million cwt) in each State after a record harvest (182.7 million cwt) in 1981. Since that time, onfarm storage has declined due to lower production and greater demand for rice. Among States, Arkansas had the largest quantity of onfarm rice stocks (app. table 20).

### *Commercial Drying and Storage*

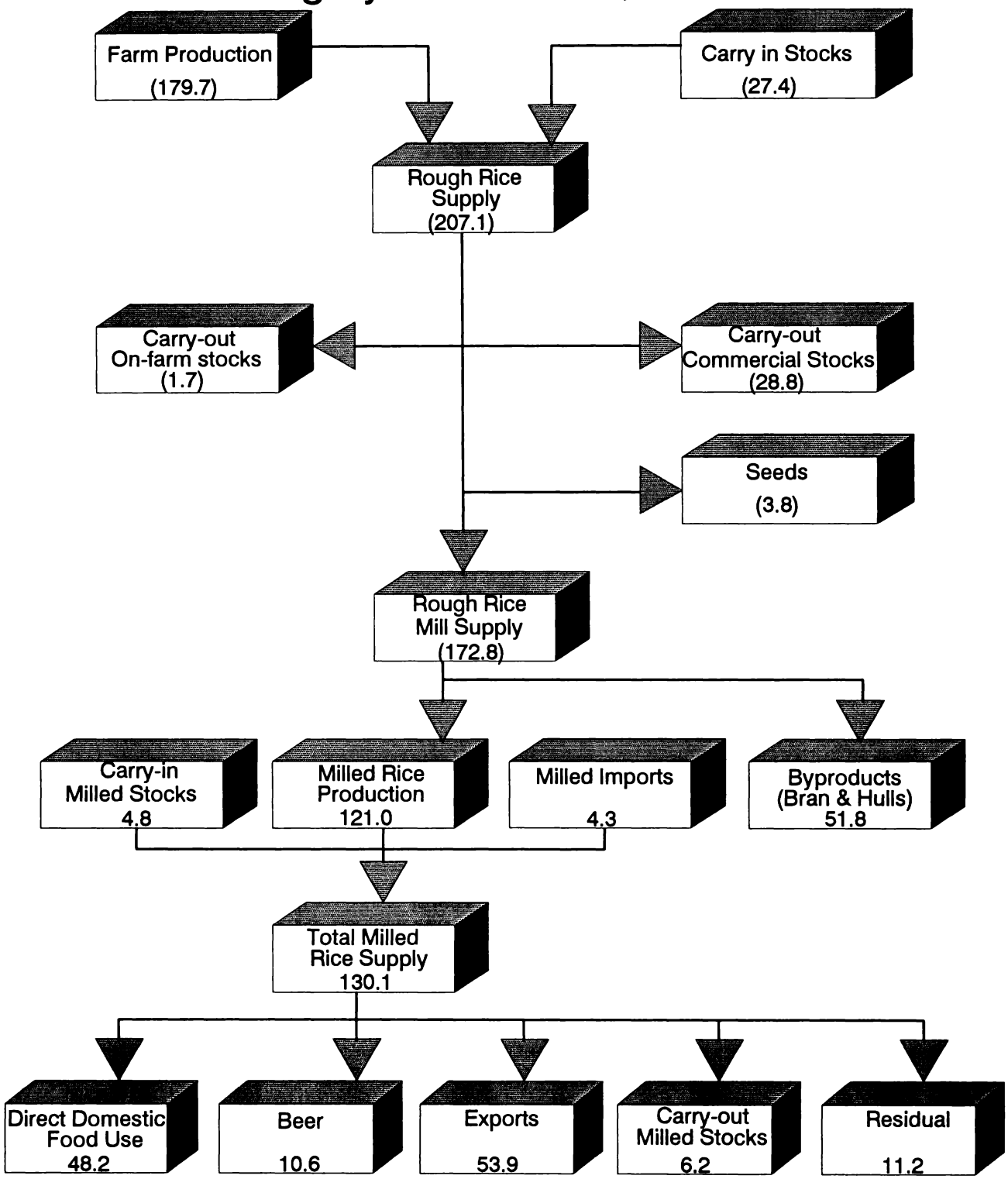
Commercial drying and storage facilities are an alternative to onfarm ones and include both those that are independent and cooperative. Commercial facilities are important to the industry's marketing system. Warehouse driers have typically held more than 60 percent of U.S. rice stocks in recent years. Among rice stocks in commercial facilities for all States, California warehouses have stored the largest share. Warehouses in Louisiana and Mississippi have held the lowest share of rice stocks in commercial facilities because of the greater supply of onfarm storage space in those States.

The number of commercial warehouses has been increasing since the mid-1960's (Smith and Wailes, 1988). Fluctuations have occurred in the number of facilities within States, and certain capacity ranges

[4] While there are four primary products, there is growing interest and research on innovative and unconventional uses for rice, including rice oil, defatted rice bran, starch, protein, and so forth.

Figure 17

# U.S. Marketing System for Rice, 1992/93




August-July. Million cwt. Figures in parentheses are rough basis; others (except byproducts) are milled basis (assuming 70-percent milling yield).

have declined (app. table 26). Commercial storage ones with less than 400,000 bushels capacity have shown the only decrease in number in recent years. This could be due to expansion of existing facilities or the closing of uncompetitive ones.

The total number of facilities has increased continuously since 1965, with a large increase in the over-1,200,000 bushels capacity category. The largest number are in Arkansas, where commercial rice driers increased by 44 percent from 1965 to 1986 and by 10 percent between 1982 and 1986. By 1986, Arkansas had 35 percent of all driers in the five southern rice-producing States and 38 percent of the facilities with capacities greater than 400,000 bushels. Texas has shown the greatest decrease in warehouse capacity.

Local drier cooperatives not affiliated with marketing cooperatives are also a marketing alternative. These facilities may either market rice to a mill for the farmer or act only as a place for drying and storage. Since the early 1970's, the number of cooperative drying and storage facilities has increased 29 percent, while the number of independent facilities has risen 56 percent. And both types of facilities have increased capacity by more than 100 percent (Smith and Wailes, 1988).

## Marketing Sector

Rice producers have a number of pricing methods available to market their rice, such as pooling, bidding, direct contracting, and hedging. Each producer chooses the pricing method most suitable to his or her risk behavior and desired timing of payment. In addition to alternatives in pricing, there are varius marketing methods.

Those producers who do not deliver their rice to a cooperative usually sell to a privately owned mill. In this case, the farmer pays for drying and short-term storage before the rice is sold. Therefore, rice often remains in on-farm storage or commercial facilities until delivered to a mill. The marketing of rice differs among individuals and producing areas. For instance, producers in Arkansas and California market their rice primarily through marketing cooperatives. Those in Louisiana and Mississippi rely on direct sales or a bidding process.

Marketing agencies that act only as a seller are available in all the southern rice-producing States. These agencies can be either independent firms or cooperative marketing associations. There is typically no physical handling of the commodity by independent selling agencies. Samples of the rough rice are delivered from either the producer or the commercial storage facility. The rice sample is shelled and milled with a small huller and rice mill and the sample is graded by the selling agency. Interested buyers arrive on sale days and inspect the sample. A sealed bid method is used to sell each lot (a "lot" being defined as a specific quantity of rice that a farmer has placed for sale). After receiving the bid, producers are usually given 24 hours to respond to the offer. On acceptance of an offer, ownership is transferred by the selling agency, with the buyer paying the costs of moving the rice from the storage facility.

The Louisiana Farm Bureau Marketing Association has a rice sales desk for marketing their members' rice. Approximately 20-25 percent of Louisiana's rice crop is marketed by the Louisiana Farm Bureau. Arkansas has three independent rice marketing companies, which marketed an estimated 6 percent of the State's production in crop year 1987. Between 40 and 50 percent of Mississippi's rice production is marketed by the bid and acceptance method. Texas, with 17 sales desks, has the greatest number of agencies that market rice by the bid and acceptance method. This method is used to market more than a third of Texas' total rice output. California is the only State not using marketing associations as a method of marketing rice, primarily because of the dominance of cooperatives in that State.

### *Cooperative Pooling*

Rice marketing cooperatives in California and Arkansas use a seasonal pool for allocating storage costs and paying producer members. Roughly 70 percent of the rice production of these two States is marketed in this manner. Rice that is delivered to cooperative driers is sampled and graded. The rice is then commingled with other producers' rice of like quality. A partial payment is made to producers at the time they deliver their rice to the cooperative, with additional payments made later in the year. Costs associated with drying and storage are also pooled. Producer members pay a base rate per unit of rice, with discounts and premiums given for quality and moisture content differences.

Cooperatives are an important element in the structural makeup of the rice industry. The Rice Millers' Association indicates that cooperatives processed 50 percent of the 1987 rice crop. Cooperatives within the rice industry are usually more vertically integrated than most other farmer cooperatives. This integration extends from provision of seed rice, machinery, fertilizers, and credit to production of the crop to drying and storage, milling, and transportation into the channels of product distribution.

Marketing cooperatives are strong within the rice industry, there being only four: two in Arkansas and two in California. These cooperatives allow their producers to be vertically integrated from farm level production through marketing of milled rice to consumers. Profits realized from drying and storage, milling, and marketing are returned to the producers. Producer members of the marketing cooperatives are usually also members of locally affiliated drier cooperatives. This system of membership is synonymous with a centralized cooperative in which producers are members of the larger marketing system.

Cooperatives contract for the delivery of rice from their members by the end of June. The type of rice and the number of acres planted are specified. Contract terms differ in that some cooperatives have penalties for grain not delivered. Membership contracts specify that the cooperative will determine the grade, weight, milling yield, class and quality of all delivered rice. The rice may then be pooled before or after milling with like grade, class, and quality of rice.

### *Private Contracting*

Rice can be sold green (crop still standing in the field) through a private contract between the producer and the mill or at a public sale. Ownership is transferred directly after harvest. It has been estimated that 25 percent of the rice marketed in 1984 was sold in this way (Dismukes, 1988). Texas, Mississippi, and Louisiana producers favor this method of marketing.

### *Commodity Credit Corporation (CCC)*

CCC is another market alternative for producers. Since enactment of the 1985 Food Security Act, which had a major goal of reducing rice stocks, very little rice has been accumulated by the CCC. The CCC acquires rice by offering nonrecourse loans to producers. If the market price is less than the loan rate set each year by the Secretary of Agriculture, the producers may choose to forfeit their rice, and the CCC takes delivery of a producer's rice as full payment of the loan.

With the addition of the marketing loan mechanism, the producer was allowed to repay the loan at a repayment rate as low as 50 percent of the 1986-87 loan rate, 60 percent of the 1988 loan rate, and 70 percent of the loan rate of subsequent years. The farmer retains the difference.

### *The Futures Market*

The futures market provides an alternative marketing channel to producers, elevator operators, millers, and food processors. By allowing hedging opportunities, price risks are absorbed by speculators. An active futures market facilitates price discovery and provides risk management opportunities (Hoffman, 1990).

Rough rice futures trading has been conducted since August 1986 at the Midamerica Commodity Exchange, trading on the floor of the Chicago Board of Trade. Before 1986, rice futures trading had an unsettled history. In the early 1980's, rice was traded at the New Orleans Commodity Exchange (NOCE), but trading stopped in July 1983. While retaining the NOCE name, the rice contract was moved to the Midamerica Commodity Exchange in September 1983, where it was briefly traded. The NOCE became the Chicago Rice and Cotton Exchange (CRCE) in 1984 and was acquired by the Midamerica Commodity Exchange in December 1985. In August 1986, rice contracts began to trade under the CRCE, but in November 1991 the CRCE was dissolved and rice trading was taken over by Midamerica.

The present contract trading unit is for 2,000 hundredweight (cwt) of rough rice. All futures contracts are for No. 2 or better long-grain rice and no other grade is deliverable. Delivery months include January, March, May, July (beginning in 1989), September, and November. All 26 delivery points are in Arkansas.

Trading in the current rough rice futures market opened in 1986 and activity has picked up significantly since then. Trading volume in 1986 was 3,095 contracts. By 1987, volume had jumped to 31,114 contracts and in 1990 peaked at 55,385. Activity slowed in 1991 and 1992, but rice trading picked up again in 1993. As of August 10, 1993, volume had reached 20,602 contracts, 23 percent higher than for the same period a year earlier.

While trading volume has exceeded the levels of a "low volume" contract, the rice futures market is still a very "thin" market compared with other grains. For example, there were only 11 million bushels (1 hundredweight = 2.22 bushels) of rice on open interest as of early July 1993, while wheat open interest futures contracts typically amount to 450 million bushels. This equates to about 3 percent of the rice crop and 18 percent of the wheat crop.

## Milling Sector

The milling sector of the United States rice industry performs multiple tasks from acquisition, storage of rough rice, processing and packaging, to distribution of milled rice. The number of rice mills is very small

compared with the number of storage and drying facilities (table 20). The size of individual mills and the extent of vertical integration of mills has also increased in the past few years, creating a more concentrated sector (U.S. Department of Commerce, Census of Manufactures).

### *The Milling Process*

The milling process includes receiving rough rice from storage facilities, all milling activities, and shipping milled rice. Mills must have enough storage space to hold the rice destined for processing within a short period of time. However, some mills also have drying facilities. The major function of local rice dryers and storage facilities is to hold rough rice for longer-term storage until the mill itself has working storage available. Besides storage space for rough rice, rice mills must also have clean storage areas for milled rice.

Direct processing in mills includes the cleaning, shelling, and sorting of rough rice. Sorting of rough, brown, or white rice is done according to size, grade, and color, with several types of rice being processed for direct food use. Regular milled white rice has the hull and bran layers removed by friction or abrasion; brown rice is processed similarly, but the bran layer is retained on the kernel.

Mills are of two basic types, regular and parboil. Nearly all mills are capable of producing white and brown rice. Because of the need for uniformity in milling, due to screening and calibrations on hullers and bran removal equipment, mills typically process in lots of like varieties. Parboiling mills have preferences for certain varieties that are uniform within the parboiling process.

### *Structure of the Rice Milling Industry*

As one moves from the producing sector to the processing sector in most agricultural industries, the number of active firms drops sharply. This situation is found in the rice market system, with the milling sector having the smallest number of firms of any sector within the industry. In 1985, there were about 12,000 rice farms, approximately 300 driers, and 66 rice mills in the United States.[5]

A number of studies have addressed such structural characteristics of the milling industry as the number of mills, their location and their size (Godwin and Jones, 1970; Holder and Grant, 1979; Wailes and Holder, 1987). Before 1978, the number of rice mills had decreased to as few as 40, due to the larger size required for mills to remain competitive. Milling technology changed at such a fast pace that a large number of mills were forced out of business by newly remodeled, more efficient mills. However, by 1985, 66 mills were in operation, a consequence of the greatly expanded output of rice that was generated by farm policy changes in 1978 and 1981. While the number of U.S. mills increased 50 percent between 1978 and 1985, the number of active mills in Arkansas increased over 160 percent.

As economies of scale in rice milling have contributed to the growth of large firms, the rice milling sector has become more concentrated, with fewer firms handling the bulk of the product passing through the system. The degree of concentration or "concentration ratio" (the proportion of total output handled by a few of the largest firms in the industry) can be used to indicate the degree of potential competition in the industry. In the U.S. rice industry, the concentration ratio for the eight largest milling firms has in- creased from 66 percent in 1963 to 75 percent in 1982 and 81 percent in 1987, meaning that in 1987 the eight largest firms milled 81 percent of U.S. rice, while the other 40 firms processed the remaining 19 percent (U.S. Dept. of Commerce, Census of Manufactures).

Competition for procurement of rice in different regions is not feasible in many instances. For example, mills in California and in the southern rice-producing regions are unable to compete with one another because of the great distances involved. But competition does exist between mills within the southern States. Texas mills obtain some of their rice from Louisiana and Mississippi, and much of Missouri rice is purchased by Arkansas mills.

Although the number of mills in the United States in 1989 was very similar to the number in the early 1960's, there has been considerable structural change within the milling sector. A number of mergers and acquisitions have resulted in a more concentrated sector. Individually owned, single-mill firms have been replaced by larger, multimill facilities. However, the number of very small mills is increasing, possibly due to the expanding markets for specialty products and an increasing demand for certain specialty rices (Wailes and Holder, 1987).

Excess capacity in the rice milling industry, created during most of the 1980's, forced average costs

[5]The number of firms is even smaller since some firms own several mills. The 1987 Census of Manufactures reports 48 companies.

Table 20--Active rice mills in the United States, selected years

| State | 1962 | 1965 | 1966 | 1967 | 1972 | 1978 | 1985 | 1992 |
|---|---|---|---|---|---|---|---|---|
| Arkansas | 9 | 9 | 9 | 9 | 8 | 8 | 21 | 20 |
| California | 9 | 8 | 7 | 6 | 6 | 7 | 10 | 11 |
| Louisiana | 33 | 28 | 23 | 20 | 17 | 16 | 15 | 10 |
| Mississippi | 0 | 0 | 0 | 0 | 1 | 3 | 6 | 3 |
| Texas | 14 | 13 | 11 | 7 | 8 | 10 | 14 | 10 |
| U.S. total | 65 | 58 | 50 | 42 | 40 | 44 | 66 | 54 |

Source: Smith, Wailes, and Cramer, 1990 and USDA/ASCS, 1993.

higher and milling profitability lower, due to idled fixed resources. Less competitive mills, typically relying on the export market, were unable to remain competitive by the late 1980's and ceased operations. These closures, which included several medium-sized rice mills in the southern-producing region that relied heavily on Government-assisted exports, reduced excess capacity and lowered average costs.

The export-oriented mills were unable to compete in the world market without Government programs (for example, Public Law 480, Commodity Credit Corporation's export credit guarantees) or to successfully shift to the domestic market due to high entrance cost, greater packaging expenses, and the quality of the rice they milled. Moreover, these mills were typically older than the industry average and could not afford to convert facilities to become competitive in the higher-quality branded domestic market.

The large rice-milling cooperatives were able to shift market orientation away from the declining export market to the higher priced, growing, and more stable domestic market. Some of the cooperatives already had well-established product lines and brand names and could expand sales in existing consumer markets. Their share of total shipments increased through 1986/87.

But with the further decline in the export market occurring in the late 1980's and early 1990's, as well as termination of American Rice Inc. (ARI) as a cooperative in 1988, cooperatives' share of total shipments decreased as their exports also declined. Cooperatives accounted for a larger share of the export market than the domestic market before 1988/89. But since 1988/89, cooperatives have accounted for a larger share of the domestic market than the export market.

Texas and Louisiana, States which had the largest share of millings exported, bore most of the burden of the weaker export market and excess milling capacity. Thus, their individual and combined share of total shipments and millings dropped. Most of Louisiana's remaining mills serve specific and limited niche markets with such specialty rices as aromatic varieties and brown rice. Large firms in Texas that did not establish greater domestic markets closed operating facilities in the 1980's.

Milling shifted away from the gulf coast to the Mississippi Delta and California. The share of total shipments from regions less dependent on export markets than the national average, the Arkansas-Missouri area and California, expanded during the 1980's. California mills had a greater domestic market orientation than the Southern ones, were not dependent on food aid shipments for exports, exported a smaller share of total state shipments than other producing areas, were already well established in the domestic market, and provided milled rice to domestic food processors.

Similarly, Arkansas mills already had a well-established domestic market in 1975/76. Currently they ship well over half their rice to domestic markets, accounting for 40 percent of total domestic shipments. Over a fourth of domestic shipments from the Arkansas-Missouri mill area were for processed foods in 1990/91. The proximity to major consumption markets in the Northeast, cities on the Great Lakes, and New England favored Delta over gulf coast mills.

Table 21--Average cost of rice milling, 1986

| Mill size (cwt/hr) | Number of mills | Total 1/ mill capacity (cwt/hr) | Percentage of total capacity | Full package line 2/ | | 70-percent cwt bag | |
|---|---|---|---|---|---|---|---|
| | | | | Avg. cost by mill size | Weighted 3/ cost by capacity | Avg. cost by mill size | Weighted 2/ cost by capacity |
| | | | | Dollars/cwt | | | |
| Single floor | | | | | | | |
| 162 | 9 | 1,458 | 5.3 | 2.43 | 0.13 | 2.24 | 0.12 |
| 243 | 5 | 1,215 | 4.4 | 1.96 | 0.09 | 1.78 | 0.08 |
| 324 | 4 | 1,296 | 4.7 | 1.72 | 0.08 | 1.54 | 0.07 |
| 405 | 6 | 2,430 | 8.8 | 1.58 | 0.14 | 1.41 | 0.12 |
| 486 | 7 | 3,402 | 12.4 | 1.51 | 0.19 | 1.34 | 0.17 |
| Multifloor | | | | | | | |
| 567 | 3 | 1,701 | 6.2 | 1.75 | 0.11 | 1.58 | 0.10 |
| 648 | 2 | 1,296 | 4.7 | 1.70 | 0.08 | 1.53 | 0.07 |
| 729 | 2 | 1,458 | 5.3 | 1.65 | 0.09 | 1.48 | 0.08 |
| 810 | 3 | 2,430 | 8.8 | 1.60 | 0.14 | 1.43 | 0.13 |
| 891 | 0 | 0 | 0.0 | 1.60 | 0.00 | 1.43 | 0.00 |
| 972 | 1 | 972 | 3.5 | 1.59 | 0.06 | 1.42 | 0.05 |
| 1,053 | 4 | 4,212 | 15.3 | 1.55 | 0.24 | 1.38 | 0.21 |
| 1,134 | 5 | 5,670 | 20.6 | 1.52 | 0.31 | 1.35 | 0.28 |
| U.S. total | 51 | 27,540 | 100.0 | | 1.66 | | 1.48 |

Source: Wailes and Holder, 1987.

1/ Capacity is for white rice mills.

2/ A full package line distribution for these cost estimates is given in Appendix table 30.

3/ Determined by multiplying each product line's average cost with its percentage share of total capacity.

The number of small rice mills producing high-value specialty rice products, (such as Della rice, Texmati rice, and U.S. jasmine varieties) for limited consumer distribution has increased since the mid-1980's. Most are operating in California, Louisiana, and Arkansas, and products milled include aromatic varieties and specialty brown rices. Though these mills together account for a small fraction of the total milling capacity, they sell rice at very high prices in small package sizes and their market is growing.

### *Milling Costs*

Milling costs, including capital requirements, annual ownership, and operating costs for various mill sizes and capacities, were estimated by Wailes and Holder (1987). An economic-engineering modeling approach was used to estimate costs. The model is designed to evaluate costs for alternative plant sizes or volumes milled, a single versus a multifloor facility, and the extent of processing and the package options produced.

Average estimated costs of owning and operating rice mills of various sizes are given in table 21 for 1986. The data summarizes mill numbers by size and capacity. Costs are given for both packaging under a full line of package types and for an operating system using bulk and 100-pound bag shipments only (Wailes and Holder, 1987). The relationships of costs to facility size for both types of packaging indicate that there are economies of scale in rice milling.

While the Wailes-Holder model has not been updated, industry sources indicate that nominal milling costs have increased on an average of 40 percent since 1986/87. Average costs are reported to be higher by the following amounts: labor costs, 34 percent, equipment and maintenance costs, 50 percent, utility costs, 50 percent, and insurance costs, 69 percent. Only interest costs have decreased since 1986. Since the consumer price index (CPI) increased approximately 21 percent from 1986 to 1992, the real milling cost in 1986 dollars has risen about 20 percent from 1986 to 1992.

The Wailes-Holder milling cost model was used to generate cost comparisons among mill centers in five rice-producing States based on known facility sizes. These results are reported in table 22. Differences in costs were as high as 52 cents/cwt on a rough rice basis. Finally, table 23 presents a comparison among the five States in 1985 of milled rice cost estimates that include farm costs, drying and storage, transportation to the mill and milling. This framework demonstrates the relative cost competitiveness of rice-producing areas in the United States. In general, the Delta Region was the lowest cost region for long-grain rice. California and Arkansas were lowest cost suppliers of medium-grain and short-grain rice.

Table 22--Cost comparison among six mill centers 1/

| State | Mill capacity | Rough equivalent milling cost | Milled equivalent cost | | | |
|---|---|---|---|---|---|---|
| | | | Long | Medium | Short | Wtd. 2/ |
| | cwt/hr | | | Dollars/cwt | | |
| Arkansas | 7,695 | 1.50 | 2.51 | 2.40 | 2.32 | 2.49 |
| California | 6,966 | 1.29 | 2.51 | 2.30 | 2.57 | 2.37 |
| Louisiana | 5,184 | 1.81 | 3.05 | 2.89 | 2.80 | 2.99 |
| Mississippi | 1,701 | 1.51 | 2.52 | 2.41 | 2.33 | 2.52 |
| Texas | 5,670 | 1.58 | 2.63 | 2.52 | 2.44 | 2.63 |
| U.S. total | 27,216 | 1.52 | 2.64 | 2.50 | 2.50 | 2.58 |

Source: Wailes and Holder, 1987.

1/ Assumptions: Mills run 245 days/year and two shifts/day; output of mills is 70% packaged in cwt bags and 30% bulk; milled equivalent is based on 96% head rice/cwt of milled rice. Capacity is for white-rice mills only.

2/ Milled equivalent costs are weighted according to the proportions of long-,medium-, and short-grain rice milled in each State for the 1985 crop year.

Table 23--Summary of rice mill costs, by state and grain type, 1986

| Grain type and cost item | Arkansas North | Arkansas South | Louisiana | Mississippi | Texas | California |
|---|---|---|---|---|---|---|
| | | | Dollars/cwt (milled basis) | | | |
| Long grain: | | | | | | |
| Grain input 1/ | 10.11 | 9.76 | 11.71 | 8.71 | 12.36 | 10.21 |
| Drying and storage 2/ | 2.08 | 2.08 | 2.47 | 2.56 | 2.22 | 2.29 |
| Assembly 3/ | 0.27 | 0.31 | 0.24 | 0.68 | 0.61 | 0.65 |
| Milling | 2.86 | 2.97 | 2.98 | 2.86 | 3.14 | 3.43 |
| Total cost | 15.32 | 15.12 | 17.40 | 14.81 | 18.33 | 16.58 |
| Medium grain: | | | | | | |
| Grain input 1/ | 9.35 | 9.03 | 12.03 | - | 14.24 | 9.08 |
| Drying and storage 2/ | 1.99 | 1.99 | 2.37 | - | 2.12 | 2.08 |
| Assembly 3/ | 0.27 | 0.31 | 0.24 | - | 0.61 | 0.65 |
| Milling | 2.37 | 2.46 | 2.47 | - | 2.57 | 2.69 |
| Total cost | 13.98 | 13.79 | 17.11 | - | 19.54 | 14.50 |
| Short grain: | | | | | | |
| Grain input 1/ | 9.28 | 8.95 | - | - | - | 9.42 |
| Drying and storage 2/ | 1.93 | 1.93 | - | - | - | 2.34 |
| Assembly 3/ | 0.27 | 0.31 | - | - | - | 0.65 |
| Milling | 2.04 | 2.11 | - | - | - | 2.68 |
| Total cost | 13.52 | 13.30 | - | - | - | 15.09 |

Source: Wailes and Holder, 1986.

1/ Amount paid per cwt (milled basis) for rice purchased by mills for processing into their final products.

2/ Conversion weights for long-, medium-, and short-grain rice are 1.67, 1.60, and 1.55 for southern States and 1.96, 1.78, and 2.00 for California.

3/ Derived by multiplying weighted average production density by the average cost of transporting rice.

## Policy

Proposals for Government intervention in the rice market date back to the early 1900's. The end of World War I brought a sharp drop in U.S. farm exports and began a period of sustained low returns to farming. Farm rice prices averaged $3.34 per cwt from 1914 to 1920, but fell to $2.10 by 1922. The situation led to widespread calls for Government help in raising farm returns.

A leading proposal debated in Congress during much of the 1920's was the McNary-Haugen Plan. The plan proposed a two-price market: Crops would be sold at a high enough price in the domestic market to support incomes, while surpluses would be sold abroad at world prices. Rice was one of the eight commodities that the legislation would have covered. The Plan was vetoed by the President twice and never became law. By 1932, rice prices fell to an all-time low of $0.93/cwt. This led to producer support for large-scale Government intervention.

The farm programs of the 1930's ultimately shaped the rice sector of today. The objective of the Agricultural Adjustment Act (AAA) of 1933 was to restore the purchasing power of farm commodities to their

### Chronology of U.S. Rice Program Changes

**1920's McNary-Haugen Plan**- The plan proposed a two-price market: high domestic prices to support incomes, and surpluses to be sold abroad at world prices.

**1929 Agricultural Marketing Act** - Established a federally funded corporation to make loans to marketing cooperatives that would purchase the surplus crop.

**1933 Agricultural Adjustment Act** - Aimed to restore the purchasing power of farm commodities to their 1910-14 level (referred to as parity) through supply controls financed by processing taxes.

**1935 DeRouen Rice Act** - Financed supply control contracts, with a processing tax, between Government and millers.

**1936 Supreme Court** - Ruled the 1933 Act's processing tax unconstitutional.

**1938 Agricultural Adjustment Act** - Provided nonrecourse loans (rice became eligible in 1941), referendums for marketing quotas, acreage allotments, and direct payments to bring producer prices up to parity.

**1948/49 Agricultural Acts** - Revised methods to calculate parity to account for productivity and other changes since 1910-14.

**1954 Agricultural Act** - Instituted flexible support prices to deal with crop surpluses acquired by the CCC and proclaimed marketing quotas.

**1955-73 Special Legislation** - Instituted marketing quotas and allotments to reduce CCC-owned rice stocks.

**1975 Rice Production Act** - Shifted rice production control from quotas and allotments to greater market orientation accompanied by target prices, deficiency payments, acreage base, and disaster payments.

**1977 Food and Agriculture Act** - Changed the mechanism to adjust target prices from the index of prices to rice production costs.

**1981 Agriculture and Food Act** - Eliminated acreage allotments and marketing quotas and made the rice program analogous to programs for other grains.

**1985 Food Security Act** - Enacted a number of provisions such as repayment of price-support loans at market-clearing prices, in-kind payments, freezing of the target price at the 1985 level, 50/92 provision, and so forth.

**1990 Food, Agriculture, Conservation, and Trade Act** - Continues the provisions of the 1985 Act but also introduces the "triple base provision," whereby 15 percent of the rice acreage base, called normal flex acreage (NFA), became ineligible for deficiency payments. The NFA and an additional 10 percent, called optional flex acreage (OFA), can be planted to other program crops which, while eligible for price support, are ineligible for deficiency payments if planted to program crops other than rice.

1910-14 level, a concept referred to as "parity," through a mix of supply controls and processing taxes.

Supply control was administered through contracts negotiated between the Government and rice millers. Contracts with producers were introduced with the DeRouen Rice Act of 1935 and were financed with a processing tax. However, the Supreme Court ruled against processing taxes and declared the AAA production control features unconstitutional in January 1936.

The Agricultural Adjustment Act of 1938 introduced many of the provisions found in today's programs. It provided nonrecourse loans for rice, referendums for marketing quotas, acreage allotments, and direct payments to bring producer prices up to parity if funds were appropriated. However, loans for rice were not offered until a subsequent act made them mandatory for farmers harvesting within their acreage allotment beginning with the 1941 crop.

## World War II to the 1960's

In 1941, rice was added to the list of basic commodities eligible for nonrecourse loans, and the first loan program for rice was initiated. Rice acreage allotments were removed during the war and for most of the rest of the 1940's, but were put back into effect in 1950. Marketing quotas and acreage allotments were in place from 1955 to 1973. There was a sharp increase in U.S. rice exports during World War II--from 5.7 million cwt in 1940 to 11.5 million cwt by 1945--which lowered stocks and pushed rice farm prices well above support levels. Because of high prices and strong demand, rice acreage allotments were lifted entirely, and, in some years, price supports were not even announced.

The Agricultural Acts of 1948 and 1949 revised the method used to calculate parity in order to account for higher productivity and other changes since the base period of 1910-14. A mandatory price support at 90 percent of parity, a level first set during the war, was continued in the 1948 Act, but the 1949 Act introduced flexibility, allowing for a range for parity prices. However, because of the Korean conflict, subsequent legislation retained parity at 90 percent. Provision for marketing quotas continued. The provisions of the 1949 Act had little immediate effect on the rice market, as prices averaged above support levels every year from 1941 to 1953, except for 1951.

In 1954, rice production reached a record 64 million cwt, over twice the World War II average. However, domestic and export demand weakened, and carryover stocks reached 27 million cwt, seven times greater than the average of the previous 3 years. Commodity Credit Corporation (CCC) loan activity for rice was significant for the first time and the CCC wound up owning 60 percent of the total carryover.

The Agricultural Act of 1954 attempted to deal with these surpluses by moving to flexible support prices, 82.5-90 percent of parity for 1955, and 75-90 percent thereafter. In addition, marketing quotas were proclaimed and voted in for the 1955 crop. From 1955 through 1973, marketing quotas and acreage allotments were effective in reducing CCC-owned rice stocks from 27 million cwt at the end of 1955/56 to nearly 300,000 cwt by the end of 1961/62, and in preventing stocks from rebuilding in the 1960's. The pace of the stock reduction was limited by a legislated, minimum, national acreage allotment of 1.65 million acres from 1956 through 1961. Rice acreage was also reduced by the soil bank program contained in the Agricultural Act of 1956. However, the latter program was not considered very effective and was terminated in 1961.

Beginning with the 1961 crop, marketing quotas were announced and voted on when total supply exceeded normal supply. Before that, quotas were announced only when total supply exceeded normal supply by 10 percent. Marketing quotas were operated through acreage allotments. Normal supply less beginning stocks determined needed production, which was then converted to a national allotment based on average U.S. yields. The allotments were then apportioned to farms.

All production from allotted acreage was eligible for price support, but production from acreage in excess of the allotment was subject to a penalty. With the 1962 crop, rice allotments gradually increased, reaching 2.8 million acres by 1968. But stocks began to build that year, and allotments were reduced below the 1968 level during 1969-73. Much of the agricultural legislation passed during the mid-1960's through the early 1970's made major changes in programs for other grains, but had little effect on rice.

## Legislation of the 1970's

Given a surge in exports due to crop shortfalls abroad, rice marketing quotas were suspended for the 1974 and 1975 crops. Acreage allotments were set at 2.1 million acres in 1974 and at 1.8 million acres in 1975. Allotments through 1981 were used for payment purposes only. Producers were not restricted on the acreage planted but could receive program benefits only on allotment acres.

Exports grew sharply in the early 1970's, raising prices well above support levels. In 1973, the average farm price was $13.80 per cwt, compared with a support level of $6.07. The Rice Production Act of 1975 reflected these changed conditions and shifted rice production control from quotas and allotments to greater market orientation along the lines of the programs for other grains.

A target price was established and direct (deficiency) payments were provided, based on the difference between the August-December average farm price and the target price. The allotments became the payment base. Farmers could now plant in excess of their allotment, but eligibility for loans and deficiency payments were restricted to producers planting within their allotted acres. Target prices and loan rates were to be adjusted annually on the basis of the index of prices paid and changes in yields. The first deficiency payments, $128 million, were paid on the 1976 crop, which was also the first crop produced under the 1975 Act. These were the first direct Government payments to rice producers since 1957, when payments were made under the Soil Bank Act.

The Act provided for annual set-asides and set a limit of $55,000 on the payments a person could receive under the rice program. Unlike programs for other grains, disaster payments counted against the payment limit for rice. Disaster payments could be made to cover losses due to natural causes that either prevented the crop from being planted or resulted in abnormally low yields. An allotment carried with it eligibility for disaster protection and no premium was required. The disaster payment program was replaced by the all-risk crop insurance program provided by the Federal Crop Insurance Act of 1980. Growers have been reluctant to pay the premiums required for coverage under this program, even though the Government also pays a significant portion. In 1983, only 5 percent of the potentially insurable rice acreage was insured and the average premium was $10.34 an acre.

The Food and Agriculture Act of 1977 contained provisions very similar to the 1975 Act. Rice production costs, rather than the index of prices paid, became the basis for adjusting the target price, with the loan rate adjusted by the same percentage as the target price. The loan rate could be lowered, but not below $6.31 per cwt. The set-aside provision was continued, although this provision has never been in effect for rice, and a cash payment for diverting land was authorized. The limit on rice program payments was $55,000 per person in 1977; this was lowered to $52,250 in 1978 and to $50,000 in 1979. Beginning in 1980, individual payments were limited to a combined total of $50,000 from the wheat, feed grains, upland cotton, and rice programs. Disaster protection was continued with a separate payment limit. Rice prices stayed well above the loan rate during the life of the 1977 Act. With exports running high, acreage passed the 3-million mark for the first time in 1980 and reached a record 3.8 million in 1981.

## Legislation of the 1980's

The Agricultural and Food Act of 1981 eliminated acreage allotments and marketing quotas for rice and made the rice program similar to those for other grains. Target prices were no longer adjusted based on rice production costs and minimum target levels were established. The loan rate was to be adjusted by the same percentage as the target price, but could be lowered to a minimum of $8.00 per cwt if rice stocks were excessive or exports weak. The acreage reduction program was introduced as a more specific acreage control method than the set-aside provision. Compliance was required for eligibility for loans and deficiency payments.

The Food Security Act (FSA) of 1985 was enacted under the general view that farm programs were costing too much, nearly $18 billion in fiscal year 1985, and must be brought under control. U.S rice exports were below earlier levels, with stocks rising and prices depressed. There was a consensus that the health of U.S. agriculture depended upon its ability to compete in world markets and that price-support levels should be set more in line with market-clearing prices, rather than being rigidly legislated by Congress, as in the 1981 Act.

The 1985 Act contained provisions for lowering the loan rate for rice to $7.20 per cwt, a 10-percent decline from $8.00 in 1985. For the 1987-90 rice crops, minimum loan rates were to be the higher of: (1) 85 percent of a 5-year moving average marketing price, excluding the highest and lowest prices; or (2) $6.50 per cwt. However, loan rates could not be reduced more than 5 percent in any one year from the preceding year.

The 1985 Act authorized a marketing loan program for rice which permitted producers to repay Commodity Credit Corporation loans at the lesser of the loan rate or world market price. The payment cannot be less than 50 percent of the loan note for the 1986 and 1987 programs, 60 percent for 1988, and 70 percent for 1989 and 1990. Section 1005 of the 1985 FSA authorized the Secretary of Agriculture to make in-

kind payments in the form of generic certificates to farmers as payment for participation in numerous Government programs.

The 1985 legislation also froze the 1986 minimum target price at the 1985 level, $11.90 per cwt, and set the minimum target prices for 1987 to 1990 at declining levels. The target prices provide a basis from which direct payments, called deficiency payments, are made to eligible producers if the national weighted average market price received by farmers for the first 5 months of the market year (August through December) falls below the target level. A deficiency payment is a Government payment made to farmers who participate in wheat, feed grain, rice, or cotton programs.

Limited cross-compliance was required for participants to be eligible for program benefits in the late 1970's and remains in effect today. In a limited cross-compliance program, a producer participating in one commodity program must not plant in excess of the crop acreage base on that farm any of the other program commodities for which an acreage reduction program is in effect.

## Current Legislation

The Food, Agriculture, Conservation, and Trade (FACT) Act of 1990 (Title VI) provides price support and production adjustments for rice producers through the 1995 crop year. Nonrecourse loans are required to have marketing loan repayment provisions. The 1990 Act also continues the use of marketing certificates to make rice more competitive in world markets. To participate in the program, producers must comply with any Acreage Reduction Program (ARP) and the Paid Land Diversion Program (PLD) announced by the Secretary.

The minimum target price for rice is set at $10.71 per hundredweight. Deficiency payment rate will continue to be based on a 5-month marketing year price for 1991-93. For 1994/95, the 1990 Budget Act amends the 1949 Act's calculation of the rice deficiency payment rate to equal the target price minus the lower of either the 12-month average calendar year price, or the 5-month marketing year average price plus an appropriate sum that is considered fair and equitable compared with wheat and feed grain prices.

The payment acreage is the lesser of either the permitted planted acreage or 85 percent of the crop acreage base minus any Acreage Reduction Program (ARP) acres. Maximum payment acreage is 85 percent of the base under the amendments made to the 1949 Agricultural Act by the 1990 Budget Act, mandating a triple base program. Under this program, 15 percent of a participating farmer's base is considered to be normal flex acreage (NFA). Producers also have the option of flexing an additional 10 percent of the farm's base (called optional flex acreage or OFA).

Flex acres can be devoted to any other program crop, any oilseed, any industrial or experimental crop designated by the Secretary, and any other crop except any fruits, vegetables, and prohibited crops. Crops planted on flexible acreage may be eligible for nonrecourse and marketing loans, but not deficiency payments. In addition, the Secretary may establish an ARP of 0-35 percent for rice with the objective of achieving an ending stocks-to-use ratio of 16.5 to 20 percent.

The basic loan rate is set at 85 percent of the simple average farm price during the marketing year of the preceding 5 years, excluding high and low years. However, the loan rate cannot be reduced more than 5 percent from the level of the previous year. The loan rate has been $6.50 per cwt since 1989.

Rice producers have the option to repay price support loans at a rate lower than the price support level. Producers can use these marketing loans whenever the adjusted world market price for rice, announced by USDA, for rice falls below the loan rate. As a condition for repaying the loan at lower than the announced price support rate, the Secretary may require a producer to accept marketing certificates for up to 50 percent of the difference between the announced rate and the repayment rate. These marketing certificates may be exchanged for rice owned by the Commodity Credit Corporation (CCC) or for cash. The value of these certificates is the difference between the loan repayment rate for the class of rice and the adjusted prevailing world market price.

For 1991/92, the general 50/92 provisions remained the same as those in effect for 1988 through 1990, except the payment (base minus Normal Flex Acres and any ARP acres) acres have been altered by the triple base provision. If producers plant between 50 and 92 percent of the crop's permitted acreage when an ARP is in effect and devote the rest to conserving uses or approved non-program crops, they are then eligible to receive deficiency payments on 92 percent of maximum payment acreage. These payments on conserving use acreage are guaranteed to be at least as high as the projected deficiency payment rate.

(The projected deficiency payment rate on acreage actually planted to rice is not guaranteed.) In 1994, the 50/92 provision was changed to 50/85, whereby producers receive benefits on 85 percent of their eligible base if up to 50 percent of their base is devoted to conservation use.

In case of prevented planting or quarantines, deficiency payments may be available on up to 92 percent (85 percent in 1994) of the permitted acreage even though the planted acreage is less than 50 percent of the permitted acreage. Under this provision, rice crop acreage base and farm program payment yield history are maintained. The 50/92 or 50/85 acreage cannot be used to fulfill requirements for the set-aside or Paid Land Diversion programs. The Secretary may permit planting of alternative crops on all or part of acreage designated idled under the 50/92 or 50/85 provisions.

If, in a given year, any producers have been prevented from planting any part of their base by a natural disaster, the Secretary must make a "prevented planting disaster payment." However, if prevented planting and reduced yield crop insurance were available to producers under the Federal Crop Insurance Act, they are ineligible for disaster payments. However, the Secretary has the discretion to make these disaster payments even when insurance was available if it is determined that the natural disaster caused substantial losses of production, that the losses created an economic emergency, that crop insurance indemnity payments and other assistance were insufficient to relieve the economic emergency, and that additional assistance is needed to alleviate the economic emergency.

Compliance with commodity programs or with crop acreage base requirements for any other commodity cannot be required as a condition of eligibility for loans, purchases, or payments under the rice program.

## Consequences of Policy

Costs of the rice program to the Government include deficiency and land diversion payments, marketing loan gains to producers, storage charge of CCC stocks, losses on CCC stock resales, and the net costs of Public Law 480. An examination of payments made directly to rice farmers indicates deficiency payments have made up the bulk of direct payments. Marketing loan gains were also an important source of income in 1985 and 1986, when world prices were low.

Also, U.S. rice export programs (Public Law 480, Section 416, CCC credit programs, CCC African Support Relief, Export Enhancement Programs) have significantly enhanced rice producers' incomes and accounted for about 40 percent of total rice exports in 1992. Though declining in recent years, Public Law 480 shipments account for the bulk of rice program exports.

The rice program has both direct and indirect effects on farmers, consumers, taxpayers, resources, and exports. These are briefly discussed:

### *Producers*

The U.S. rice program directly influences prices received by rice producers, their incomes, the costs of resources used in rice production, and rice growers' production decisions. Rice producers also benefit from such Government programs as Public Law 480 that enhance exports. For example, between fiscal years 1980 and 1987, net Government expenditures on the rice price support program, including those for Public Law 480, totaled over $5 billion. The total market value of rice production for crop years 1980 to 1987 totaled $9.1 billion.

Since the implementation of target prices, direct Government payments have made up an increasing share of producer incomes. During fiscal years 1982/87, rice producers received $1.91 billion in direct payments under deficiency, diversion, and disaster program provisions. In 1982, Government payments comprised 17 percent of rice growers' gross incomes. By 1987, Government payments rose to 40 percent of growers' gross incomes.

### *Consumers*

Domestic demand for rice in the United States is influenced more by tastes, preferences, geographic location, convenience, and cultural factors than by price. Thus, if the rice program changes the farm price of rice, domestic consumption is unlikely to change much. Retail prices for milled rice currently average around 50 cents a pound, while farm prices for paddy (at loan) are $0.06-$0.07 per pound. Thus, farm prices account for roughly 15 percent of the retail price paid by consumers, a much higher share than for other grains such as wheat. The higher farm share of rice price is explained by the large share of domestic consumption of rice as a whole grain. In comparison, wheat is consumed in processed forms, adding to the value of the final product (and hence, the price paid by consumers) and thus diminishing the farm share.

Statistical analysis indicates a very small response in food demand for rice due to changes in retail prices: about a 0.07-percent change in demand for a 1-percent change in the retail price. Thus, a 4-percent increase in farm prices would increase retail prices by 4 percent, but consumption might decline by only 1 percent.

The effect of deficiency payments on consumer prices is less than certain. Although deficiency payments are a taxpayer burden, in essence, consumers pay higher than market price for rice through tax liabilities. Without deficiency payments, farm prices may have to be raised to maintain supplies and consumer prices would, therefore, increase. However, when deficiency payments are tied to compliance with acreage reduction provisions, consumers lose most of the benefits of larger supplies and lower farm prices that might have occurred with a larger supply of rice if no acreage reduction had been required.

Consumers in the United States are also affected by Government expenditures for rice exports. When the Government disposes of rice through export programs (or removes rice from the market under a loan program), free stocks are reduced, supplies decline, and farm prices (hence, 15 percent of the retail price) for rice are supported above market-clearing levels. However, consumers (both domestic and foreign) and processors are the primary beneficiaries of the rice marketing loan. An ERS study shows that the program-reduced rough rice farm prices from $7.00 per cwt without a marketing loan to $3.80 in 1986/87 (Lin, 1988). To the extent that this price drop was passed on to consumers, consumers stood to gain $224 million from the marketing loan.

### *Taxpayers*

Rice program and related expenditures are, like other Government expenditures, an income transfer from taxpayers to the rice industry. In 1961, net price support and related expenditures for the rice program totaled $29.5 million. Expenditures for Public Law 480 contributed an additional $110 million. Expenditures for the rice program in 1961 totaled $2.11 per taxpayer. In 1983, rice program expenditures per taxpayer were $7.88. Not only did per taxpayer expenditures nearly quadruple over 23 years, but the number of taxpayers increased 53 percent during this period.

Between 1961 and 1987, annual expenditures for the rice program averaged $176 million, excluding Public Law 480, and increase to $334 million if Public Law 480 is included. Total related expenditures for the rice program since 1961 have been $9.01 billion, with $4.26 billion of these for Government-assisted exports.

### *Resources*

Sustained, sizable, Government program expenses aimed at supporting or enhancing income often translate into rigid resource constraints. Dampening price signals through the use of price and income support can slow or prevent resource adjustments that would take place in an unencumbered free market. These resource adjustments may be undesirable if the price signals are short term and largely disruptive in nature. But over the long run, muted price signals generally only prolong adjustments at taxpayers' cost. When resources are used inefficiently, marginal land is kept in production, average costs rise, and barriers to entry and exit are erected. Overcapacity, stock accumulation, and low prices also result, which increase the need for support.

Since rice production is relatively capital-intensive, resources would tend to be more fixed than for other crops even with the absence of support programs. Irrigation systems, land leveling, the construction of levees in and around fields, and harvesting equipment are costly items in rice production, with few alternative uses. The high cost of production may explain the traditionally high program participation rates of rice producers.

The sector's high, capital-intensive cost structure implies that price protection is needed during periods of weak demand. Producers, in effect, can find themselves locked into programs and continue to expand acreage and production, even when demand has fallen. The effects of declines in demand are muted when the deficiency payment rate is equal to one-third of the season's average price for rice.

### *Exports*

When the loan rate is set high enough to become a price floor, U.S. competitors benefit. They increase production and export the surplus, or they undercut U.S. prices and increase market share, or both. Since 1980 the United States has lost a good part of its market share to Thailand, largely as the result of this phenomenon. Thailand has abandoned many of its previous controls on exports, and production has increased. Thailand's rice is currently comparable in quality to U.S. rice, which was not always the case. The price gap between Thai and U.S. rice, once justified on quality differences, grew significantly in the early 1980's. It has had the effect of reducing U.S. exports.

The implementation of the marketing loan program, however, enhanced U.S. competitiveness in world rice markets by breaking the link between the loan rate and U.S. export price. The marketing loan program made more U.S. rice available for export and narrowed export price differentials between the United States and other exporters. As a result of the program, the export price differential between the United States and Thailand declined drastically, from as high as $260 per metric ton in early 1985 to less than $105 by late April 1986, and below $53 by August 1986.

## World Rice Market and U.S. Trade

Rice accounts for around 20 percent of world grain production and is second only to wheat in food grain production. World rice production has expanded dramatically since 1960, largely as the result of the "Green Revolution" technology adopted in major importing countries and the expansion of hybrid rice varieties in China. World rice production reached a record of over 521.4 million metric tons (rough basis) in 1992/93, more than double production in 1965/66. And while area harvested rose 18 percent, average yields increased 80 percent since 1965/66.

More than 90 percent of the world's rice production is concentrated in Asia. China, India, Indonesia, and Bangladesh are the world's largest producers of rice, accounting for over 70 percent of world production since 1988/89.

China is the world's largest producer, accounting for 36 percent of the world total since 1988/89. Since the early 1960's, China's production has increased threefold. While area increased marginally in the 1960's and 1970's under Government pressure to increase food grain production, area declined in the early and mid-1980's, when market reforms allowed farmers to diversify crops and use land for such purposes as housing and industries. Area was between 32 and 33 million hectares from 1985/86 to 1992/93, and dropped to 30 million in 1993/94.

Production gains in China have been, and continue to be, generated by yield growth. Area planted to rice is trending downward although Government pressure continues to limit the decline and, in some years, contributes to small increases. Area planted to hybrid varieties has been increasing and is likely to be the primary source of future growth.

India has contributed over 21 percent of total rice production since 1988/89. The spread of high-yielding varieties and irrigation facilities and the rapid rise in fertilizer use since the early 1960's allowed India to reach self-sufficiency and shift from being a major rice importer to a net exporter in most years since the late 1970's.

The "Green Revolution" has also allowed production to increase sufficiently to allow Indonesia and Bangladesh to substantially reduce imports. Indonesia accounted for almost 9 percent of world production between 1988/89 and 1992/93. Production in Indonesia increased threefold since 1967/68, largely due to rising yields. Bangladesh has accounted for a little over 5 percent of world production since 1988/89. Production has almost doubled since 1960/61, but this is a slower rate than achieved by the top three producing countries. Yield growth has been smaller in Bangladesh than in any of the top three rice-producing countries.

Other major Asian rice producers include Vietnam, Thailand, Japan, and Burma. These four countries have together accounted for 12 to 13 percent of world production since 1988/89. However, the pattern of growth in this second tier of countries has been different than in the top four. Asian exporters, including Thailand, Vietnam, and Burma, did not experience the same rate of production growth as did the major Asian importers. Rice production in these three countries is concentrated in river deltas. Although the high-yielding varieties and Green Revolution technology require tight water control and adequate drainage, farmers in these countries did not adopt these new techniques.

Thailand developed its irrigation system in the late 1970's and the use of high-yielding varieties for dry season production expanded. However, investment in irrigation, especially in the exporting countries, declined in the 1980's. Low world rice prices and the high cost of irrigation development discouraged irrigation expansion.

Rice production peaked in Japan in the late 1960's. Riceland diversion programs were largely responsible for the subsequent decline. Rice production in Vietnam was depressed in the 1960's and 1970's under the effects of war and Government policy. In the early 1980's, it began to expand and then in the late 1980's grew significantly as the country reemerged as a major exporter. Rice production in Thailand, currently the world's largest exporter, doubled between 1968/69 and 1992/93. Increased acreage has been almost totally responsible for Thailand's growth in rice production. Other major Asian rice-producing coun-

tries include the Philippines, South Korea, Brazil, and North Korea.

Non-Asian rice producers contribute about 10 percent of the world's total. Brazil is the largest non-Asian rice producer, accounting for a little over 2 percent of world production, followed by the United States, Egypt, the Republics of the former Soviet Union, the European Union (EU), and Australia. In the 1960's, Brazil was a net exporter. However, despite production gains in the 1980's, consumption has increased at an even higher rate. By the late 1980's, Brazil had become a large net importer.

The United States accounts for 1.5 to 2 percent of the world's production and exports around half of its production. Egypt's production expanded in recent years in response to increased acreage and higher yields. Despite strong domestic demand, Egypt remains a net exporter. The countries of the former Soviet Union account for less than one-half of 1 percent of world rice production and, in total, they are net importers.

The EU produces less than one-half of 1 percent of world rice production, primarily in Italy and Spain. Small quantities are also produced in France, Portugal, and Greece. Most EU production is japonica rice, but indica production has increased recently in response to high price supports. The EU exports over 1 million tons of rice annually, including intra-EU trade. The EU also imports over a million tons of rice, mostly high-quality, long-grain varieties.

### Harvest Area and Yield

Harvested area was nearly 146 million hectares in 1992/93, barely short of the 1990/91 record of 146.7 million. Since 1965/66, area harvested has expanded 18 percent while production has doubled, indicating that higher yields have been responsible for most of the growth in output.

India harvests the most rice area, 42 million hectares in 1992/93, just short of the country's 1990/91 record of 42.7 million. China ranks second, harvesting 32.5 million hectares in 1992/93, nearly 4 million hectares below the 1975/76 record of 36.2 million. Substantially higher yields in China more than compensate for smaller acreage, allowing China to be the number one producer of rice. Indonesia and Bangladesh each currently harvest 10-11 million hectares a year. Thailand, which harvests 9-10 million cwt, ranks fifth. Vietnam, Brazil, Burma, and the Philippines also account for a substantial part of world rice acreage.

Brazil harvests the largest rice area outside of Asia, growing rice on 5-6 million hectares. The United States is the only other non-Asian country to harvest more than 1 million hectares.

Rice area in Japan has declined by about one-third since 1966/67, dropped about 46 percent in Taiwan, and remained constant in South Korea, as these Asian countries have experienced rising incomes and declining per capita rice consumption. Italy, Spain, Australia, Egypt, and Argentina, all exporters of rice, have increased rice area since the mid-1960's. Indonesia and Nigeria, at one time large importers, have both increased area harvested since the mid-1970's and reduced imports.

### Consumption

Almost 90 percent of rice is consumed in Asia. Cereal grains account for two-thirds of the calories in the average Asian diet, with rice alone providing 40 percent of the total and wheat another 15 percent (Barker and others, 1985). With the exception of Pakistan, rice is the dominant food grain in Asia, and total consumption continues to increase primarily as a result of population growth and, to a lesser extent in some countries, rising incomes.

Global rice consumption has doubled since the mid-1960's. Since most rice is consumed in the countries where it is produced, about 90 percent of global production is consumed in Asia. Since the mid-1970's, non-Asian consumption has increased rapidly, particularly in the Middle East and Africa. Consumption in developed countries has grown at a slower rate.

Per capita consumption has also been rising steadily, with most of the gains of the 1980's occurring in China, where increased production, rising incomes, and policy changes allowed consumers to substitute rice for other grains. Per capita consumption also increased in South and Southeast Asia as production expanded. However, per capita consumption in East Asia, including Japan, South Korea, and Taiwan has been declining steadily. East Asian consumers are diversifying their diets as their incomes rise.

China, India, Indonesia, and Bangladesh are the largest consumers of rice. They currently account for over 70 percent of total consumption. China consumed a record 129 million metric tons of rice in 1992/93, double the amount consumed in 1967/68. India's consumption was also a record in 1992/93, 75 million metric tons and double the 1966/67 consumption. Indonesia has experienced an even faster growth rate since 1966/67, nearly tripling use to 30.2 million met-

ric tons in 1992/93. Other major consuming countries include Vietnam, Japan, Thailand, and Burma. All of these major rice-consuming countries are important producers.

Rice consumption in Japan peaked at 12.5 million metric tons in 1971/72 and has declined since. Two factors have contributed to this decline. First, domestic rice prices in Japan are supported substantially above world levels, which discourages consumption. Second, rising incomes have shifted food demand toward meat and vegetables. Rice consumption peaked in Taiwan at 2.42 million cwt in 1967/68 and in South Korea at 5.8 million metric tons in 1978/79 for similar reasons. Consumption in Thailand, Burma, and Vietnam continues to increase.

Since the 1960's, Asia's share of world rice consumption has declined slightly. Increased rice consumption by Middle Eastern and African countries has been largely responsible for this shift. Consumption of rice in the Middle East more than tripled between 1970/71 and 1992/93, and the region's share of total consumption doubled. This was largely a result of rising incomes from oil sales. The Middle East imports much of its rice. Consumption of rice by Sub-Saharan Africa has also increased since the 1960's, more than doubling between 1970/71 and 1992/93. The region's share of total consumption also increased.

Rice is not a staple food for most people in developed Western countries and is most often served as a side dish. Although continuing to rise a little every year, per capita rice consumption is much lower in the United States, Canada, Australia, and the EU than in Asia. And these countries have rather slow population growth rates. Hence, developed non-Asian countries provide a small, but growing, market for rice.

Per capita consumption was over 10 kilograms in the United States in 1990/91, about half that in the EU. U.S. consumption of rice exceeded 3.1 million metric tons in 1990/91, the EU consumed 1.7 million cwt. Processed food use of rice accounted for much of the increase in rice use in the United States since 1980. Health, nutrition, and convenience are factors that contributed to increasing per capita use in the United States. These same factors could eventually lead to greater consumption in other developed countries.

## Stocks

Rice stocks have averaged about 16 percent of production since 1988/89, so no large reserve of rice exists if a shortage occurs in any major producing country. The United States does not maintain large stocks either, so a small drop in production in a major consuming country could lead to much larger percentage increase in price.

China is the largest holder of rice stocks, holding about 28 million metric tons, over half the world total of over 53 million in 1992/93. But most of this rice is of poor quality and could not enter world markets. India is the next largest holder of rice stocks, holding 12 to 15 million metric tons between 1988/89 and 1991/92. In 1992/93, India is expected to have stocks of 9.1 million metric tons. The only other countries to have stocks that currently or recently exceeded 1 million metric tons are: Indonesia, South Korea, Thailand, the Philippines, Brazil, Burma, Pakistan, and the United States.

Although most major rice consuming countries have stocks-to-use ratios less than 0.20, Japan, Taiwan, and South Korea have experienced stocks-to-use ratios higher than desired. Japan and Taiwan have substantially reduced there rice stocks through area diversion programs. South Korea's rice stocks have thus far been higher in the 1990's than during the 1980's as consumption has dropped faster than production.

## World Trade

Production and consumption patterns combine with technical factors and government policies to shape the world rice market. Five factors are particularly important: trade accounts for a small share of production, annual price variability exceeds that experienced by other grains, producers are unable to escape the risks associated with price variability, rice is strongly stratified by type and quality, and large-scale government intervention is prevalent.

The world rice market can be characterized as thin in terms of the small volume of trade relative to production. Trade has typically accounted for 3-4 percent of production since 1960. Thus, the effects of normal year-to-year fluctuations in production of 2-3 percent can generate substantial world price variability if changes in production are shifted to the world market.

The world rice market is thin compared with other grain markets for several reasons. First, the uncertainties associated with the timing of the Asian monsoon and the concentration of a substantial portion of the world's production in South and Southeast Asia discourage countries from relying on imports for much of their domestic needs. Second, government programs in many Asian countries aimed at

self-sufficiency in rice further diminish the role of an international market for rice.

Price and trade variability in the world rice market relates to the small share of production available for export. Variability is reflected in short-run price fluctuations of often 10-20 percent between marketing years and, more broadly, in uncertainty traders face in negotiating prices.

Government intervention in rice trade and production is pervasive and contributes to the small share of production traded and world price variability. Most Asian countries maintain domestic rice price stabilization policies and many pursue stringent rice import controls. Most rice-importing countries make concerted efforts to stabilize domestic prices and thus transmit fluctuations in supply and demand to the world market. Many exporters also intervene to further domestic policy goals.

The size and price variability of the world rice market are exacerbated by its stratification by quality and variety. Most rice trade is long-grain indica rice, produced mostly in tropical climates, including southern China, South and Southeast Asia, and the southern United States. There are different markets for high- and low-quality rice, as measured by the percentage of broken rice. The United States competes primarily with Thailand for high-quality markets. Thailand also is a strong competitor in lower quality markets, where it faces competition from Pakistan, Vietnam, and Burma.

Medium-grain japonica rice is largely produced and consumed in temperate climates. It is the preferred rice in Japan and South Korea. Japonica rice is also produced in northern China, Taiwan, Brazil, Australia, Spain, Italy, Egypt, and parts of the United States. Imports of this variety of rice are limited and account for only 13 percent of world trade (1986-87 average). The United States, Australia, Spain, and Italy compete for the japonica markets.

Tastes and preferences can be as important as prices as key buyer considerations. In addition to limited substitution in demand between various types of rice, there are also limits to substitution in production among the various types and classes.

World rice trade more than doubled from 6.5 million tons in 1961 to 13.1 million in 1981, but remained between 11 and 15 million metric tons through 1993, while world production and consumption have grown. Thus, competition for limited export opportunities heightened during those years, putting downward pressure on price.

In 1993, Japan harvested its smallest crop since WWII, and, in response, imported significant quantities of rice for the first time since the 1960's. This led to an increase in world trade to over 15 million metric tons in 1993 with expectations of trade reaching 15.5 million in 1993/94. In addition, in December 1993, a GATT agreement was signed that partially opens the Japanese and Korean markets to international competion. This will likely allow trade to expand over the longer term.

Thailand has been the world's largest exporter of rice since 1981, shipping 4 million metric tons, or 25 percent, of world rice trade in 1994. The United States is the second largest exporter, shipping 2.7 million metric tons in 1994. The United States had been the largest exporter of rice from 1967 to 1981. Vietnam ranks a very close third, exporting 2 million metric tons in 1994. Vietnam only reentered the world rice market in 1989 after being absent since the 1960's.

Pakistan has ranked fourth in the 1990's, averaging 1.15 million metric tons annually in this decade. Pakistan became a major exporter in the mid-1970's with the use of high-yielding varieties. China both exports and imports rice, with both quantities varying each year. From 1966 to 1987, China often exported over 1 million metric tons annually. But exports from China dropped in the late 1980's to 300,000 to 700,000 metric tons before recovering to 1.4 milllion tons in 1994. These top five rice exporters have accounted for 74 percent of world rice trade since 1989.

Australia, Burma, Italy, India, and Uruguay have all exported over 300,000 metric tons annually thus far in the 1990's. Australia began to export significant quantities of rice in the mid-1970's due to yield and quality improvements coupled with competitive pricing. Australia exported a record 775,000 metric tons in 1994, much of the increase due to Japan's importation of high-quality japonica rice. Exports from Uruguay have greatly expanded since 1980, reaching a record 400,000 metric tons in 1994. India exported 800,000 tons of rice in 1994 and has shown an increasing trend during the 1990's.

In addition, Argentina, Taiwan, Spain, and Egypt have exported at least 100,000 metric tons annually thus far in the 1990's. Egypt has seen especially strong growth in exports since 1990, as area harvested has risen.

The most traded rice is indica, with Thailand and the United States the largest exporters. Italy, Australia, and the United States are the principal exporters of japonica rice, together accounting for about 60 percent of japonica exports.

While the export side of the world rice market is fairly concentrated and somewhat stable, the import side is much more fragmented with relative positions among countries changing. The largest importers of rice in the 1990's, receiving 500,000 metric tons to over 1 million, have been the EU, Iran, Saudi Arabia, and the Republics of the former USSR. A second tier of importers, receiving 300,00 to 500,00 cwt annually, include: Iraq, Hong Kong, the Republic of South Africa, Brazil, the Ivory Coast, Senegal, Mexico, and Malaysia. And finally, those countries importing at least 100,000 metric tons annually in the 1990's have been China, Sri Lanka, Nigeria, Turkey, Canada, Cuba, Peru, the United Arab Emirates, Singapore, Syria, and the United States. Indonesia and the Philippines at times enter the world market as substantial importers.

Although the developing nations have accounted for roughly two-thirds of rice imports since 1960, the breakdown by countries has changed considerably. The share accounted for by Asian countries declined during the early and mid-1980's, while the share accounted for by Middle Eastern and African countries increased. Asia's decline was due to the successful adoption of high-yielding varieties and government policies aimed at self-sufficiency. The shift in import demand to Africa and the Middle East has countered this decline somewhat.

Bangladesh, Sri Lanka, and Senegal are significant importers of low-quality rice. Importers of high-quality rice include the EC and the OPEC countries (Iran and Saudi Arabia). The United States is a major supplier to the EC and certain Middle Eastern markets. Pakistan supplies basmati rice to the Middle East. Thailand exports both high- and low-quality rice to the Middle East (principally Iran) and Africa. Annual exports of aromatic rice from Thailand to the United States increased since 1980 from virtually none to over 150,000 metric tons by the 1990's.

Developed countries account for a relatively small but stable portion of world imports, about 14 percent in 1980/88. This reflects rice's position as a relatively new or minor item in developed country diets, excluding Japan. Developments in Japan are important enough, however, that policy affects the operation of the world market.

Three critical issues are likely to shape the world rice market ahead. First, a GATT Agreement was signed in December 1993 that partially opened the Korean and Japanese rice markets to international suppliers. Although Japan's imports in 1993 and 1994 were largely due to a poor domestic harvest, over the longer term the GATT agreement should spur world trade and prices. The partial removal of import barriers by Japan and South Korea will likely open a high-quality japonica market for the United States and other suppliers.

Second is growth in total world demand for rice. World rice production increased at an annual average rate of 3 percent from 1982 to 1992 while growth in use was marginally slower. The historical data suggest that growth in imports will depend heavily on developments in Africa and the Middle East. Their increased role has been a result of income growth, growth in urban population, policies which stimulate consumption and dampen production increases, and limited production capacity. As the cost of consumer subsidies in these nations rises, some governments may choose to raise consumer prices. And if self-sufficiency policies are adopted or if suitable high-yielding varieties are developed for nonirrigated rice, the growth in world import demand could weaken further. Finally, a slowdown in income growth in the Middle East as a result of lower oil prices could encourage these countries to consume less rice and more lower-priced wheat.

And finally, the ability of supply to to meet consumer demand in the future will be an important issue. With yield growth in Asia almost stagnant and little surplus land available for rice production, higher incomes and greater populations in Asia may pressure world rice supplies. The world's ability to meet increased demand for rice without harming the environment will be an important issue in the next decade. And because of the prominence of Asia in world rice markets, events there will largely shape the trends of the next decade.

### U.S. Rice Trade

Although it produces less than 2 percent of the world rice crop, the United States has averaged 17.5 percent of annual world rice exports since 1989. Thus, while the U.S. rice crop is insignificant compared to world production, it has a large impact on trade. The world rice market has been changing over time and it is important to understand the role of the United States in that market. Some of these changes include: a signed GATT Agreement that partially opens the Japanese and Korean markets to international competition,

a shift in regional demand for U.S. rice, the quantity and type of government-assisted exports, type and class of exports, emergence of new exporters, and degree of competition.

Moreover, U.S. rice production remains fairly stable in an often volatile world market. The entire U.S. crop is flood irrigated, promoting reliable supplies. Production capacity is resilient and far outweighs domestic requirements. These factors, in addition to some Government program provisions (nonrecourse loans and announced support prices) that help promote production stability, assure a reliable supply of rice for export. U.S. rice exports are considered of high quality and typically sell at a premium to rice from low-cost Asian producers.

The export channel is an important outlet U.S. rice mills have for marketing their products. Rice is exported through either commercial sales arrangements with foreign buyers or through U.S. government aid programs such as Public Law-480 assistance programs. In addition, the U.S. also exports rough rice which accounts for a small, but growing share of U.S. rice exports. Rough rice exports made up almost 10 percent of U.S. rice exports in market year 1991/92, up from 6.7 percent a year earlier.

Exports accounted for over half of total U.S. shipments from the late 1950's through 1988/89. But since 1989/90, the domestic market has exceeded the export market each year even with the expansion in trade in 1993 and 1994. The U.S. domestic market continues to expand, thus providing millers a viable market outlet.

### *Major Buyers*

Reasons for importing U.S. rice vary by importing region. In recent years, Asian countries have typically imported U.S. rice in response to shortfalls in domestic production, such as Japan did in 1993 and 1994, and when such imports were financed by food aid as in Bangladesh. African countries import rice from the United States under food aid programs. The exceptions include the Republic of South Africa, a major commercial outlet, and the Ivory Coast and Nigeria. Shipments to the Middle East are commercial and buyers are primarily concerned with competitive prices and high quality. Until 1986, the EC did not produce the high quality long-grain rice demanded by its consumers. However, in recent years, Spain has produced long-grain rice and has even exported some long-grain rice, mostly to the other EU countries. Long-grain production in the EU partly results from heavy state subsidies.

Prior to Japan's decision to import rice in 1993, the largest regional markets for U.S. rice exports were: the Middle East, Sub-Saharan Africa, and Western Europe. Together, these three regions accounted for 64.3 percent of U.S. rice exports from 1988 to 1992. Of the three regions, the Middle East accounted for the largest share, 27.5 percent, and each of the others accounted for 18 to 19 percent. North America and the Caribbean are the next largest regional markets for U.S. rice exports, each accounting for 9 to 10 percent of U.S. rice exports from 1988 to 1992. In 1993/94, Japan was the largest single export market for U.S. rice, accounting for around 16 percent of U.S. exports.

Saudi Arabia and Turkey are the two largest U.S. markets in the Middle East. Iraq had been the largest single country U.S. market for milled rice from 1984 to 1990, but ceased to be an outlet for U.S. rice during and for a period after the Persian Gulf War. The Republic of South Africa is the largest market for U.S. rice in Sub-Saharan Africa and has been a consistent buyer, averaging over 100,000 metric tons since 1988. Other major importers of U.S. rice in Sub-Saharan Africa include: Senegal, Ivory Coast, Liberia, Guinea, and Sierra Leone. Nigeria had been the largest market for United States in Africa from 1977 through 1983, but now imports little rice from the U.S. Within Western Europe, The Netherlands, Switzerland, Belgium-Luxembourg, United Kingdom, and Germany are the principal U.S. markets in Western Europe.

Exports to North America had shown no pattern of long-term growth during the decade prior to 1989. But substantially increased shipments to Mexico, starting in 1989, and renewed growth in shipments to Canada after 1987 have made North America a much more important outlet for U.S. rice. U.S. exports to Mexico have averaged 133,000 metric tons since 1989, and are expected to continue rising. Shipments to Canada have risen each year since 1987 and were 136,000 metric tons in 1992. Haiti is the largest market for U.S. rice in the Caribbean, importing over 100,000 metric tons since 1990. Jamaica had been importing around 65,000 metric tons annually, but the United States has recently lost much of this market, and exports to Jamaica were only 26,422 metric tons in 1992. Trinidad and Tobago have together averaged importing around 30,000 metric tons annually from 1988 to 1992.

### *Exports by Type of Rice*

Five types of rice account for almost all of U.S. exports; parboiled, brown rice, rough rice, broken

kernels, and regular milled long and medium/short grain rice. Regular milled rice accounted for 53 percent of exports from 1981 to 1990, and parboiled rice accounted for just under one-third. Almost 70 percent of regular milled rice exports are long grain and the rest is predominantely medium grain. The destinations for each type of rice are distinct, and little substitution between types is possible. Consequently, the exit or entry of a major buyer can cause relative shares of U.S. rice exports by type to change substantially in a very short time.

The Middle East, Africa, and the European Union are the principal markets for U.S. parboiled rice, together accounting for over 80 percent of these shipments from 1981 to 1990. The Middle East imported about 35 percent of U.S. parboiled shipments between 1981 and 1990. The principal buyer of U.S. parboiled rice is Saudi Arabia, which imported about 28 percent of U.S. parboiled shipments from 1981 to 1990. Africa, mostly Sub-Saharan, accounted for 34 percent of U.S. parboiled exports from 1981 to 1990. The Republic of South Africa and Liberia were the largest importers in the region. The European Union accounted for 14 percent of U.S. parboiled shipments between 1981 and 1990. However, the European Union increased imports of U.S. parboiled rice after 1988 and the region accounted for over 22 percent of shipments in 1990. Belgium-Luxembourg, The Netherlands, and Germany are the principal buyers in this region. Some of this rice is reexported.

Parboiled rice increased from 29 percent of total U.S. rice exports in 1981 to 35 percent in 1990. However, parboiled rice shipments were under 30 percent of U.S. exports from 1985 to 1988 as shipments to principal markets declined. From 1981 to 1990, parboiled shipments to Africa dropped substantially due to reduced exports to Nigeria, rose to Western Europe, and were roughly stable to the Middle East.

Western Europe is the dominant market for U.S. brown rice exports, accounting for over 30 percent of shipments from 1981 to 1990. Canada ranks second, with about 10 percent of the U.S. brown rice export market from 1981 to 1990. In 1989 and 1990, Jamaica, Brazil, the Ivory Coast, Mexico, and Senegal were also strong markets for U.S. brown rice exports. Much of the U.S. brown rice imported by the EC-12 is further milled and reexported.

As Asian import needs decreased in the 1980's, brown rice declined as a share of U.S. exports. South Korea was a strong market for U.S. brown rice from 1979 to 1981, but ceased importing rice from the United States after 1983. The growing markets for U.S. rice, Sub-Saharan Africa and the Middle East, import little brown rice. And even in Latin America, only Brazil, Mexico, Jamaica, and Haiti currently import much U.S. brown rice.

The Middle East is the major market for long grain rice and the region has been responsible for about 40 percent of U.S. long-grain exports, including parboiled rice, from 1981 to 1990. Saudi Arabia and Iraq were the largest country markets for U.S. long-grain rice in the 1980's. U.S. rice shipments to Iraq were halted in 1990 as a result of the Persian Gulf War. Africa is the second largest market for long-grain milled rice, averaging 22 percent of U.S. shipments from 1981 to 1990. The Republic of South Africa, Liberia, and Senegal are important U.S. long-grain markets in Africa. Most U.S. exports to Sub-Saharan Africa are concessional shipments, and much of the rice shipped to Iraq was in the form of credit-assisted sales.

The Middle East is currently the largest market for U.S. medium/short grain exports, accounting for 53 percent of shipments between 1988 and 1990. Turkey and Jordan are the principal importers in this region, and accounted for over 90 percent of U.S. medium- and short-grain shipments to the Middle East in 1989 and 1990. Africa was the largest market for medium- and short-grain rice from 1984 to 1986, but shipments declined from 1986 to 1989. Medium-grain exports decreased as a share of U.S. rice exports in the 1980's, as several Asian markets declined, most notably, South Korea. Medium grain exports declined from 1989 through 1991. Medium grain rice is typically imported by African countries because it sells internationally below the price of long grain. Recently, several Eastern European countries and certain countries of the former Soviet Union have imported substantial quantities of U.S. medium-grain rice, typically with Export Enhancement Program (EEP) assistance.

Before 1980, Asia provided the primary market for U.S. medium-grain rice. Indonesia was the largest importer of medium grain rice before 1979, and South Korea was the largest in 1979 and 1980. However, U.S. medium-grain producers lost these two markets by the early 1980's. Kampuchea received substantial food aid shipments of medium grain rice from 1979 to 1981, in response to severe shortages caused by war and political upheaval, but U.S. exports to Kampuchea stopped when the war ended. Food aid shipments to Bangladesh, Indonesia, and the Philip-

pines constitute the only remaining substantial shipments of U.S. medium-grain rice to Asia.

Rough rice exports account for only a small, but growing share, of total U.S. shipments, averaging 4.4 percent from 1981 to 1990. Brazil, Venezuela, Costa Rica, Turkey, and Mexico have, at times, been major importers of U.S. rough rice since 1981. Since 1990, Mexico has substantially increased imports of U.S. rough rice due to a tariff differential between milled and rough, favoring importing rough rice. Rough rice accounted for 12 percent of U.S. rice exports in 1986 because Brazil purchased 277,000 metric tons. The EU has been a major and consistent importer of U.S. rough rice since 1981, with Italy and Spain the principal buyers in the European Union.

U.S. rice typically sells at a premium compared to major competitors and is generally believed to be of a higher quality. In addition, food aid and credit assistance have reduced the effects of higher prices on the competitiveness of U.S. producers in some markets.

### *The Role of Public Law 480*

Government-assisted exports authorized under Public Law 480 have played a vital role in promoting and expanding U.S. rice exports. The total volume of rice exports moving through Public Law 480 peaked in the early 1970's. However, Government-assisted credit programs have increased in quantity and as a share of concessional exports in the 1980's, making up for the decline in Public Law 480 shipments. Government-assisted exports (through Public Law 480 and Commodity Credit Corporation's export credit guarantees), as a percentage of all rice exports, declined from 36 percent in fiscal 1975 to a record low of 13 percent in fiscal 1982 before hitting a record high of 56 percent in fiscal 1985. Government-assisted exports made up 40 percent of U.S. rice exports in fiscal 1992.

In the 1950's, Japan, Pakistan, India, and Indonesia were key markets for Government-assisted rice exports. In the 1960's, India and Indonesia were the major recipients. South Vietnam, Kampuchea, and South Korea received most of the Public Law 480 rice in the early 1970's. Although Indonesia was the largest recipient of Public Law 480 shipments in the late 1970's, assistance was increasingly targeted to African countries after 1975.

Severe weather-related problems made Bangladesh the largest recipient of Public Law 480 rice shipments in the 1980's. Although normally not a recipient of U.S. food aid, the Philippines received over 150,000 tons of rice in 1985 and in 1988 (and probably 1989) because of a production shortfall.

The experiences of Bangladesh and the Philippines have been in sharp contrast to most other Asian countries, where domestic production has reduced the need for food aid. Other consistently large recipients in the 1980's have been Guinea, Liberia, Sierra Leone, Somalia, Madagascar, and Yemen. In addition, Peru received large Public Law 480 shipments in the late 1970's and early 1980's. In the 1980's, Public Law 480 shipments were about evenly split between long and medium grain. Iraq was the major recipient of credit assistance programs in the 1980's, allowing the country to become the number one single market for U.S. rice in the second half of that decade.

## Glossary

**Acreage allotment** -- An individual farm's share of the national acreage that the Secretary of Agriculture determines is needed to produce sufficient supplies of a particular crop. The farm's share is based on its previous production.

**Acreage reduction program (ARP)** -- A voluntary land retirement system in which participating farmers idle a prescribed portion of their crop acreage base of wheat, feed grains, cotton, or rice. The base is the average of the acreage planted for harvest and considered to be planted for harvest. Acreage considered to be planted includes any acreage not planted because of acreage reduction and diversion programs during a period specified by law. Farmers are not given a direct payment for ARP participation, although they must participate to be eligible for benefits such as Commodity Credit Corporation loans and deficiency payments. Participating producers are sometimes offered the option of idling additional land under a paid land diversion program, which gives them a specific payment for each idled acre.

**Acreage slippage** -- A measure of the effectiveness of acreage reduction programs. Slippage occurs when harvested acres change by less than the change in idled acres.

**Advance deficiency payments** -- The Secretary is required to make advance deficiency payments to producers of crops when an acreage limitation program is in effect and deficiency payments are expected to be paid. Advance deficiency payments can range from 30 to 50 percent of expected payments.

**Advance recourse loans** -- Price-support loans made early in a marketing year to enable farmers to hold their crops for later sale. Farmers must repay the recourse loan with interest and reclaim the crops used as collateral.

**Basic commodities** -- Six crops (corn, cotton, peanuts, rice, tobacco, and wheat) declared by legislation as price-supported commodities.

**Blended credit** -- A form of export subsidy which combines direct Government export credit and credit guarantees to reduce the effective interest rate.

**Carryover** -- Existing supplies of a farm commodity at the beginning of a new harvest.

**Cereals** -- Generic name for certain grasses that produce edible seeds; the name includes wheat, oats, barley, rye, rice, millet, corn, and sorghum grain.

**Coarse grains** -- Includes corn, barley, oats, grain sorghum, and rye. Millet is also included in the statistics of some foreign nations.

**Commodity Credit Corporation (CCC)** -- A federally owned and operated corporation within the U.S. Department of Agriculture created to stabilize, support, and protect farm income and prices through loans, purchases, payments, and other operations. All money transactions for agricultural price and income support and related programs are handled through the CCC; the CCC also helps maintain balanced, adequate supplies of agricultural commodities and helps in their orderly distribution.

**Common Agricultural Policy (CAP)** -- A set of regulations by which member states of the European Community (EC) seek to merge their individual agricultural programs into a unified effort to promote regional agricultural development and achieve other goals. The variable levy and export subsidies are the two main elements of the CAP.

**Concessional sales** -- Credit sales of a commodity in which the buyer is allowed more favorable payment terms than those on the open market (such as low-interest, long-term credit).

**Cost of production** -- An amount, measured in dollars, of all purchased inputs, allowances for management, and rent, that is necessary to produce farm products.

**Crop acreage base** -- A farm's average acreage of wheat, feed grains, cotton, or rice planted for harvest, plus land not planted because of acreage reduction or diversion programs during a period specified by law. Crop acreage bases are permanently reduced by the portion of land placed in the conservation reserve program.

**Crop year** -- The year in which a crop is planted; used interchangeably with marketing year.

**Cross compliance (full or strict)** -- A requirement that a farmer participating in a program for one crop must also meet the program provisions for other major program crops which the farmer grows. Strict cross-compliance provisions have not been enforced since the 1960's.

Cross compliance (limited) -- A producer participating in one commodity program must not plant in excess of the crop acreage base on that farm for any of the other program commodities for which an acreage reduction program is in effect. Limited cross-compliance authority was implemented in the late 1970's and remains in effect under the Food Security Act of 1985.

**Decoupling** -- A farm policy concept which, by separating farm program payments from the amount of production, would represent an alternative to current policies. Farmers would make planting decisions based on market prices but receive income-support payments independent of production and marketing decisions.

**Deficiency payment** -- A Government payment made to farmers who participate in wheat, feed grain, rice, or cotton programs. The payment rate is per bushel, pound, or hundredweight, based on the difference between the price level established by law (target price) and the higher of the market price during a period specified by law or the price per unit at which the Government will provide loans to farmers to enable them to hold their crops for later sale (loan rate). The payment is equal to the payment rate multiplied by the acreage planted for harvest and then by the program yield established for the particular farm.

**Developing countries** -- Countries whose economies are mostly dependent on agriculture and primary resources and do not have a strong industrial base.

**Direct payments** -- Payments in the form of cash or commodity certificates made directly to producers for

such purposes as deficiency payments, annual land diversion, or conservation reserve payments.

**Disaster payments** -- Federal aid provided to farmers for feed grain, wheat, rice, and upland cotton who have crop insurance (when available), when either planting is prevented or crop yields are abnormally low because of adverse weather and related conditions. Payments also may be made under special legislation enacted after an extensive natural disaster.

**European Community (EC)** -- Established by the Treaty of Rome in 1957, also known as the European Economic Community and the Common Market. Originally composed of six European nations, it has expanded to 12. In 1993, it became known as the European Union (EU). The EU attempts to unify and integrate member economies by establishing a customs union and common economic policies, including the Common Agricultural Policy (CAP).

**Export Credit Guarantee Program (GSM-102)** -- The largest U.S. agricultural export promotion program, functioning since 1982; guarantees repayment of private, short-term credit for up to 3 years.

**Export enhancement program (EEP)** -- Begun in May 1985 under a Commodity Credit Corporation charter to help U.S. exporters meet competitors' prices in subsidized markets. Under the EEP, exporters are awarded bonus certificates redeemable for CCC-owned commodities, enabling them to sell certain commodities to specified countries at prices below those of the U.S. market.

**Export subsidies** -- Special incentives, such as cash payments, tax exemptions, preferential exchange rates, and special contracts, extended by governments to encourage increased foreign sales; often used when a nation's domestic price for a good is artificially raised above world market prices.

**Farm acreage base** -- The annual total of the crop acreage bases (wheat, feed grains, upland cotton, and rice) on a farm, the average acreage planted to soybeans, peanuts, and other approved nonprogram crops, and the average acreage devoted to conserving uses. Conserving uses include all uses of cropland except crop acreage bases, acreage devoted to nonprogram crops, acreage enrolled in annual acreage reduction or limitation programs, and acreage in the conservation reserve program.

**Farm value** -- A measure of the return or payment received by farmers calculated by multiplying farm prices by the quantities of farm products equivalent to food sold at retail.

**Food grains** -- Cereal seeds used for human food, chiefly wheat and rice.

**Food Security Act of 1985 (Public Law 99-198)** -- The omnibus food and agriculture legislation signed into law on December 23, 1985, that provides a 5-year framework for the Secretary of Agriculture to administer various agricultural and food programs.

**Free market** -- The reliance on the market forces of supply and demand to determine prices and allocate available supplies.

**Free trade** -- Exchange of goods between countries with no trade barriers or restrictions such as tariffs or import quotas.

**General Agreement on Tariffs and Trade (GATT)** -- An agreement originally negotiated in Geneva, Switzerland, in 1947 among 23 countries, including the United States, to increase international trade by reducing tariffs and other trade barriers. The agreement provides a code of conduct for international commerce and a framework for periodic multilateral negotiations on trade liberalization and expansion.

**Generic commodity certificates** -- Negotiable certificates, which do not specify a certain commodity, that are issued by USDA in lieu of cash payments to commodity program participants and sellers of agricultural products. The certificates, frequently referred to as payment-in-kind (PIK) certificates, can be used to acquire stocks held as collateral on Government loans or owned by the Commodity Credit Corporation.

**Gramm-Rudman-Hollings Deficit Reduction Act** -- Common name for The Balanced Budget and Emergency Deficit Control Act of 1985 (Public Law 99-177). The law mandates annual reductions in the Federal budget deficit to eliminate it by 1991. If Congress and the President cannot agree on a targeted budget package for any specific fiscal year, automatic cuts occur for almost all Federal programs.

**Gross farm income** -- Income which farm operators realize from farming; includes cash receipts from the sale of farm products, Government payments, value of food and fuel produced and consumed on farms where grown, and other items.

**Harvested acres** -- Acres actually harvested for a particular crop. Usually somewhat smaller at the

national level than planted acres because of abandonment due to weather damage or other disasters or market prices too low to cover harvesting costs.

**Hedonic price** -- Refers to the disaggregation of the price paid for a product into explicit prices paid for its various attributes, particularly its quality characteristics.

**Import barriers** -- Quotas, tariffs, embargoes, and restrictive licensing used by a country to restrict the quantity or value of a good that may enter that country.

**Import quota** -- The maximum quantity or value of a commodity allowed to enter a country during a specified time period.

**Intermediate Export Credit Guarantee Program (GSM-103)** -- Established by the Food Security Act of 1985, this program complements GSM (General Sales Manager)-102 but guarantees repayment of private credit for 3-10 years.

**International commodity agreements** -- Agreements by a group of countries that contain substantive economic provisions aimed at stabilizing world trade, supplies, and prices, such as quotas, buffer stocks, and so forth.

**International trade barriers** -- Regulations imposed by governments to restrict imports from, and exports to, other countries, including tariffs, embargoes, and import quotas.

**Inventory (CCC)** -- The quantity of a commodity owned by the Commodity Credit Corporation (CCC) at any specified time.

**Inventory reduction program** -- Introduced in the Food Security Act of 1985, these discretionary programs provide producers with payments-in-kind (PIK) if they reduce acreage by half the required reduction and agree to forego loans and deficiency payments. Inventory reduction programs have not been implemented to date.

**Loan deficiency payments** -- A provision of the Food Security Act of 1985 giving the Secretary of Agriculture the discretion to provide producers who, although eligible to obtain loans, agree not to obtain loans for 1986-90 crops of wheat, feed grains, upland cotton, and rice. This program has not been implemented to date.

**Loan rate** -- The price per unit (bushel, bale, or pound) at which the Government will provide loans to farmers to enable them to hold their crops for later sale.

**Market Promotion Program (MPP)** -- Replaces the Targeted Export Assistance Program. The program assists U.S. producer groups or regional organizations the exports of which have been adversely affected by a foreign government's policies. MPP promotes exports of a specific American commodity or product in specified markets.

**Marketing certificate** -- A certificate which may be redeemed for a specified amount of Commodity Credit Corporation commodities. Such certificates may be generic or for a specific commodity.

**Marketing loan program** -- A program authorized by the Food Security Act of 1985 that allows producers to repay nonrecourse price support loans at less than the announced loan rates whenever the world price for the commodity is less than the loan rate. Under the act, the programs are mandatory for upland cotton and rice, and discretionary for wheat, feed grains, and soybeans. To date, the discretionary programs have not been implemented.

**Marketing quota** -- Marketing quotas are used to regulate the marketing of some commodities when supplies are excessive. When marketing quotas are in effect, growers who produce more of a commodity than their farm acreage allotments should yield are subject to marketing penalties on the "excess" production and are ineligible for Government price-support loans.

**Marketing year** -- Generally, the period from the beginning of a new harvest through marketing the following year.

**Multilateral trade negotiations** -- Discussions of trade issues involving three or more countries.

**National farm program acreage** -- The number of harvested acres of feed grains, wheat, upland cotton, and rice needed nationally to meet domestic and export use and to accomplish any desired increase or decrease in carryover levels.

**Net cashflow** -- A financial indicator that measures cash available to farm operators and landlords in a given year; it indicates the ability to meet current obligations and provide for family living expenses, and to undertake investments.

**Net cash income** -- An income measure based on actual receipts and expenses in a given year, regardless of the year in which the marketed output was produced; indicates the availability of funds to cover cash operating costs, finance capital investment and savings, service debts, maintain living standards, and pay taxes.

**Net farm income** -- Measures the profit or loss associated with a given year's production; approximates the net value of agricultural production regardless of whether the commodities were sold, fed, or placed in inventory during the year.

**Nonfarm income** -- Includes all income from nonfarm sources (excluding money earned from working for other farmers) received by owner-operator families residing on a farm and by hired farm labor residing on a farm.

**Nonprogram crop** -- Crops, such as potatoes, vegetables, fruits, and hay that are not included in Federal price support programs.

**Nonrecourse loans** -- The major price support instrument used by the Commodity Credit Corporation (CCC) to support the price of wheat, rice, feed grains, cotton, peanuts, and tobacco. Farmers who agree to comply with all commodity program provisions may pledge a quantity of a commodity as collateral and obtain a loan from the CCC. The borrower may elect either to repay the loan with interest within a specified period and regain control of the collateral commodity or default on the loan. In case of a default, the borrower forfeits without penalty the collateral commodity to the CCC.

**Nontariff trade barriers** -- Regulations used by governments to restrict imports from, and exports to, other countries, including embargoes and import quotas.

**Normal crop acreage** -- The acreage on a farm normally devoted to a group of designated crops. When a set-aside program is in effect, the total of the planted acreage of the designated crops and the set-aside acreage cannot exceed the normal crop acreage. Producers must comply to be eligible for commodity loan programs or deficiency payments.

**Normal flex acreage** -- This provision of the Omnibus Budget Reconciliation Act of 1990 (Public Law 101-508) requires a mandatory 15-percent reduction in payment acreage. Under this provision, producers are ineligible to receive deficiency payments on 15 percent of their crop acreage base (not including any acreage removed from production under any production adjustment program). Producers, however, are allowed to plant any crop on this acreage, except fruit, vegetables, and other prohibited crops.

**Normal yield** -- A term designating the average historical yield established for a particular farm or area.

**Offsetting compliance** -- Requires that a producer participating in a diversion or acreage reduction program must not offset that reduction by planting more than the acreage base for that crop on another farm under the same management control.

**Optional flex acreage** -- Under the planting flexibility provision of the 1990 Act, producers can choose to plant up to 25 percent of the crop acreage base to other Commodity Credit Corporation-specified crops (except fruits and vegetables) without a reduction in crop acreage bases on the farm, but receiving no deficiency payments on this acreage. The Omnibus Budget Reconciliation Act of 1990 (Public Law 101-508) made a 15-percent reduction in payment acreage mandatory. The remaining 10 percent is the optional flex acreage.

**Paid land diversion** -- If the Secretary of Agriculture determines that planted acres for a program crop should be reduced, producers may be offered a paid voluntary land diversion. Farmers are given a specific payment per acre to idle a percentage of their crop acreage base. The idled acreage is in addition to an acreage reduction program.

**Parity price** -- Originally defined as the price which gives a unit of a commodity the same purchasing power today as it had in the 1910-14 base period. In 1948, the base prices used in the calculation were made dependent on the most recent 10-year average price for commodities.

**Parity ratio** -- A measure of the relative purchasing power of farm products; the ratio between the index of prices received by farmers for all farm products and the index of prices paid by farmers for commodities and services used in farm production and family living.

**Payment-in-kind (PIK)** -- A payment made to eligible producers in the form of an equivalent amount of commodities owned by the Commodity Credit Corporation.

**Payment limitation** -- The maximum amount of commodity program benefits a person can receive. A $50,000 per person payment limitation was established in 1981 and applies to direct subsidy payments to wheat, feed grain, cotton, and rice producers. The law was amended in 1987 for the 1987 through 1990 crops to place a $250,000 limit on total program payments.

**Permanent legislation** -- Legislation that would be in force in the absence of all temporary amendments and temporarily suspended provisions. The Agricultural Adjustment Act of 1938 and the Agricultural Act of 1949 serve as the principal laws authorizing the major commodity programs.

**Permitted acreage** -- The maximum acreage of a crop that may be planted for harvest. The permitted acreage is computed by multiplying the crop acreage base by the acreage reduction program requirement (announced by the Commodity Credit Corporation each year) minus the diversion acreage (if applicable). For example, if a farm has a crop acreage base of 100 acres and a 10-percent acreage reduction (ARP) is required, the permitted acreage is 90 acres.

**PIK and roll** -- A procedure by which producers attempt to profit from situations where certificate exchange values (posted county prices) are below nonrecourse loan rates. With this procedure, a producer places the eligible commodity under nonrecourse loan at the loan rate, and uses generic certificates to exchange the commodity out from under loan. If the posted county price is below the nonrecourse loan rate, then the producer is able to acquire the quantity placed under loan for less than the proceeds of the nonrecourse loan, in addition to saving interest and storage charges.

**Price-support programs** -- Government programs that aim to keep farm prices received by participating producers from falling below specific minimum levels. Price support programs for major commodities are carried out by providing loans and purchase agreements to farmers so that they can store their crops during periods of low prices. The loans can later be redeemed if commodity prices rise sufficiently to make the sale of the commodity on the market profitable, or the farmer can forfeit the commodity to the Commodity Credit Corporation (CCC). With a purchase agreement, the producer may sell the commodity to the CCC.

**Prices-paid index** -- An indicator of changes in the prices farmers pay for goods and services (including interest, taxes, and farm wage rates) used for producing farm products and those needed for farm family living.

**Prices-received index** -- A measure computed on the basis of prices farmers received for their products at the point of the first sale.

**Producer** -- A person who, as owner, landlord, tenant, or sharecropper, is entitled to a share of the crops available for marketing from the farm or a share of the proceeds from the sale of those commodities.

**Production expenses** -- Total cash outlays for production. Capital expenses are figured on annual depreciation rather than on yearly cash outlays for capital items.

**Production controls** -- Any Government program or policy intended to limit production. These have included acreage allotments, acreage reduction, set-aside, and diverted acreage.

**Program costs** -- No single definition is applicable to all uses. Program costs may be (1) gross or net CCC expenditures on a commodity or all commodities during a fiscal year or other period; (2) the realized loss on disposition of a commodity, plus other related net costs during a fiscal year or other period; or (3) the net costs attributed to a particular year's crop of a commodity during the marketing year for that commodity.

**Program crops** -- Federal support programs are available to producers of wheat, corn, barley, grain sorghum, oats, rye, extra long staple and upland cotton, rice, soybeans, tobacco, peanuts, and sugar.

**Program yield** -- The farm commodity yield of record determined by averaging the yield for the 1981/85 crops, dropping the high and low years. Program yields are constant for the 1986/90 crops. The farm program yield applied to eligible acreage determines the level of production eligible for direct payments to producers.

**Protectionism** -- A tariff or quota, for example, imposed by a country in response to foreign competition in order to protect domestic producers.

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

I of the Food for Peace Program, as it is called, makes U.S. agricultural commodities available through long-term dollar credit sales at low interest rates for up to 40 years. Donations for emergency food relief needs are provided under Title II. Title III authorizes "food for development" grants.

**Section 32** -- A section of the Agricultural Act of 1935 (PL 320) which authorizes use of customs receipts funds to encourage increased consumption of agricultural commodities by means of purchase, export, and diversion programs.

**Section 301** -- A provision of the U.S. Trade Act of 1974 that allows the President to take appropriate action to get a foreign government to remove any act, policy, or practice that violates an international agreement or that is unjustified, unreasonable, or discriminatory, and which burdens or restricts U.S. commerce.

**Section 416** -- A section of the Agricultural Act of 1949 that permits donations of agricultural products through public and private nonprofit humanitarian organizations, foreign governments, and international organizations.

**Set-aside** -- A voluntary program to limit production by restricting the use of land. When offered, producers must participate to be eligible for Federal loans, purchases, and other payments.

**Subsidy** -- A direct or indirect benefit granted by a government for the production or distribution of a good.

**Supply control** -- The policy of changing the amount of acreage permitted to be planted to a commodity or the quantity of a commodity allowed to be sold by a program participant; used to maintain a desired carryover or price level.

**Target option program** -- A program implemented at the Secretary's discretion, in which wheat, feed grain, cotton, and rice producers have the option of choosing from a schedule of target prices and corresponding acreage reduction levels.

**Target price** -- A price level established by law for wheat, feed grains, rice, and cotton. Farmers participating in the Federal commodity programs receive the difference between the target price and the higher of the market price during a period prescribed by law or the unit price at which the Government will provide loans to farmers to enable them to hold their crops for later sale (the loan rate).

**The Disaster Assistance Act of 1989 (Public Law 101-82) and Public Law 101-81** -- Both signed August 14, 1989. These laws provided assistance to crop and livestock producers who suffered losses in production in 1988 and 1989 due to natural disaster. To be eligible for assistance, program producers with crop insurance had to have suffered losses of at least 35 percent of production, 40 percent for those without crop insurance, 45 percent for soybean and sunflower producers, and 50 percent for nonparticipating program crop producers, nonprogram crop producers, and honey producers. They also allowed producers to plant alternative crops on up to 20 percent of permitted acreage.

**The Omnibus Budget Reconciliation Act of 1986 (Public Law 99-509)** -- Signed October 21, 1986. This law required advance deficiency payments to be made to producers of 1987 wheat, feed grains, upland cotton, and rice crops of at least 40 percent of projected deficiency payments for wheat and feed grains and 30 percent of rice and upland cotton.

**The Omnibus Budget Reconciliation Act of 1990 (Public Law 101-508)** -- Signed November 5, 1990. This law amended the Food, Agriculture, Conservation, and Trade Act of 1990 to reduce agricultural spending for 1991-95. It included a mandatory 15-percent planting flexibility for program crops and assessments on certain other crop loans and incentive payments.

**Triple base** -- The planting flexibility concept used in the Food, Agriculture, Conservation, and Trade Act of 1990 (Public Law 101-624). Under this concept, a crop acreage base is divided into three categories: acreage removed from production under the Acreage Reduction Program; the permitted acreage on which the program crop is planted and deficiency payments may be paid; and the nonpayment acreage. On the nonpayment acreage, producers may plant any Commodity Credit Corporation-specified crop (except fruits and vegetables), but cannot receive deficiency payments. Crops planted on nonpayment acreage are still eligible for nonrecourse and marketing loans, and crop acreage bases are not reduced. In the Omnibus Budget Reconciliation Act of 1990, triple base refers to the mandatory 15-percent acreage base (also referred to as normal flex acreage).

**U.S. Trade Representative** -- Head of the Office of the U.S. Trade Representative, the principal trade pol-

icy agency of the U.S. Government. The U.S. Trade Representative is also the chief U.S. delegate and negotiator at all major trade talks and negotiations.

**World Price** -- The cost, insurance, and freight (c.i.f.) price of an imported agricultural commodity at a principal port.

**50/92** -- A program provision that allows cotton and rice growers who plant at least 50 percent of their permitted acreage to receive 92 percent of their deficiency payments under certain conditions.

## Bibliography


Barker, R., R.W. Herot, and B. Rose. 1985. The Rice Economy of Asia. Resources for the Future, Washington, DC.

Bateman, M.J. 1988. "Economic Effects of Japan's Rice Policy on the U.S. and World Rice Economies," Commodity Information, Inc., Orem, Utah.

Beer Institute. 1986. "The Brewing Industry in the United States:" *Brewers Almanac.* Washington, DC.

Boehlje, M., and S. Griffin. 1979. "Financial Impacts of Government Support Price Programs," *American Journal of Agricultural Economics* 61: 285-96.

Brorsen, B. W., W.R. Grant, and M.E. Rister. 1984. "A Hedonic Price Model for Rough Rice Bid/Acceptance Markets," *American Journal of Agricultural Economics* 66: 156-163.

Brorsen, B. W., W.R. Grant, and M.E. Rister. 1988. "Some Effects of Rice Quality on Rough Rice Prices," *Southern Journal of Agricultural Economics* 20: 131-140.

Chang, Te-tzu. 1977. "The Rice Cultures" in *The Early History of Agriculture.* Oxford University Press, London, U.K.: 143-155.

Chang, Te-tzu. 1976. "The Origin, Evolution, Cultivation, Dissemination, and Diversification of Asian and African Rices," *Euphytica* 25: 425-440.

Chicago Board of Trade. 1987. *Statistical Annual.* Chicago, Illinois.

Chicago Rice and Cotton Exchange. 1988. *Rough Rice Delivery Manual.*

Childs, N.W. 1989. *U.S. Rice Distribution Patterns.* SB-776. Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Childs, N.W. 1991. "Domestic Rice Consumption patterns, 1988/89". *Rice Situation and Outlook Report,* RS-61, Economic Research Service, U.S. Department of Agriculture, Washington, DC.: 12-15.

Cramer, G.L., E.J. Wailes, B. Gardner, and W. Lin. 1990. "Regulation in the U.S. Rice Industry, 1965-89," *American Journal of Agricultural Economics* 72: 1056-1065.

Cramer, G.L., K.B. Young, and E.J. Wailes. 1993. "Mexico's Rice Market: Current Status and Prospects for U.S. Trade," Bulletin 935, Arkansas Agricultural Experiment Station, Univ. of Arkansas, Fayetteville, AR.

Dalrymple, D.G. 1990. *Development and Spread of Semi-Dwarf Varieties of Wheat and Rice in the United States.* AER-455, Office of International Cooperation and Development, U.S. Department of Agriculture, Washington, DC.

Denison, J.F., H.D. Taylor, and B. E. McManus. 1988. "An Analysis of the Effects of Selected Quality Factors on Prices Paid Producers for Rough Rice in Louisiana," *Proceedings. 22nd Rice Technical Working Group.* Davis, California.

Dethloff, H.C. 1988. *A History of the American Rice Industry, 1685-1985.* Texas A&M University Press, College Station, TX.

Dilday, R.H. 1989. "Milling quality of rice: cylinder speed vs grain-moisture content at harvest," *Crop Science* 29: 1532-1535.

Dismukes, R. 1988. *U.S. Rice Farms: A Regional Comparison.* Staff Report No. AGES880119, Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Economic Research Service, U.S. Department of Agricultura. 1991. *Rice Situation and Outlook Yearbook.* RS-61. Washington, DC.

Efferson, J.N. 1952. *The Production and Marketing of Rice.* Simmons Press, New Orleans, LA.

Esmay, M., and coauthors. 1979. *Rice Production Technology in the Tropics.* University Press of Hawaii. Honolulu, Hawaii.

Efferson, J.N. 1985. "Rice Quality in World Markets," in *Rice Grain Quality and Marketing*. International Rice Research Institute. Manila, Philippines.

Elam, E.W., and S.H. Holder. 1985. "Rice Outlook and Situation Price Forecasts Accuracy Evaluated," *Arkansas Farm Research* 34: 7.

Fryar, E.O., L.D. Parsch, S.H. Holder, and N.P. Tugwell. 1986. "The Economics of Controlling Peck in Arkansas Rice," *Arkansas Farm Research* 35: 7.

Gardner, B. 1988. "A Framework for Analyzing Commodity Programs." Working Paper No. 88-5, Department of Agricultural and Resource Economics, University of Maryland, College Park, MD.

Gardner, B. 1983. "Efficient Redistribution through Commodity Markets," *American Journal of Agricultural Economics* 65: 225-246.

Godwin, M.R., and L.L. Jones. 1970. *The Southern Rice Industry*. Texas A&M University Press, College Station, TX.

Grant, W.R. 1970. "Application of an Economic Model for Evaluating Government Program Costs for Rice," *American Journal of Agricultural Economics* 52: 209-215.

Grant, W.R., S.H. Holder, Jr., and M.H. Ericksen. December 1980. *Rice - Analytical Base and Policy Issues*. Staff Report. Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Grant, W.R., J. Beach, and W. Lin. 1984. *Factors Affecting Supply, Demand, and Prices of U.S. Rice.* Staff Report No. AGES840803. Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Grant, W.R., M.E. Rister, and B.W. Brorsen. 1986. *Rice Quality Factors: Implications for Management Decisions*. Bulletin 1541, Texas Agricultural Experiment Station, Texas A&M University, College Station, TX.

Hoffman, L. 1990. "Performance of the Rough Rice Futures Market, 1986-89," *Rice Situation and Outlook Report,* RS-57, Economic Research Service, U.S. Department of Agriculture, Washington, DC.: 14-19.

Holder, S.H.,Jr., and W.R. Grant. 1979. *U.S. Rice Industry*. AER-433, Economics, Statistics and Cooperative Service, U.S. Department of Agriculture, Washington, DC.

Holder, S.H., Jr., and E.J. Wailes. 1985. *An Economic Analysis of Commercial Rice Drying and Storage Facilities.* Arkansas Agricultural Experiment Station, University of Arkansas, Fayetteville.

Houston, D.F. 1972. *Rice: Chemistry and Technology.* Monograph Series Vol. IV. American Association of Cereal Chemists, Inc. St. Paul, MN.

IRRI. 1985. *Proceedings of Workshop in Chemical Aspects of Rice Grain Quality*. International Rice Research Institute, Manila, Philippines.

Josling, T.E. 1974. "Agricultural Policies in Developed Countries: A Review," *Journal of Agricultural Economics* 25: 220-264.

Juliano, B.O. 1985. "Criteria and Tests for Rice Grain Qualities," in *Rice: Chemistry and Technology.* B.O. Juliano (ed.). American Association of Cereal Chemists, Inc., St. Paul, MN.

Just, R.E., D. Hueth, and A. Schmitz. 1982. *Applied Welfare Economics and Public Policy*. Prentice-Hall, Englewood Cliffs, NJ.

Kunze, O.R., and D. Calderwood. 1980. "Systems for Drying Rice," in *Drying and Storage of Agricultural Crops.* C.W. Hall (ed). AVI Publishing Company, Inc., Westport, CT.

Kunze, O.R., and F.T. Wratten. 1985. "Physical and Mechanical Properties of Rice," in *Rice: Chemistry and Technology*. B.O. Juliano, (ed.). American Association of Cereal Chemists, Inc., St. Paul, MN.

Lin, W. 1988. "Distributional Effects of the Marketing Loan Program: The Case of Rice." Paper presented at the Southern Agricultural Economics Association annual meetings, New Orleans, LA.

Livezey, J. 1993. "Marketing Loan: Its Process and Implications for U.S. Rice Prices," *Rice Situation and Outlook Report,* RS-67, Economic Research Service, U.S. Department of Agriculture, Washington, DC.: 19-21.

Lu, J.J., and Te-tzu Chang. 1980. "Rice in its Temporal and Spatial Perspectives," in *Rice: Production and Utilization.* B.S. Luh (ed.). AVI Publishing Company, Inc. Westport, CT.

Luh, B.S. (ed.) 1980. *Rice: Production and Utilization.* AVI Publishing Company, Inc. Westport, CT.

Lynch, L. 1991. "Title VI--Rice," in *Provisions of the Food, Agriculture, Conservation, and Trade Act of 1990.* AIB-6624. Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Martinez, A., H. Taylor, and L.L. Fielder. 1976. *Analysis of Quality and Non-Quality Factors on Prices of Medium and Long Grain Rough Rice in Louisiana.* Research Report. No. 507, Department of Agricultural Economics, Louisiana State University, Baton Rouge, LA.

McElroy, R., M. Ali, R. Dismukes, and A. Clausen. 1989. *Costs of Production for Major U.S. Crops, 1975-87.* Staff Report No. AGES 89-22. Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Perry, G.M., M.E. Rister, J.W. Richardson, W.E. Grant, and J.W. Sij, Jr. 1986. *The Impact of Tenure Arrangements and Crop Rotations on Upper Gulf Coast Rice Farms.* Research Report No. B-1530. Texas Agricultural Experiment Station, Texas A&M University, College Station, TX.

Roningen, V.O., and P.M. Dixit. 1989. *Economic Implications of Agricultural Policy Reforms in Industrial Market Economies.* Staff Rep. No. AGES-89-36, Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Salassi, M. 1992a. *Characteristics and Production Costs of U.S. Rice Farms, 1988,* AIB-657, Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Salassi, M. 1992b. *Rice Production Practices and Costs, 1988,* SB-837, Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Setia, P. 1991. "Characteristics of U.S. Rice Farms and Operators," *Rice Situation and Outlook Report.* RS-61, Economic Research Service, U.S. Department of Agriculture, Washington, DC.: 16-20.

Siamwalla, A., and S. Haykin. 1983. *The World Rice Market: Structure, Conduct, and Performance.* Research Report No. 39. International Food Policy Research Institute, Washington, DC.

Slayton, T.M. 1984. "Some Pieces of the World Rice Puzzle," *Rice: Situation and Outlook Report.* RS-43, Economic Research Service, U.S. Department of Agriculture, Washington, DC.

Smith, R.K., E.J. Wailes. 1988. *On-farm Cost Study of Drying and Storing Rice in Arkansas.* SPO-488, Department of Agricultural Economics, University of Arkansas, Fayetteville, AR.

Smith, R.K., E.J. Wailes, G.L. Cramer. 1990. *The Market Structure of the U.S. Rice Industry.* Bulletin 921, Arkansas Agricultural Experiment Station, University of Arkansas, Fayetteville, AR.

Texas Agricultural Experiment Station. 1984. *The Semi-Dwarfs, A New Era in Rice Production.* Bulletin 1462, Texas A&M University, College Station, TX.

U.S. Department of Agriculture, Agricultural Research Service. 1975. *Nutritive Value of American Foods.* Agricultural Handbook No. 456. Washington, DC.

U.S. Department of Agriculture, Federal Grain Inspection Service. 1982. *Rice Inspection Handbook.* Washington, DC.

U.S. Department of Agriculture, Federal Grain Inspection Service. 1983. *United States Standards for Rice* (rev.), Washington, DC.

U.S. Department of Agriculture, Economic Research Service. 1984. *Rice: Background for 1985 Farm Legislation.* AIB-470. Washington, DC.

U.S. Department of Agriculture, Agricultural Marketing Service. Various issues. *Rice Market News.* Washington, DC.

U.S. Department of Agriculture, Economic Research Service. Various issues. *Rice Situation and Outlook Report.* Washington, DC.

U.S. Department of Agriculture, Agricultural Stabilization & Conservation Service. 1991. Summary of Rice: Production, Supply, Use, Price, and Income Measures. Washington, DC.

U.S. Department of Agriculture, Economic Research Service. 1991. *Economic Indicators of the Farm Sector: Cost of Production - Major Field Crops, 1989.* ECIFS 9-5, Washington, DC.

U.S. Department of Agriculture, Economic Research Service. 1992. *Economic Indicators of the Farm Sec-*

*tor: Cost of Production - Major Field Crops, 1989.* ECIFS 10-4, Washington, DC.

U.S. Department of Agriculture, National Agricultureal Statistics Service. Various issues. *Rice Stocks.* Washington, DC.

U.S. Department of Commerce, Bureau of the Census. 1982 and 1987 Censuses of Agriculture. Washington, DC.

U.S. Department of Commerce, Bureau of the Census. Various years. Census of Manufactures. Washington, DC.

Wailes, E.J., and E.C. Chavez. 1992. *On-farm Cost of Drying and Storing Rice in Arkansas.* Research Report. Department of Agricultural Economics, University of Arkansas, Fayetteville, AR.

Wailes, E.J., and S.H. Holder, Jr. 1985. "Rough Rice Farm Movements in Arkansas Documented," *Arkansas Farm Research* 34: 6.

Wailes, E. J., and S. H. Holder, Jr. 1986. *A Study of the Spatial Organization of the U.S. Rice Industry.* SP 0486. Dept. of Ag. Econ. & Rural Sociology, University of Arkansas, Fayetteville, AR.

Wailes, E.J., and S.H. Holder, Jr. 1987. *Cost Models and An Analysis of Modern Rice Mills.* Bulletin 907, Arkansas Agricultural Experiment Station, University of Arkansas, Fayetteville, AR.

Wailes, E.J., and J. Livezey. 1991. "U.S. Rice Imports and Domestic Use," *Rice Situation and Outlook Report.* RS-62, Economic Research Service, U.S. Department of Agriculture, Washington, DC.: 13-17.

Wallace, T.D. 1962. "Measures of Social Costs of Agricultural Programs," *Farm Economics Journal* 44: 580-94.

Webb, B.D. 1985. "Criteria of Rice Quality in the United States," in *Rice: Chemistry and Technology.* B.O. Juliano, (ed.). American Association of Cereal Chemists Inc., St. Paul, MN.

Wolff, I. A., (ed.). 1982. *Handbook of Processing and Utilization in Agriculture. Volume II: Part 1, Plant Products.* CRC Press, Inc., Boca Raton, FL.

Yoshizawa, K., and S. Kishi. 1985. "Rice in Brewing," in *Rice: Chemistry and Technology.* B.O. Juliano (ed.). American Association of Cereal Chemists Inc., St. Paul, MN.

Young, K.B., G.L. Cramer, and E.J. Wailes. 1991. "Prospects for Increasing Returns from Rice Bran and other Rice Milling Byproducts," Special Report No. 152, Arkansas Agricultural Experiment Station, University of Arkansas, Fayetteville, AR.

Appendix table 1--Rice acreage, yield, and production, United States, 1895-1993

| Crop year 1/ | Acreage | | Yield per harvested acre | Total production |
|---|---|---|---|---|
| | Planted | Harvested | | |
| | 1,000 acres | | Pounds | 1,000 cwt |
| 1895 | N/A | 292 | 1,144 | 3,341 |
| 1896 | N/A | 270 | 867 | 2,340 |
| 1897 | N/A | 290 | 1,064 | 3,087 |
| 1898 | N/A | 314 | 1,190 | 3,737 |
| 1899 | N/A | 338 | 1,192 | 4,029 |
| 1900 | N/A | 361 | 1,221 | 4,407 |
| 1901 | N/A | 423 | 1,348 | 5,702 |
| 1902 | N/A | 545 | 1,200 | 6,541 |
| 1903 | N/A | 547 | 1,570 | 8,590 |
| 1904 | N/A | 574 | 1,506 | 8,647 |
| 1905 | N/A | 457 | 1,575 | 7,217 |
| 1906 | N/A | 505 | 1,584 | 7,999 |
| 1907 | N/A | 563 | 1,659 | 9,338 |
| 1908 | N/A | 596 | 1,691 | 10,079 |
| 1909 | N/A | 662 | 1,603 | 10,614 |
| 1910 | N/A | 666 | 1,671 | 11,129 |
| 1911 | N/A | 636 | 1,603 | 10,198 |
| 1912 | N/A | 643 | 1,659 | 10,665 |
| 1913 | N/A | 722 | 1,509 | 10,894 |
| 1914 | N/A | 646 | 1,635 | 10,565 |
| 1915 | N/A | 740 | 1,588 | 11,748 |
| 1916 | N/A | 843 | 2,111 | 17,795 |
| 1917 | N/A | 953 | 1,639 | 15,621 |
| 1918 | N/A | 1,101 | 1,635 | 17,999 |
| 1919 | N/A | 1,083 | 1,783 | 19,310 |
| 1920 | N/A | 1,299 | 1,789 | 23,242 |
| 1921 | N/A | 990 | 1,785 | 17,673 |
| 1922 | N/A | 1,053 | 1,780 | 18,748 |
| 1923 | N/A | 874 | 1,711 | 14,957 |
| 1924 | N/A | 838 | 1,753 | 14,689 |
| 1925 | N/A | 853 | 1,743 | 14,866 |
| 1926 | N/A | 1,016 | 1,861 | 18,911 |
| 1927 | N/A | 1,027 | 1,950 | 20,024 |
| 1928 | N/A | 972 | 2,029 | 19,725 |
| 1929 | 860 | 860 | 2,069 | 17,790 |
| 1930 | 966 | 966 | 2,093 | 20,218 |
| 1931 | 965 | 965 | 2,080 | 20,076 |
| 1932 | 874 | 874 | 2,143 | 18,729 |
| 1933 | 798 | 798 | 2,123 | 16,943 |
| 1934 | 812 | 812 | 2,164 | 17,571 |
| 1935 | 817 | 817 | 2,173 | 17,753 |
| 1936 | 981 | 981 | 2,285 | 22,419 |
| 1937 | 1,116 | 1,099 | 2,187 | 24,040 |
| 1938 | 1,076 | 1,076 | 2,196 | 23,628 |
| 1939 | 1,045 | 1,045 | 2,328 | 24,328 |
| 1940 | 1,090 | 1,069 | 2,291 | 24,495 |
| 1941 | 1,263 | 1,214 | 1,902 | 23,095 |
| 1942 | 1,490 | 1,457 | 1,996 | 29,082 |
| 1943 | 1,517 | 1,472 | 1,988 | 29,264 |

Refer to footnotes at end of table

—Continued

Appendix table 1--Rice acreage, yield, and production, United States, 1895-1993--continued

| Crop year 1/ | Acreage | | Yield per harvested acre | Total production |
|---|---|---|---|---|
| | Planted | Harvested | | |
| | 1,000 acres | | Pounds | 1,000 cwt |
| 1944 | 1,503 | 1,480 | 2,093 | 30,974 |
| 1945 | 1,512 | 1,499 | 2,046 | 30,668 |
| 1946 | 1,595 | 1,582 | 2,054 | 32,497 |
| 1947 | 1,719 | 1,708 | 2,062 | 35,217 |
| 1948 | 1,826 | 1,804 | 2,122 | 38,275 |
| 1949 | 1,884 | 1,858 | 2,194 | 40,769 |
| 1950 | 1,654 | 1,637 | 2,371 | 38,820 |
| 1951 | 2,033 | 1,996 | 2,389 | 46,089 |
| 1952 | 2,047 | 1,997 | 2,413 | 48,193 |
| 1953 | 2,210 | 2,159 | 2,447 | 52,834 |
| 1954 | 2,610 | 2,550 | 2,517 | 64,193 |
| 1955 | 1,851 | 1,826 | 3,061 | 55,902 |
| 1956 | 1,605 | 1,569 | 3,151 | 49,459 |
| 1957 | 1,372 | 1,340 | 3,204 | 42,935 |
| 1958 | 1,439 | 1,415 | 3,164 | 44,760 |
| 1959 | 1,608 | 1,586 | 3,382 | 53,647 |
| 1960 | 1,614 | 1,595 | 3,423 | 54,591 |
| 1961 | 1,618 | 1,589 | 3,411 | 54,198 |
| 1962 | 1,789 | 1,773 | 3,726 | 66,045 |
| 1963 | 1,785 | 1,771 | 3,968 | 70,269 |
| 1964 | 1,797 | 1,786 | 4,098 | 73,166 |
| 1965 | 1,804 | 1,793 | 4,255 | 76,281 |
| 1966 | 1,980 | 1,967 | 4,322 | 85,020 |
| 1967 | 1,982 | 1,970 | 4,537 | 89,379 |
| 1968 | 2,367 | 2,353 | 4,425 | 104,142 |
| 1969 | 2,141 | 2,128 | 4,318 | 91,904 |
| 1970 | 1,826 | 1,815 | 4,618 | 83,805 |
| 1971 | 1,826 | 1,818 | 4,718 | 85,768 |
| 1972 | 1,824 | 1,818 | 4,700 | 85,439 |
| 1973 | 2,181 | 2,170 | 4,274 | 92,765 |
| 1974 | 2,550 | 2,531 | 4,440 | 112,386 |
| 1975 | 2,833 | 2,818 | 4,558 | 128,437 |
| 1976 | 2,489 | 2,480 | 4,663 | 115,648 |
| 1977 | 2,261 | 2,249 | 4,412 | 99,223 |
| 1978 | 2,993 | 2,970 | 4,484 | 133,170 |
| 1979 | 2,890 | 2,869 | 4,599 | 131,947 |
| 1980 | 3,380 | 3,312 | 4,413 | 146,150 |
| 1981 | 3,827 | 3,792 | 4,819 | 182,742 |
| 1982 | 3,295 | 3,262 | 4,710 | 153,637 |
| 1983 | 2,190 | 2,169 | 4,598 | 99,720 |
| 1984 | 2,830 | 2,802 | 4,954 | 138,810 |
| 1985 | 2,512 | 2,492 | 5,414 | 134,913 |
| 1986 | 2,381 | 2,360 | 5,651 | 133,356 |
| 1987 | 2,356 | 2,333 | 5,555 | 129,603 |
| 1988 | 2,933 | 2,900 | 5,514 | 159,897 |
| 1989 | 2,731 | 2,687 | 5,749 | 154,487 |
| 1990 | 2,897 | 2,823 | 5,529 | 156,088 |
| 1991 | 2,878 | 2,775 | 5,674 | 157,457 |
| 1992 | 3,176 | 3,132 | 5,736 | 179,658 |
| 1993 2/ | 2,920 | 2,833 | 5,510 | 156,110 |

1/ August 1 to July 31. 2/ Preliminary.

Source: Economic Research Service, U.S. Department of Agriculture.

Appendix table 2--Rice acreage, yield, and production, Arkansas, 1960-93

| Crop year 1/ | Acreage | | Yield per harvested acre | Total production |
|---|---|---|---|---|
| | Planted | Harvested | | |
| | 1,000 acres | | Pounds | 1,000 cwt |
| 1960 | 391 | 384 | 3,525 | 13,536 |
| 1961 | 391 | 384 | 3,500 | 13,440 |
| 1962 | 430 | 426 | 3,850 | 16,401 |
| 1963 | 430 | 426 | 4,300 | 18,318 |
| 1964 | 434 | 430 | 4,300 | 18,490 |
| 1965 | 438 | 434 | 4,300 | 18,662 |
| 1966 | 482 | 477 | 4,300 | 20,511 |
| 1967 | 482 | 477 | 4,550 | 21,704 |
| 1968 | 578 | 572 | 4,350 | 24,882 |
| 1969 | 550 | 548 | 3,950 | 21,646 |
| 1970 | 468 | 466 | 4,900 | 22,834 |
| 1971 | 442 | 441 | 5,050 | 22,271 |
| 1972 | 442 | 441 | 4,975 | 21,939 |
| 1973 | 534 | 533 | 4,770 | 25,424 |
| 1974 | 750 | 725 | 4,535 | 32,879 |
| 1975 | 885 | 898 | 4,540 | 40,775 |
| 1976 | 850 | 847 | 4,770 | 40,362 |
| 1977 | 840 | 837 | 4,230 | 35,396 |
| 1978 | 1,100 | 1,090 | 4,110 | 48,505 |
| 1979 | 1,030 | 1,020 | 4,320 | 44,064 |
| 1980 | 1,300 | 1,280 | 4,110 | 52,615 |
| 1981 | 1,560 | 1,540 | 4,520 | 69,610 |
| 1982 | 1,350 | 1,330 | 4,290 | 57,037 |
| 1983 | 925 | 915 | 4,280 | 39,159 |
| 1984 | 1,160 | 1,150 | 4,600 | 52,900 |
| 1985 | 1,060 | 1,050 | 5,200 | 54,597 |
| 1986 | 1,030 | 1,020 | 5,300 | 54,060 |
| 1987 | 1,020 | 1,010 | 5,250 | 53,025 |
| 1988 | 1,220 | 1,210 | 5,350 | 64,735 |
| 1989 | 1,150 | 1,140 | 5,600 | 63,840 |
| 1990 | 1,240 | 1,200 | 5,000 | 60,000 |
| 1991 | 1,300 | 1,260 | 5,300 | 66,780 |
| 1992 | 1,400 | 1,380 | 5,500 | 75,914 |
| 1993 2/ | 1,280 | 1,230 | 5,050 | 62,094 |

1/August 1-July 31. 2/Preliminary.

Appendix table 3--Rice acreage, yield, and production, California, 1960-93

| Crop year 1/ | Acreage | | Yield per harvested acre | Total producti |
|---|---|---|---|---|
| | Planted | Harvested | | |
| | 1,000 acres | | Pounds | 1,000 cwt |
| 1960 | 290 | 288 | 4,775 | 13,752 |
| 1961 | 292 | 290 | 4,800 | 13,920 |
| 1962 | 325 | 323 | 4,950 | 15,988 |
| 1963 | 326 | 324 | 4,325 | 14,013 |
| 1964 | 329 | 327 | 5,050 | 16,514 |
| 1965 | 329 | 327 | 4,900 | 16,023 |
| 1966 | 362 | 360 | 5,500 | 19,800 |
| 1967 | 362 | 360 | 4,900 | 17,640 |
| 1968 | 434 | 432 | 5,325 | 23,004 |
| 1969 | 391 | 389 | 5,525 | 21,492 |
| 1970 | 333 | 331 | 5,700 | 18,867 |
| 1971 | 333 | 331 | 5,200 | 17,212 |
| 1972 | 333 | 331 | 5,614 | 18,583 |
| 1973 | 403 | 401 | 5,616 | 22,521 |
| 1974 | 470 | 467 | 5,380 | 25,110 |
| 1975 | 530 | 525 | 5,750 | 30,179 |
| 1976 | 400 | 399 | 5,520 | 22,017 |
| 1977 | 310 | 308 | 5,810 | 17,915 |
| 1978 | 493 | 490 | 5,220 | 25,578 |
| 1979 | 525 | 522 | 6,520 | 34,042 |
| 1980 | 569 | 565 | 6,440 | 36,386 |
| 1981 | 600 | 593 | 6,900 | 40,924 |
| 1982 | 540 | 535 | 6,700 | 35,848 |
| 1983 | 330 | 328 | 7,040 | 23,089 |
| 1984 | 458 | 450 | 7,120 | 32,060 |
| 1985 | 405 | 390 | 7,300 | 28,468 |
| 1986 | 363 | 360 | 7,700 | 27,727 |
| 1987 | 374 | 370 | 7,550 | 27,935 |
| 1988 | 430 | 425 | 7,020 | 29,840 |
| 1989 | 415 | 410 | 7,900 | 32,390 |
| 1990 | 400 | 395 | 7,700 | 30,429 |
| 1991 | 351 | 350 | 8,100 | 28,350 |
| 1992 | 396 | 394 | 8,500 | 33,490 |
| 1993 2/ | 440 | 437 | 8,300 | 36,271 |

1/August 1-July 31. 2/Preliminary.

Appendix table 4--Rice acreage, yield, and production, Louisiana, 1960-93

| Crop year 1/ | Acreage | | Yield per harvested acre | Total productio |
|---|---|---|---|---|
| | Planted | Harvested | | |
| | 1,000 acres | | Pounds | 1,000 cwt |
| 1960 | 464 | 458 | 2,850 | 13,053 |
| 1961 | 465 | 458 | 2,925 | 13,396 |
| 1962 | 512 | 508 | 3,050 | 15,494 |
| 1963 | 512 | 508 | 3,325 | 16,891 |
| 1964 | 515 | 513 | 3,300 | 16,929 |
| 1965 | 517 | 515 | 3,550 | 18,282 |
| 1966 | 567 | 565 | 3,700 | 20,905 |
| 1967 | 567 | 565 | 3,900 | 22,035 |
| 1968 | 680 | 679 | 3,900 | 26,481 |
| 1969 | 613 | 611 | 3,400 | 20,774 |
| 1970 | 525 | 523 | 3,900 | 20,397 |
| 1971 | 524 | 522 | 3,800 | 19,836 |
| 1972 | 523 | 522 | 3,825 | 19,967 |
| 1973 | 624 | 620 | 3,451 | 21,394 |
| 1974 | 674 | 620 | 3,650 | 24,090 |
| 1975 | 660 | 658 | 3,810 | 25,064 |
| 1976 | 570 | 568 | 3,910 | 22,203 |
| 1977 | 480 | 475 | 3,670 | 17,445 |
| 1978 | 590 | 587 | 3,820 | 22,425 |
| 1979 | 530 | 528 | 3,910 | 20,643 |
| 1980 | 615 | 585 | 3,550 | 20,768 |
| 1981 | 670 | 667 | 4,060 | 27,078 |
| 1982 | 600 | 598 | 4,160 | 24,862 |
| 1983 | 390 | 385 | 3,820 | 14,693 |
| 1984 | 530 | 528 | 4,150 | 21,932 |
| 1985 | 465 | 463 | 4,370 | 20,256 |
| 1986 | 430 | 426 | 4,550 | 19,380 |
| 1987 | 425 | 420 | 4,550 | 19,110 |
| 1988 | 545 | 535 | 4,500 | 24,080 |
| 1989 | 505 | 485 | 4,430 | 21,488 |
| 1990 | 555 | 545 | 4,860 | 26,469 |
| 1991 | 560 | 510 | 4,850 | 24,735 |
| 1992 | 630 | 620 | 4,650 | 28,846 |
| 1993 2/ | 545 | 530 | 4,550 | 24,108 |

1/August 1-July 31. 2/Preliminary.

Appendix table 5--Rice acreage, yield, and production, Mississippi, 1960-93

| Crop year 1/ | Acreage | | Yield per harvested acre | Total product |
|---|---|---|---|---|
| | Planted | Harvested | | |
| | 1,000 acres | | Pounds | 1,000 c |
| 1960 | 45 | 44 | 2,950 | 1,298 |
| 1961 | 45 | 44 | 3,300 | 1,452 |
| 1962 | 50 | 49 | 3,200 | 1,568 |
| 1963 | 50 | 49 | 3,900 | 1,911 |
| 1964 | 50 | 49 | 3,800 | 1,862 |
| 1965 | 51 | 50 | 3,700 | 1,850 |
| 1966 | 56 | 55 | 4,300 | 2,365 |
| 1967 | 56 | 55 | 4,300 | 2,365 |
| 1968 | 68 | 67 | 4,300 | 2,881 |
| 1969 | 61 | 60 | 4,200 | 2,520 |
| 1970 | 52 | 51 | 4,400 | 2,244 |
| 1971 | 52 | 51 | 4,600 | 2,346 |
| 1972 | 52 | 51 | 4,559 | 2,325 |
| 1973 | 62 | 62 | 4,306 | 2,670 |
| 1974 | 114 | 108 | 4,180 | 4,513 |
| 1975 | 175 | 171 | 3,900 | 6,665 |
| 1976 | 145 | 144 | 4,200 | 6,048 |
| 1977 | 112 | 111 | 4,000 | 4,440 |
| 1978 | 220 | 215 | 4,250 | 9,138 |
| 1979 | 210 | 207 | 4,050 | 8,384 |
| 1980 | 250 | 240 | 3,840 | 9,226 |
| 1981 | 340 | 337 | 4,390 | 14,792 |
| 1982 | 250 | 245 | 4,120 | 10,094 |
| 1983 | 162 | 161 | 4,000 | 6,440 |
| 1984 | 195 | 190 | 4,350 | 8,265 |
| 1985 | 190 | 188 | 5,350 | 10,058 |
| 1986 | 200 | 198 | 5,400 | 10,692 |
| 1987 | 200 | 198 | 5,100 | 10,098 |
| 1988 | 265 | 260 | 5,300 | 13,780 |
| 1989 | 240 | 235 | 5,700 | 13,395 |
| 1990 | 255 | 250 | 5,700 | 14,250 |
| 1991 | 225 | 220 | 5,600 | 12,320 |
| 1992 | 280 | 275 | 5,700 | 15,675 |
| 1993 2/ | 250 | 245 | 5,300 | 12,985 |

1/August 1-July 31. 2/Preliminary.

Appendix table 6--Rice acreage, yield, and production, Texas, 1960-93

| Crop year 1/ | Acreage | | Yield per harvested acre | Total producti |
|---|---|---|---|---|
| | Planted | Harvested | | |
| | 1,000 acres | | Pounds | 1,000 c |
| 1960 | 420 | 417 | 3,075 | 12,823 |
| 1961 | 421 | 409 | 2,900 | 11,861 |
| 1962 | 467 | 462 | 3,550 | 16,401 |
| 1963 | 462 | 459 | 4,125 | 18,934 |
| 1964 | 464 | 462 | 4,150 | 19,173 |
| 1965 | 464 | 462 | 4,600 | 21,252 |
| 1966 | 508 | 505 | 4,200 | 21,210 |
| 1967 | 510 | 508 | 5,000 | 25,400 |
| 1968 | 599 | 597 | 4,600 | 27,164 |
| 1969 | 550 | 548 | 3,950 | 21,646 |
| 1970 | 469 | 467 | 4,450 | 20,782 |
| 1971 | 470 | 468 | 5,100 | 23,868 |
| 1972 | 469 | 468 | 4,727 | 22,122 |
| 1973 | 553 | 549 | 3,740 | 20,530 |
| 1974 | 565 | 562 | 4,494 | 25,258 |
| 1975 | 550 | 548 | 4,560 | 24,996 |
| 1976 | 510 | 508 | 4,810 | 24,430 |
| 1977 | 502 | 501 | 4,670 | 23,400 |
| 1978 | 560 | 558 | 4,700 | 26,226 |
| 1979 | 560 | 557 | 4,220 | 24,481 |
| 1980 | 590 | 586 | 4,320 | 24,814 |
| 1981 | 580 | 579 | 4,700 | 27,239 |
| 1982 | 475 | 474 | 4,690 | 22,214 |
| 1983 | 320 | 318 | 4,340 | 13,805 |
| 1984 | 410 | 408 | 4,940 | 20,160 |
| 1985 | 330 | 329 | 5,490 | 18,071 |
| 1986 | 290 | 289 | 6,250 | 18,063 |
| 1987 | 270 | 269 | 5,900 | 15,871 |
| 1988 | 390 | 388 | 6,000 | 23,280 |
| 1989 | 340 | 338 | 5,700 | 19,266 |
| 1990 | 355 | 353 | 6,000 | 21,180 |
| 1991 | 345 | 343 | 6,000 | 20,580 |
| 1992 | 353 | 351 | 5,800 | 20,357 |
| 1993 2/ | 300 | 298 | 5,400 | 16,095 |

1/August 1-July 31. 2/Preliminary.

Appendix table 7--Proportional distribution of rice production, by type of grain, United States, 1960-93

| Crop year 1/ | Long grain | Medium grain | Short grain | Total production |
|---|---|---|---|---|
| | | Percent of total production | | 1,000 cwt |
| 1960 | 48.2 | 35.2 | 16.6 | 54,591 |
| 1961 | 45.3 | 38.4 | 16.3 | 54,198 |
| 1962 | 43.7 | 41.8 | 14.5 | 66,045 |
| 1963 | 36.8 | 48.7 | 14.5 | 70,269 |
| 1964 | 37.5 | 50.2 | 12.3 | 73,166 |
| 1965 | 43.0 | 45.6 | 11.4 | 76,281 |
| 1966 | 41.6 | 46.5 | 11.9 | 85,020 |
| 1967 | 48.5 | 42.3 | 9.2 | 89,379 |
| 1968 | 46.8 | 42.1 | 11.1 | 104,075 |
| 1969 | 49.0 | 40.3 | 10.7 | 91,904 |
| 1970 | 49.3 | 40.4 | 10.3 | 83,805 |
| 1971 | 52.6 | 37.2 | 10.2 | 85,768 |
| 1972 | 50.2 | 39.7 | 10.1 | 85,439 |
| 1973 | 46.2 | 42.9 | 10.9 | 92,765 |
| 1974 | 49.8 | 41.0 | 9.2 | 112,386 |
| 1975 | 52.9 | 38.4 | 8.7 | 128,437 |
| 1976 | 60.6 | 31.8 | 7.6 | 115,648 |
| 1977 | 62.7 | 26.5 | 10.8 | 99,223 |
| 1978 | 63.7 | 27.4 | 8.9 | 133,170 |
| 1979 | 61.2 | 30.6 | 8.2 | 131,947 |
| 1980 | 59.4 | 35.2 | 5.4 | 146,150 |
| 1981 | 60.4 | 33.7 | 5.9 | 182,742 |
| 1982 | 60.8 | 33.4 | 5.8 | 153,637 |
| 1983 | 65.2 | 26.7 | 8.1 | 99,720 |
| 1984 | 69.2 | 25.4 | 5.4 | 138,810 |
| 1985 | 74.4 | 21.1 | 4.5 | 134,913 |
| 1986 | 72.8 | 24.0 | 3.2 | 133,356 |
| 1987 | 68.7 | 29.0 | 2.2 | 129,603 |
| 1988 | 74.6 | 23.1 | 2.3 | 159,897 |
| 1989 | 70.7 | 26.8 | 2.5 | 154,487 |
| 1990 | 69.1 | 30.3 | 0.6 | 156,088 |
| 1991 | 69.3 | 30.2 | 0.5 | 157,457 |
| 1992 | 71.3 | 28.2 | 0.5 | 179,658 |
| 1993 2/ | 66.0 | 33.2 | 0.8 | 156,110 |

1/ August 1–July 31. 2/Preliminary.

Appendix table 8--Proportional distribution of rice production, by type of grain, Arkansas, 1960-93

| Crop year 1/ | Long grain | Medium grain | Short grain | Total production |
|---|---|---|---|---|
| | | Percent of total production | | 1,000 cwt |
| 1960 | 54.1 | 45.9 | N/A | 13,536 |
| 1961 | 52.2 | 47.8 | N/A | 13,440 |
| 1962 | 54.3 | 47.8 | N/A | 16,401 |
| 1963 | 54.1 | 45.4 | 0.5 | 18,318 |
| 1964 | 53.0 | 46.5 | 0.5 | 18,490 |
| 1965 | 55.6 | 42.8 | 1.6 | 18,662 |
| 1966 | 57.5 | 41.5 | 1.0 | 20,511 |
| 1967 | 65.0 | 34.1 | 0.9 | 21,704 |
| 1968 | 69.9 | 29.3 | 0.8 | 24,882 |
| 1969 | 72.2 | 26.1 | 1.7 | 21,646 |
| 1970 | 75.2 | 23.8 | 1.0 | 22,834 |
| 1971 | 74.1 | 25.0 | 0.9 | 20,271 |
| 1972 | 73.1 | 26.0 | 0.9 | 21,939 |
| 1973 | 70.3 | 28.5 | 1.2 | 25,424 |
| 1974 | 70.0 | 28.5 | 1.5 | 32,379 |
| 1975 | 77.2 | 20.4 | 2.4 | 40,775 |
| 1976 | 80.6 | 16.6 | 2.8 | 40,352 |
| 1977 | 80.4 | 17.0 | 2.6 | 35,396 |
| 1978 | 82.4 | 14.3 | 3.3 | 48,505 |
| 1979 | 85.0 | 12.0 | 3.0 | 44,064 |
| 1980 | 80.7 | 17.2 | 2.1 | 52,615 |
| 1981 | 82.3 | 15.9 | 1.8 | 69,610 |
| 1982 | 83.5 | 14.7 | 1.8 | 57,037 |
| 1983 | 84.3 | 14.8 | 0.9 | 39,159 |
| 1984 | 87.6 | 12.1 | 0.3 | 52,900 |
| 1985 | 92.5 | 7.0 | 0.5 | 54,597 |
| 1986 | 91.7 | 8.2 | 0.1 | 55,120 |
| 1987 | 85.4 | 14.4 | 0.2 | 53,025 |
| 1988 | 88.7 | 11.2 | 0.1 | 64,735 |
| 1989 | 90.0 | 9.9 | 0.1 | 63,840 |
| 1990 | 88.4 | 11.5 | 0.1 | 60,000 |
| 1991 | 87.3 | 12.6 | 0.1 | 66,780 |
| 1992 | 88.1 | 11.8 | 0.1 | 75,914 |
| 1993 2/ | 86.8 | 12.9 | 0.3 | 62,094 |

1/ August 1-July 31. 2/Preliminary.

Appendix table 9--Proportional distribution of rice production, by type of grain, California, 1960-93

| Crop year 1/ | Long grain | Medium grain | Short grain | Total production |
|---|---|---|---|---|
| | | Percent of total production | | 1,000 cwt |
| 1960 | N/A | 31.2 | 68.8 | 13,752 |
| 1961 | N/A | 34.5 | 65.5 | 13,920 |
| 1962 | N/A | 37.5 | 62.5 | 15,988 |
| 1963 | N/A | 32.1 | 67.9 | 14,013 |
| 1964 | N/A | 44.8 | 55.2 | 16,514 |
| 1965 | N/A | 47.5 | 52.5 | 16,023 |
| 1966 | N/A | 50.0 | 50.0 | 19,800 |
| 1967 | N/A | 54.0 | 46.0 | 17,640 |
| 1968 | N/A | 52.6 | 47.4 | 23,004 |
| 1969 | N/A | 58.1 | 41.9 | 21,492 |
| 1970 | N/A | 53.4 | 46.6 | 18,867 |
| 1971 | N/A | 51.7 | 48.3 | 17,212 |
| 1972 | N/A | 54.8 | 45.2 | 18,583 |
| 1973 | N/A | 56.5 | 43.5 | 22,521 |
| 1974 | N/A | 59.0 | 40.0 | 25,110 |
| 1975 | N/A | 65.2 | 34.8 | 30,179 |
| 1976 | N/A | 65.0 | 35.0 | 22,017 |
| 1977 | 0.3 | 40.2 | 59.5 | 17,913 |
| 1978 | N/A | 60.0 | 40.0 | 25,578 |
| 1979 | N/A | 72.3 | 27.7 | 34,042 |
| 1980 | N/A | 81.4 | 18.6 | 36,386 |
| 1981 | N/A | 76.7 | 23.3 | 40,924 |
| 1982 | 2.3 | 75.9 | 21.8 | 35,848 |
| 1983 | 5.7 | 61.2 | 33.1 | 35,089 |
| 1984 | 13.4 | 64.0 | 22.6 | 32,060 |
| 1985 | 13.5 | 65.4 | 21.1 | 28,468 |
| 1986 | 5.5 | 79.0 | 15.4 | 27,727 |
| 1987 | 9.3 | 80.5 | 10.2 | 27,935 |
| 1988 | 14.1 | 73.9 | 12.0 | 29,840 |
| 1989 | 6.9 | 81.2 | 11.8 | 32,390 |
| 1990 | 5.9 | 88.2 | 5.9 | 29,260 |
| 1991 | 4.1 | 93.4 | 2.5 | 28,350 |
| 1992 | 3.6 | 93.6 | 2.8 | 33,490 |
| 1993 2/ | 3.2 | 94.0 | 2.8 | 36,271 |

1/ August 1-July 31. 2/Preliminary.

Appendix table 10--Proportional distribution of rice production, by type of grain, Louisiana, 1960-93

| Crop year 1/ | Long grain | Medium grain | Short grain | Total production |
|---|---|---|---|---|
| | | Percent of total production | | 1,000 cwt |
| 1960 | 51.9 | 48.1 | N/A | 13,053 |
| 1961 | 53.7 | 46.3 | N/A | 13,596 |
| 1962 | 42.6 | 57.4 | N/A | 15,494 |
| 1963 | 29.6 | 70.4 | N/A | 16,591 |
| 1964 | 24.3 | 75.7 | N/A | 16,929 |
| 1965 | 24.6 | 75.4 | N/A | 18,202 |
| 1966 | 22.5 | 77.5 | N/A | 20,905 |
| 1967 | 22.7 | 77.3 | N/A | 22,035 |
| 1968 | 22.6 | 77.4 | N/A | 26,481 |
| 1969 | 27.8 | 72.2 | N/A | 20,774 |
| 1970 | 24.5 | 75.5 | N/A | 20,397 |
| 1971 | 29.6 | 70.4 | N/A | 19,836 |
| 1972 | 31.5 | 68.5 | N/A | 19,967 |
| 1973 | 24.7 | 75.3 | N/A | 21,394 |
| 1974 | 25.8 | 74.2 | N/A | 24,090 |
| 1975 | 24.6 | 75.4 | N/A | 25,064 |
| 1976 | 36.3 | 63.7 | N/A | 22,203 |
| 1977 | 36.2 | 63.8 | N/A | 17,445 |
| 1978 | 40.9 | 59.1 | N/A | 22,425 |
| 1979 | 53.5 | 46.5 | N/A | 20,643 |
| 1980 | 42.7 | 57.3 | N/A | 20,768 |
| 1981 | 39.0 | 61.0 | N/A | 27,078 |
| 1982 | 44.1 | 55.9 | N/A | 24,862 |
| 1983 | 51.9 | 48.1 | N/A | 14,693 |
| 1984 | 63.4 | 36.6 | N/A | 21,932 |
| 1985 | 71.2 | 28.8 | N/A | 20,256 |
| 1986 | 72.5 | 27.5 | N/A | 19,380 |
| 1987 | 63.2 | 36.8 | N/A | 19,110 |
| 1988 | 72.8 | 27.2 | N/A | 24,080 |
| 1989 | 61.1 | 38.9 | N/A | 21,488 |
| 1990 | 55.9 | 44.1 | N/A | 26,469 |
| 1991 | 50.5 | 49.5 | N/A | 24,735 |
| 1992 | 66.8 | 33.2 | N/A | 28,846 |
| 1993 2/ | 60.8 | 39.2 | N/A | 24,108 |

1/ August 1–July 31. 2/Preliminary.

Appendix table 11--Proportional distribution of rice production, by type of grain, Mississippi, 1960-93

| Crop year 1/ | Long grain | Medium grain | Short grain | Total production |
|---|---|---|---|---|
| | | Percent of total production | | 1,000 cwt |
| 1960 | 92.3 | 7.7 | N/A | 1,298 |
| 1961 | 86.7 | 13.3 | N/A | 1,452 |
| 1962 | 93.3 | 6.7 | N/A | 1,568 |
| 1963 | 94.7 | 5.3 | N/A | 1,911 |
| 1964 | 94.7 | 5.3 | N/A | 1,862 |
| 1965 | 94.4 | 5.6 | N/A | 1,850 |
| 1966 | 91.7 | 8.3 | N/A | 2,365 |
| 1967 | 95.8 | 4.2 | N/A | 2,365 |
| 1968 | 96.6 | 3.4 | N/A | 2,881 |
| 1969 | 96.0 | 4.0 | N/A | 2,520 |
| 1970 | 100.0 | N/A | N/A | 2,244 |
| 1971 | 100.0 | N/A | N/A | 2,346 |
| 1972 | 100.0 | N/A | N/A | 2,325 |
| 1973 | 96.4 | 3.6 | N/A | 2,670 |
| 1974 | 97.8 | 2.2 | N/A | 4,513 |
| 1975 | 98.3 | 1.0 | 0.7 | 6,665 |
| 1976 | 99.3 | 0.7 | N/A | 6,048 |
| 1977 | 98.2 | 1.8 | N/A | 4,440 |
| 1978 | 99.1 | 0.9 | N/A | 9,138 |
| 1979 | 99.5 | 0.5 | N/A | 8,384 |
| 1980 | 98.5 | 1.5 | N/A | 9,226 |
| 1981 | 97.5 | 2.5 | N/A | 14,792 |
| 1982 | 100.0 | N/A | N/A | 10,094 |
| 1983 | 100.0 | N/A | N/A | 6,440 |
| 1984 | 100.0 | N/A | N/A | 8,265 |
| 1985 | 100.0 | N/A | N/A | 10,058 |
| 1986 | 100.0 | N/A | N/A | 10,692 |
| 1987 | 100.0 | N/A | N/A | 10,098 |
| 1988 | 96.3 | 3.7 | N/A | 13,780 |
| 1989 | 100.0 | N/A | N/A | 13,395 |
| 1990 | 100.0 | N/A | N/A | 14,250 |
| 1991 | 100.0 | N/A | N/A | 12,320 |
| 1992 | 100.0 | N/A | N/A | 15,675 |
| 1993 2/ | 100.0 | N/A | N/A | 12,985 |

1/ August 1-July 31. 2/Preliminary.

Appendix table 12--Proportional distribution of rice production, by type of grain, Texas, 1960-93

| Crop year 1/ | Long grain | Medium grain | Short grain | Total production |
|---|---|---|---|---|
| | | Percent of total production | | 1,000 cwt |
| 1960 | 82.0 | 18.0 | N/A | 12,823 |
| 1961 | 75.6 | 24.4 | N/A | 11,861 |
| 1962 | 69.5 | 30.5 | N/A | 16,401 |
| 1963 | 59.5 | 40.5 | N/A | 18,934 |
| 1964 | 62.3 | 37.7 | N/A | 19,173 |
| 1965 | 73.1 | 26.9 | N/A | 21,252 |
| 1966 | 79.7 | 20.3 | N/A | 21,210 |
| 1967 | 85.4 | 14.6 | N/A | 25,400 |
| 1968 | 86.8 | 13.2 | N/A | 27,164 |
| 1969 | 88.9 | 11.1 | N/A | 21,646 |
| 1970 | 84.3 | 15.7 | N/A | 20,782 |
| 1971 | 87.5 | 12.5 | N/A | 23,868 |
| 1972 | 81.5 | 18.5 | N/A | 22,122 |
| 1973 | 83.5 | 16.5 | N/A | 20,530 |
| 1974 | 86.6 | 13.4 | N/A | 25,258 |
| 1975 | 89.0 | 11.0 | N/A | 24,976 |
| 1976 | 94.5 | 5.5 | N/A | 24,430 |
| 1977 | 96.9 | 3.1 | N/A | 23,400 |
| 1978 | 97.0 | 3.0 | N/A | 26,226 |
| 1979 | 96.4 | 3.2 | 0.4 | 23,481 |
| 1980 | 98.0 | 2.0 | N/A | 24,814 |
| 1981 | 93.3 | 6.7 | N/A | 27,239 |
| 1982 | 93.5 | 6.5 | N/A | 22,214 |
| 1983 | 97.6 | 2.4 | N/A | 13,805 |
| 1984 | 98.7 | 1.3 | N/A | 20,160 |
| 1985 | 99.2 | 0.8 | N/A | 18,071 |
| 1986 | 98.0 | 2.0 | N/A | 18,063 |
| 1987 | 98.0 | 2.0 | N/A | 15,871 |
| 1988 | 98.0 | 2.0 | N/A | 23,280 |
| 1989 | 98.0 | 2.0 | N/A | 19,266 |
| 1990 | 97.7 | 2.3 | N/A | 21,180 |
| 1991 | 98.0 | 2.0 | N/A | 20,580 |
| 1992 | 96.4 | 3.6 | N/A | 20,357 |
| 1993 2/ | 98.2 | 1.8 | N/A | 16,095 |

1/ August 1–July 31. 2/Preliminary.

Appendix table 13—Rice production costs and returns, United States, 1975–91

| Item | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gross value of production: | | | | | | | | | | | | | | | | | |
| (excluding direct Government payments): | | | | | | | | | | | | | | | | | |
| Harvest-period price (dollars/cwt.) | 8.01 | 6.73 | 9.10 | 7.82 | 10.07 | 10.69 | 10.21 | 7.61 | 8.79 | 8.05 | 8.01 | 3.83 | 4.83 | 6.82 | 7.45 | 6.06 | 7.52 |
| Yield (cwt./planted acre) | 45.54 | 46.79 | 43.99 | 44.49 | 45.70 | 43.24 | 47.75 | 46.86 | 45.53 | 48.87 | 53.78 | 56.97 | 54.67 | 53.79 | 55.79 | 52.71 | 54.24 |
| Gross value of production (dollars/acre) | 364.59 | 314.93 | 400.26 | 348.08 | 460.07 | 462.37 | 487.67 | 356.65 | 400.12 | 393.22 | 430.71 | 218.41 | 263.89 | 366.85 | 415.64 | 319.42 | 407.88 |
| | | | | | | | | Dollars per planted acre | | | | | | | | | |
| Cash expenses: | | | | | | | | | | | | | | | | | |
| Seed | 28.00 | 23.48 | 19.72 | 25.69 | 23.07 | 28.94 | 29.95 | 26.10 | 25.89 | 25.51 | 24.21 | 19.89 | 21.01 | 21.22 | 21.43 | 21.51 | 20.42 |
| Fertilizer | 44.39 | 29.62 | 28.00 | 27.24 | 28.49 | 36.04 | 38.85 | 37.78 | 35.51 | 35.61 | 34.06 | 35.34 | 30.96 | 35.45 | 38.43 | 35.59 | 34.26 |
| Chemicals | 17.72 | 25.02 | 22.20 | 20.84 | 21.54 | 22.93 | 25.08 | 26.63 | 28.04 | 5.51 | 5.69 | 42.06 | 39.08 | 39.21 | 40.60 | 42.59 | 46.99 |
| Custom operations | 19.26 | 21.26 | 21.70 | 23.44 | 26.16 | 28.88 | 30.64 | 31.88 | 32.60 | 47.92 | 47.81 | 36.52 | 36.23 | 32.18 | 34.24 | 35.05 | 37.19 |
| Fuel, lube, and electricity | 19.94 | 21.66 | 21.97 | 23.40 | 33.35 | 43.41 | 49.83 | 50.48 | 46.45 | 38.72 | 44.56 | 37.53 | 47.10 | 55.19 | 58.11 | 64.23 | 68.91 |
| Repairs | 13.62 | 13.65 | 12.89 | 13.54 | 16.21 | 18.27 | 19.59 | 21.01 | 22.24 | 28.23 | 28.72 | 22.24 | 23.34 | 26.78 | 28.32 | 30.01 | 31.13 |
| Hired labor | 19.09 | 21.49 | 14.48 | 15.41 | 17.15 | 18.52 | 19.38 | 20.86 | 20.79 | 25.35 | 26.09 | 39.34 | 39.09 | 34.70 | 35.92 | 38.55 | 40.12 |
| Purchased irrigation water | 5.48 | 6.05 | 6.17 | 6.67 | 7.83 | 7.91 | 7.66 | 20.03 | 20.10 | 20.45 | 20.29 | 9.12 | 8.30 | 6.78 | 7.16 | 6.97 | 1/ |
| Drying | 21.46 | 23.31 | 23.64 | 25.18 | 27.56 | 29.30 | 35.78 | 36.30 | 35.29 | 32.04 | 34.67 | 43.32 | 39.08 | 39.02 | 40.80 | 40.20 | 41.8 |
| Miscellaneous | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.56 | 0.46 | 1.29 | 1.32 | 1.36 | 9.49 |
| Technical services | 0.30 | 0.29 | 0.29 | 0.30 | 0.28 | 0.26 | 1.51 | 1.48 | 1.48 | 5.24 | 5.31 | 1.29 | 1.28 | 0.44 | 0.47 | 0.48 | 1/ |
| Total, variable cash expenses | 189.25 | 185.84 | 171.06 | 181.71 | 201.64 | 234.46 | 258.27 | 272.55 | 268.39 | 264.58 | 271.41 | 287.21 | 285.93 | 292.26 | 306.80 | 316.54 | 330.31 |
| General farm overhead | 20.09 | 20.99 | 22.35 | 24.82 | 27.00 | 27.95 | 25.99 | 23.40 | 23.08 | 23.67 | 26.08 | 20.77 | 20.28 | 21.60 | 20.97 | 23.96 | 22.21 |
| Taxes and insurance | 5.38 | 5.63 | 6.43 | 6.85 | 8.13 | 9.86 | 9.55 | 9.96 | 10.47 | 12.26 | 13.21 | 11.24 | 12.02 | 12.01 | 12.43 | 12.57 | 12.65 |
| Interest on operating loans | 21.53 | 19.91 | 19.04 | 21.34 | 25.88 | 31.08 | 35.13 | 35.64 | 26.53 | 27.16 | 25.20 | 22.56 | 15.89 | 13.30 | 13.37 | 14.28 | 2/ |
| Interest on real estate | 31.21 | 31.20 | 31.15 | 31.15 | 31.29 | 31.47 | 26.44 | 22.59 | 22.85 | 26.86 | 27.20 | 12.54 | 10.16 | 11.41 | 12.38 | 13.53 | 26.72 |
| Total, fixed cash expenses | 78.21 | 77.74 | 78.98 | 84.15 | 92.30 | 100.36 | 97.11 | 91.59 | 82.93 | 89.95 | 91.69 | 67.11 | 58.35 | 58.32 | 59.15 | 64.34 | 61.58 |
| Total, cash expenses | 267.46 | 263.58 | 250.03 | 265.86 | 293.94 | 334.82 | 355.38 | 364.14 | 351.32 | 354.53 | 363.10 | 354.32 | 344.28 | 350.58 | 365.95 | 380.88 | 391.89 |
| Gross value of production less cash expenses | 97.13 | 51.35 | 150.23 | 82.21 | 166.14 | 127.55 | 132.29 | -7.49 | 48.80 | 38.69 | 67.61 | -135.91 | -80.39 | 16.27 | 49.69 | -61.46 | 15.99 |
| Economic (full ownership) costs: | | | | | | | | | | | | | | | | | |
| Variable cash expenses | 189.25 | 185.84 | 171.06 | 181.71 | 201.64 | 234.46 | 258.27 | 272.55 | 268.39 | 264.58 | 271.41 | 287.21 | 285.93 | 292.26 | 306.80 | 316.54 | 330.31 |
| General farm overhead | 20.09 | 20.99 | 22.35 | 24.82 | 27.00 | 27.95 | 25.99 | 23.40 | 23.08 | 23.67 | 26.08 | 20.77 | 20.28 | 21.60 | 20.97 | 23.96 | 22.21 |
| Taxes and insurance | 5.38 | 5.63 | 6.43 | 6.85 | 8.13 | 9.86 | 9.55 | 9.96 | 10.47 | 12.26 | 13.21 | 11.24 | 12.02 | 12.01 | 12.43 | 12.57 | 12.65 |
| Capital replacement | 29.04 | 26.86 | 28.82 | 31.05 | 37.08 | 40.15 | 42.94 | 45.27 | 47.94 | 49.71 | 51.44 | 40.69 | 44.27 | 41.54 | 43.81 | 45.76 | 47.79 |
| Operating capital | 4.35 | 3.69 | 3.21 | 4.69 | 6.42 | 8.40 | 11.00 | 8.89 | 6.78 | 7.88 | 6.18 | 5.01 | 5.65 | 10.11 | 12.33 | 11.82 | 8.98 |
| Other nonland capital | 8.03 | 6.95 | 6.66 | 6.70 | 7.86 | 7.76 | 7.51 | 7.62 | 7.31 | 10.12 | 10.03 | 7.65 | 8.01 | 16.70 | 20.17 | 22.21 | 24.72 |
| Land | 67.37 | 58.12 | 74.36 | 70.47 | 96.26 | 87.84 | 92.13 | 53.80 | 65.00 | 68.86 | 75.74 | 25.59 | 34.24 | 61.89 | 72.78 | 48.67 | 65.24 |
| Unpaid labor | 13.26 | 14.94 | 10.06 | 10.71 | 11.91 | 12.87 | 13.47 | 14.50 | 14.44 | 17.62 | 18.13 | 23.20 | 23.54 | 22.88 | 23.95 | 25.20 | 27.33 |
| Subtotal | 336.77 | 323.01 | 322.94 | 337.00 | 396.30 | 429.29 | 460.86 | 435.99 | 443.42 | 454.70 | 472.21 | 421.36 | 433.94 | 478.99 | 513.14 | 506.73 | 539.23 |
| Residual returns to management and risk | 27.82 | -8.08 | 77.32 | 11.07 | 63.78 | 33.08 | 26.81 | -79.34 | -43.30 | -61.48 | -41.50 | -202.95 | -170.05 | -112.14 | -97.50 | -187.31 | -131.35 |

1/ Included in the Miscellaneous category.

2/ Included in the real estate interest.

Note: Survey base changed in 1984 and 1986.

Appendix table 14—Rice production costs and returns, Arkansas (non-Delta), 1975-91

| Item | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gross value of production: | | | | | | | | | | | | | | | | | |
| (excluding direct Government payments): | | | | | | | | | | | | | | | | | |
| Harvest-period price (dollars/cwt.) | 7.96 | 6.69 | 9.05 | 7.78 | 10.01 | 10.30 | 9.95 | 7.74 | 8.93 | 8.19 | 8.57 | 3.87 | 4.92 | 6.93 | 7.52 | 6.08 | 7.70 |
| Yield (cwt./planted acre) | 47.30 | 47.94 | 43.32 | 44.55 | 43.10 | 41.38 | 45.30 | 43.10 | 42.69 | 46.28 | 52.01 | 53.95 | 53.60 | 53.49 | 55.87 | 49.41 | 51.99 |
| Gross value of production(dollars/acre) | 376.42 | 320.74 | 391.81 | 346.46 | 431.31 | 426.21 | 450.74 | 333.63 | 381.21 | 379.02 | 445.69 | 208.79 | 263.71 | 370.69 | 420.14 | 300.41 | 400.32 |
| | | | | | | | | Dollars per planted acre | | | | | | | | | |
| Cash expenses: | | | | | | | | | | | | | | | | | |
| Seed | 26.14 | 21.00 | 20.57 | 27.43 | 22.23 | 31.74 | 31.82 | 24.95 | 27.43 | 26.75 | 21.78 | 18.72 | 19.98 | 19.06 | 19.46 | 19.60 | 16.44 |
| Fertilizer | 38.55 | 26.24 | 26.48 | 25.89 | 26.48 | 34.51 | 36.74 | 36.00 | 32.08 | 27.89 | 27.11 | 31.39 | 27.50 | 32.06 | 34.68 | 31.64 | 28.13 |
| Chemicals | 18.45 | 27.17 | 21.15 | 19.93 | 20.33 | 21.61 | 23.59 | 25.40 | 26.69 | 1.21 | 1.21 | 32.67 | 31.90 | 32.41 | 33.69 | 35.47 | 38.53 |
| Custom operations | 15.29 | 16.65 | 16.33 | 17.94 | 19.18 | 21.63 | 22.93 | 23.79 | 24.61 | 36.92 | 36.51 | 29.47 | 30.28 | 25.16 | 26.82 | 27.65 | 28.49 |
| Fuel, lube, and electricity | 21.19 | 22.72 | 22.14 | 23.98 | 33.96 | 45.45 | 54.48 | 52.82 | 48.61 | 46.28 | 54.54 | 38.23 | 50.77 | 58.97 | 62.55 | 70.15 | 75.70 |
| Repairs | 13.72 | 13.56 | 12.31 | 13.15 | 15.31 | 17.42 | 18.63 | 19.91 | 21.14 | 32.25 | 33.08 | 28.10 | 28.33 | 28.73 | 30.40 | 31.92 | 33.36 |
| Hired labor | 22.43 | 23.57 | 14.48 | 15.88 | 17.32 | 19.12 | 19.49 | 22.19 | 21.20 | 27.03 | 26.85 | 35.18 | 34.94 | 32.40 | 33.60 | 37.30 | 40.53 |
| Purchased irrigation water | 0.64 | 0.70 | 0.68 | 0.75 | 0.96 | 1.07 | 1.07 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Drying | 23.24 | 24.91 | 24.28 | 26.30 | 28.52 | 29.99 | 35.89 | 34.12 | 33.78 | 20.73 | 23.31 | 33.99 | 32.70 | 32.63 | 34.90 | 31.83 | 32.41 |
| Miscellaneous | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.33 | 1.32 | 1.33 | 1.37 | 1.42 | 1.44 |
| Technical services | 0 | 0 | 0 | 0 | 0 | 0 | 1.61 | 1.61 | 1.61 | 5.28 | 5.28 | 0.15 | 0.15 | 0.15 | 0.16 | 0.17 | 1/ |
| Total, variable cash expenses | 179.66 | 176.52 | 158.43 | 171.25 | 184.29 | 222.54 | 246.25 | 240.79 | 237.15 | 224.34 | 229.67 | 249.23 | 257.87 | 262.90 | 277.63 | 287.15 | 295.03 |
| General farm overhead | 20.92 | 21.86 | 23.27 | 25.09 | 25.69 | 25.38 | 24.04 | 17.37 | 17.25 | 17.78 | 26.25 | 16.61 | 16.22 | 18.35 | 17.81 | 20.62 | 18.72 |
| Taxes and insurance | 5.90 | 5.94 | 6.24 | 6.76 | 7.99 | 7.74 | 8.02 | 8.25 | 8.84 | 11.27 | 12.16 | 12.74 | 13.29 | 12.69 | 13.10 | 13.30 | 13.47 |
| Interest on operating loans | 22.04 | 20.38 | 19.49 | 21.84 | 26.49 | 31.81 | 32.96 | 34.49 | 21.38 | 22.69 | 27.45 | 18.01 | 12.69 | 11.33 | 11.40 | 12.26 | 28.69 |
| Interest on real estate | 32.72 | 32.71 | 32.66 | 32.65 | 32.80 | 32.99 | 24.33 | 21.59 | 13.80 | 22.47 | 22.42 | 15.01 | 12.15 | 15.00 | 16.00 | 17.82 | 2/ |
| Total, fixed cash expenses | 81.57 | 80.89 | 81.66 | 86.34 | 92.97 | 97.92 | 89.35 | 81.70 | 61.27 | 74.21 | 88.28 | 62.37 | 54.35 | 57.37 | 58.31 | 64.00 | 60.88 |
| Total, cash expenses | 261.23 | 257.41 | 240.09 | 257.59 | 277.27 | 320.46 | 335.60 | 322.49 | 298.42 | 298.55 | 317.95 | 311.60 | 312.22 | 320.27 | 335.94 | 351.15 | 355.91 |
| Gross value of production less cash expenses | 115.18 | 63.33 | 151.72 | 88.87 | 154.04 | 105.75 | 115.14 | 11.14 | 82.79 | 80.97 | 127.74 | -102.81 | -48.51 | 50.42 | 84.20 | -50.74 | 44.41 |
| Economic (full ownership) costs: | | | | | | | | | | | | | | | | | |
| Variable cash expenses | 179.66 | 176.52 | 158.43 | 171.25 | 184.29 | 222.54 | 246.25 | 240.79 | 237.15 | 224.34 | 229.67 | 249.23 | 257.87 | 262.90 | 277.63 | 287.15 | 295.03 |
| General farm overhead | 20.92 | 21.86 | 23.27 | 25.09 | 25.69 | 25.38 | 24.04 | 17.37 | 17.25 | 17.78 | 26.25 | 16.61 | 16.22 | 18.35 | 17.81 | 20.62 | 18.72 |
| Taxes and insurance | 5.90 | 5.94 | 6.24 | 6.76 | 7.99 | 7.74 | 8.02 | 8.25 | 8.84 | 11.27 | 12.16 | 12.74 | 13.29 | 12.69 | 13.10 | 13.30 | 13.47 |
| Capital replacement | 33.28 | 30.03 | 25.94 | 28.79 | 34.34 | 38.12 | 40.16 | 41.70 | 44.32 | 56.15 | 57.58 | 60.45 | 60.94 | 45.50 | 47.81 | 49.44 | 51.66 |
| Operating capital | 4.00 | 3.48 | 2.87 | 4.32 | 5.49 | 7.77 | 10.16 | 8.05 | 6.34 | 6.86 | 5.33 | 4.59 | 5.27 | 9.10 | 11.16 | 10.73 | 8.02 |
| Other nonland capital | 9.47 | 8.00 | 6.17 | 6.40 | 7.50 | 7.58 | 7.24 | 7.30 | 7.02 | 10.97 | 10.72 | 10.59 | 10.49 | 17.85 | 21.53 | 23.65 | 26.40 |
| Land | 79.93 | 69.46 | 85.72 | 82.62 | 100.88 | 87.63 | 90.61 | 53.92 | 67.27 | 78.15 | 94.90 | 15.84 | 29.01 | 58.62 | 69.63 | 40.30 | 63.07 |
| Unpaid labor | 15.59 | 16.38 | 10.06 | 11.03 | 12.04 | 13.29 | 13.54 | 15.42 | 14.74 | 18.78 | 18.66 | 16.30 | 16.19 | 16.87 | 17.48 | 19.42 | 21.10 |
| Subtotal | 348.75 | 331.67 | 318.69 | 336.26 | 378.21 | 410.05 | 440.02 | 392.80 | 402.93 | 424.30 | 455.27 | 386.35 | 409.28 | 441.88 | 476.15 | 464.61 | 497.47 |
| Residual returns to management and risk | 27.66 | -10.93 | 73.12 | 10.20 | 53.09 | 16.16 | 10.72 | -59.17 | -21.72 | -45.28 | -9.58 | -177.56 | -145.57 | -71.19 | -56.01 | -164.20 | -97.15 |

1/Included in the Miscellaneous category.

2/Included in the real estate interest category.

Note: Survey base changed in 1984 and 1986.

Appendix table 15—Rice production costs and returns, California, 1975–91

| Item | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Dollars per planted acre | | | | | | | | | |
| Gross value of production: | | | | | | | | | | | | | | | | | |
| (excluding direct Government payments): | | | | | | | | | | | | | | | | | |
| Harvest-period price (dollars/cwt.) | 7.74 | 6.51 | 8.80 | 7.57 | 9.74 | 10.90 | 9.85 | 7.21 | 8.32 | 7.63 | 7.38 | 3.69 | 4.49 | 5.95 | 6.61 | 5.35 | 6.69 |
| Yield (cwt./planted acre) | 57.30 | 55.70 | 57.78 | 51.88 | 64.80 | 63.95 | 68.21 | 67.87 | 69.97 | 70.10 | 72.07 | 76.38 | 70.42 | 69.39 | 78.05 | 75.03 | 76.82 |
| Gross value of production (dollars/acre) | 443.80 | 362.69 | 508.61 | 392.68 | 631.12 | 697.05 | 671.87 | 489.34 | 582.15 | 534.86 | 531.88 | 281.84 | 316.19 | 412.87 | 515.91 | 401.41 | 513.93 |
| Cash expenses: | | | | | | | | | | | | | | | | | |
| Seed | 24.55 | 24.55 | 20.07 | 31.01 | 28.23 | 25.79 | 30.68 | 31.33 | 24.15 | 26.56 | 26.56 | 21.09 | 21.59 | 22.01 | 22.06 | 22.09 | 24.8 |
| Fertilizer | 46.57 | 34.47 | 33.29 | 32.97 | 32.94 | 41.48 | 43.66 | 45.35 | 43.52 | 37.38 | 34.70 | 37.26 | 34.37 | 38.63 | 41.07 | 41.89 | 39.23 |
| Chemicals | 10.23 | 15.43 | 20.24 | 18.98 | 19.36 | 20.60 | 22.41 | 24.03 | 25.24 | 6.00 | 6.00 | 49.12 | 47.96 | 48.74 | 50.66 | 53.34 | 57.94 |
| Custom operations | 32.89 | 34.35 | 38.67 | 37.09 | 43.27 | 48.54 | 52.90 | 55.08 | 57.75 | 58.34 | 57.77 | 47.20 | 48.49 | 48.23 | 51.42 | 53.02 | 55.62 |
| Fuel, lube, and electricity | 12.45 | 12.80 | 14.32 | 13.54 | 18.67 | 25.76 | 29.88 | 30.54 | 28.50 | 26.82 | 32.28 | 43.49 | 47.51 | 54.85 | 59.08 | 58.40 | 62.15 |
| Repairs | 16.41 | 15.56 | 16.21 | 15.12 | 17.41 | 20.16 | 22.00 | 23.69 | 25.15 | 34.65 | 34.53 | 20.57 | 20.58 | 21.44 | 22.80 | 24.49 | 25.59 |
| Hired labor | 20.30 | 20.37 | 14.42 | 15.36 | 16.60 | 18.24 | 18.50 | 19.55 | 19.41 | 30.92 | 32.65 | 41.37 | 44.08 | 40.36 | 42.86 | 42.61 | 43.08 |
| Purchased irrigation water | 13.38 | 13.97 | 15.73 | 15.09 | 16.65 | 18.37 | 19.81 | 24.32 | 24.41 | 24.83 | 24.63 | 21.51 | 21.73 | 21.64 | 23.59 | 24.32 | 1/ |
| Drying | 22.04 | 22.65 | 25.35 | 23.97 | 30.23 | 37.62 | 45.43 | 49.72 | 51.26 | 46.04 | 47.33 | 53.47 | 47.89 | 48.03 | 55.59 | 55.09 | 59.15 |
| Miscellaneous | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.41 | 1.40 | 1.41 | 1.46 | 1.50 | 26.12 |
| Technical services | 0 | 0 | 0 | 0 | 0 | 0 | 1.42 | 1.42 | 1.42 | 8.28 | 8.28 | 1.15 | 1.14 | 1.15 | 1.25 | 1.29 | 1/ |
| Total, variable cash expenses | 198.81 | 194.15 | 198.30 | 203.13 | 223.36 | 256.56 | 286.69 | 305.03 | 300.80 | 299.82 | 304.73 | 337.64 | 336.74 | 346.49 | 371.84 | 378.04 | 393.68 |
| General farm overhead | 30.20 | 31.56 | 33.59 | 36.21 | 42.94 | 41.00 | 38.03 | 53.59 | 54.13 | 55.16 | 39.09 | 35.78 | 34.93 | 37.92 | 36.81 | 42.60 | 38.67 |
| Taxes and insurance | 5.83 | 6.20 | 6.55 | 6.97 | 8.09 | 18.85 | 18.96 | 16.44 | 18.68 | 22.28 | 22.78 | 14.50 | 14.65 | 16.80 | 17.66 | 18.10 | 17.93 |
| Interest on operating loans | 29.59 | 27.37 | 26.17 | 29.33 | 35.57 | 42.71 | 47.57 | 52.01 | 52.12 | 51.28 | 26.86 | 38.50 | 27.11 | 18.68 | 18.79 | 20.21 | 2/ |
| Interest on real estate | 57.20 | 57.19 | 57.10 | 57.09 | 57.35 | 57.68 | 40.30 | 30.96 | 66.00 | 57.71 | 65.26 | 30.03 | 24.32 | 25.76 | 27.48 | 30.61 | 48.48 |
| Total, fixed cash expenses | 122.82 | 122.31 | 123.41 | 129.59 | 143.95 | 160.24 | 144.86 | 153.00 | 190.93 | 186.43 | 153.99 | 118.81 | 101.01 | 99.16 | 100.74 | 111.52 | 105.08 |
| Total, cash expenses | 321.63 | 316.46 | 321.71 | 332.73 | 367.31 | 416.80 | 431.55 | 458.03 | 491.73 | 486.25 | 458.72 | 456.45 | 437.75 | 445.65 | 472.58 | 489.56 | 498.76 |
| Gross value of production less cash expenses | 122.17 | 46.23 | 186.90 | 59.95 | 263.81 | 280.25 | 240.32 | 31.31 | 90.42 | 48.61 | 73.16 | -174.61 | -121.56 | -32.78 | 43.33 | -88.15 | 15.17 |
| Economic (full ownership) costs: | | | | | | | | | | | | | | | | | |
| Variable cash expenses | 198.81 | 194.15 | 198.30 | 203.13 | 223.36 | 256.56 | 286.69 | 305.03 | 300.80 | 299.82 | 304.73 | 337.64 | 336.74 | 346.49 | 371.84 | 378.04 | 393.68 |
| General farm overhead | 30.20 | 31.56 | 33.59 | 36.21 | 42.94 | 41.00 | 38.03 | 53.59 | 54.13 | 55.16 | 39.09 | 35.78 | 34.93 | 37.92 | 36.81 | 42.60 | 38.67 |
| Taxes and insurance | 5.83 | 6.20 | 6.55 | 6.97 | 8.09 | 18.85 | 18.96 | 16.44 | 18.68 | 22.28 | 22.78 | 14.50 | 14.65 | 16.80 | 17.66 | 18.10 | 17.93 |
| Capital replacement | 26.27 | 30.35 | 27.94 | 30.38 | 35.90 | 39.27 | 43.49 | 46.87 | 49.75 | 62.22 | 64.34 | 30.70 | 30.71 | 38.83 | 41.21 | 43.99 | 45.97 |
| Operating capital | 4.19 | 3.62 | 3.17 | 4.98 | 6.84 | 8.51 | 11.23 | 9.44 | 7.27 | 10.05 | 7.93 | 6.36 | 7.24 | 11.99 | 14.95 | 14.12 | 10.71 |
| Other nonland capital | 7.02 | 7.59 | 6.23 | 6.33 | 7.35 | 7.34 | 7.35 | 7.56 | 7.26 | 12.22 | 11.97 | 5.95 | 5.84 | 15.89 | 19.24 | 21.36 | 23.85 |
| Land | 99.50 | 80.85 | 114.05 | 83.92 | 158.83 | 159.63 | 150.95 | 101.71 | 125.29 | 111.15 | 108.62 | 72.03 | 81.70 | 114.12 | 135.18 | 104.44 | 111.14 |
| Unpaid labor | 14.10 | 14.15 | 10.02 | 10.68 | 11.54 | 12.68 | 12.85 | 13.58 | 13.48 | 21.49 | 22.68 | 42.25 | 44.21 | 46.99 | 49.90 | 49.61 | 50.16 |
| Subtotal | 385.91 | 368.47 | 399.86 | 382.60 | 494.85 | 543.84 | 569.54 | 554.22 | 576.67 | 594.39 | 582.14 | 545.21 | 556.02 | 629.03 | 686.79 | 672.26 | 692.11 |
| Residual returns to management and risk | 57.88 | -5.78 | 108.76 | 10.07 | 136.27 | 153.21 | 102.33 | -64.88 | 5.48 | -59.53 | -50.26 | -263.37 | -239.83 | -216.16 | -170.88 | -270.85 | -178.18 |

1/ Included in the miscellaneous category.

2/ Included in the real estate interest category.

Note: Survey base changed in 1984 and 1986.

Appendix table 16—Rice production costs and returns, Mississippi River Delta, 1975–91

| Item | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gross value of production: | | | | | | | | | | | | | | | | | |
| (excluding direct Government payments): | | | | | | | | | | | | | | | | | |
| Harvest-period price (dollars/cwt.) | 7.99 | 6.72 | 9.09 | 7.81 | 10.05 | 10.13 | 10.43 | 7.68 | 8.86 | 8.03 | 7.90 | 3.91 | 4.98 | 6.94 | 7.53 | 6.12 | 7.68 |
| Yield (cwt./planted acre) | 39.10 | 43.82 | 41.35 | 42.45 | 41.10 | 36.75 | 42.35 | 40.10 | 39.91 | 42.93 | 50.16 | 51.86 | 48.18 | 50.67 | 53.08 | 49.76 | 48.68 |
| Gross value of production (dollars/acre) | 312.62 | 294.55 | 375.75 | 331.68 | 413.22 | 372.28 | 441.71 | 307.97 | 353.60 | 344.73 | 396.26 | 202.77 | 239.94 | 351.65 | 399.69 | 304.53 | 373.86 |
| | | | | | | | | Dollars per planted acre | | | | | | | | | |
| Cash expenses: | | | | | | | | | | | | | | | | | |
| Seed | 32.40 | 24.30 | 20.08 | 26.41 | 21.41 | 30.58 | 30.58 | 23.91 | 26.27 | 23.48 | 23.48 | 17.83 | 19.01 | 20.76 | 20.82 | 20.85 | 19.03 |
| Fertilizer | 32.40 | 24.00 | 29.56 | 20.72 | 22.36 | 26.96 | 30.75 | 28.57 | 29.87 | 39.61 | 37.62 | 31.57 | 26.00 | 31.47 | 34.35 | 33.27 | 30.20 |
| Chemicals | 19.05 | 27.75 | 22.05 | 24.92 | 25.42 | 27.04 | 29.44 | 31.55 | 33.14 | 12.87 | 12.87 | 46.46 | 45.37 | 46.10 | 47.92 | 50.46 | 54.81 |
| Custom operations | 16.36 | 19.69 | 20.17 | 22.12 | 23.62 | 26.42 | 28.34 | 29.46 | 30.49 | 49.32 | 50.40 | 37.67 | 38.71 | 37.07 | 39.52 | 40.75 | 42.70 |
| Fuel, lube, and electricity | 20.35 | 24.12 | 24.55 | 26.54 | 36.47 | 43.54 | 52.07 | 52.77 | 47.20 | 43.98 | 48.54 | 29.37 | 39.75 | 53.53 | 56.07 | 63.25 | 67.96 |
| Repairs | 10.34 | 11.31 | 10.72 | 11.43 | 13.27 | 15.16 | 16.29 | 17.53 | 18.66 | 22.03 | 22.87 | 22.00 | 21.84 | 29.00 | 30.73 | 32.46 | 33.92 |
| Hired labor | 16.81 | 21.28 | 15.22 | 13.82 | 15.62 | 16.33 | 17.05 | 16.92 | 17.82 | 20.16 | 20.42 | 38.88 | 38.62 | 38.39 | 39.81 | 44.19 | 46.28 |
| Purchased irrigation water | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0.43 | 0.43 | 0.44 | 0.48 | 0.50 | 1/ |
| Drying | 19.85 | 23.53 | 23.95 | 25.89 | 28.63 | 26.73 | 32.08 | 30.38 | 30.24 | 26.18 | 30.58 | 39.93 | 36.13 | 40.15 | 43.03 | 41.59 | 39.95 |
| Miscellaneous | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.31 | 1.30 | 1.31 | 1.35 | 1.39 | 1.92 |
| Technical services | 0 | 0 | 0 | 0 | 0 | 0 | 1.44 | 1.44 | 1.44 | 5.54 | 5.54 | 0.85 | 0.84 | 0.85 | 0.92 | 0.95 | 1/ |
| Total, variable cash expenses | 167.56 | 175.98 | 166.29 | 171.85 | 186.80 | 212.76 | 238.04 | 232.53 | 235.13 | 243.17 | 252.32 | 266.30 | 268.00 | 299.07 | 315.00 | 329.66 | 336.77 |
| General farm overhead | 15.10 | 15.78 | 16.80 | 20.05 | 20.53 | 22.07 | 22.23 | 15.99 | 16.41 | 16.37 | 23.34 | 19.55 | 19.08 | 19.61 | 19.03 | 22.03 | 20.00 |
| Taxes and insurance | 5.64 | 5.64 | 6.63 | 6.52 | 7.66 | 6.88 | 6.88 | 8.82 | 8.03 | 10.33 | 11.35 | 10.70 | 10.83 | 10.36 | 10.60 | 10.76 | 10.82 |
| Interest on operating loans | 22.74 | 21.03 | 20.11 | 22.54 | 27.33 | 32.82 | 30.47 | 31.75 | 20.34 | 20.89 | 24.41 | 17.87 | 12.58 | 11.74 | 11.81 | 12.70 | 2/ |
| Interest on real estate | 19.53 | 19.52 | 19.49 | 19.49 | 19.58 | 19.69 | 22.50 | 19.88 | 13.13 | 20.69 | 19.93 | 6.24 | 5.06 | 5.55 | 5.92 | 6.59 | 18.40 |
| Total, fixed cash expenses | 63.01 | 61.98 | 63.03 | 68.59 | 75.10 | 81.46 | 82.08 | 76.44 | 57.91 | 68.28 | 79.03 | 54.36 | 47.55 | 47.26 | 47.36 | 52.08 | 49.22 |
| Total, cash expenses | 230.57 | 237.96 | 229.33 | 240.44 | 261.89 | 294.22 | 320.12 | 308.97 | 293.04 | 311.45 | 331.35 | 320.66 | 315.55 | 346.33 | 362.36 | 381.74 | 385.99 |
| Gross value of production less cash expenses | 82.05 | 56.60 | 146.42 | 91.24 | 151.33 | 78.06 | 121.59 | -1.00 | 60.56 | 33.28 | 64.91 | -117.89 | -75.61 | 5.32 | 37.33 | -77.21 | -12.13 |
| Economic (full ownership) costs: | | | | | | | | | | | | | | | | | |
| Variable cash expenses | 167.56 | 175.98 | 166.29 | 171.85 | 186.80 | 212.76 | 238.04 | 232.53 | 235.13 | 243.17 | 252.32 | 266.30 | 268.00 | 299.07 | 315.00 | 329.66 | 336.77 |
| General farm overhead | 15.10 | 15.78 | 16.80 | 20.05 | 20.53 | 22.07 | 22.23 | 15.99 | 16.41 | 16.37 | 23.34 | 19.55 | 19.08 | 19.61 | 19.03 | 22.03 | 20.00 |
| Taxes and insurance | 5.64 | 5.64 | 6.63 | 6.52 | 7.66 | 6.88 | 6.88 | 8.82 | 8.03 | 10.33 | 11.35 | 10.70 | 10.83 | 10.36 | 10.60 | 10.76 | 10.82 |
| Capital replacement | 30.77 | 28.04 | 32.86 | 26.55 | 31.70 | 35.36 | 37.45 | 38.96 | 41.43 | 45.11 | 46.38 | 40.29 | 40.19 | 39.64 | 41.86 | 43.75 | 45.72 |
| Operating capital | 3.74 | 3.46 | 3.62 | 4.27 | 5.66 | 7.43 | 9.91 | 7.76 | 5.42 | 6.80 | 5.34 | 4.79 | 5.43 | 10.35 | 12.66 | 12.31 | 9.16 |
| Other nonland capital | 8.73 | 7.44 | 7.79 | 5.88 | 6.90 | 7.00 | 6.73 | 6.81 | 6.56 | 10.03 | 9.96 | 7.81 | 7.64 | 15.87 | 19.18 | 21.12 | 23.58 |
| Land | 51.67 | 50.60 | 64.82 | 62.63 | 79.59 | 63.50 | 77.69 | 38.33 | 48.93 | 47.91 | 50.89 | 21.68 | 26.06 | 60.68 | 71.45 | 48.61 | 61.85 |
| Unpaid labor | 11.68 | 14.79 | 10.58 | 9.61 | 10.85 | 11.35 | 11.85 | 11.75 | 12.38 | 14.01 | 14.19 | 14.75 | 14.65 | 15.26 | 15.82 | 17.57 | 18.40 |
| Subtotal | 294.90 | 301.73 | 309.40 | 307.36 | 349.68 | 366.35 | 410.78 | 360.95 | 374.29 | 393.73 | 413.77 | 385.87 | 391.88 | 470.84 | 505.60 | 505.81 | 526.30 |
| Residual returns to management and risk | 17.72 | -7.18 | 66.35 | 24.32 | 63.54 | 5.93 | 30.93 | -52.98 | -20.69 | -49.00 | -17.51 | -183.10 | -151.94 | -119.19 | -105.91 | -201.28 | -152.44 |

1/ Included in the miscellaneous category.

2/ Included in the real estate interest category.

Note: Survey base changed in 1984 and 1986.

Appendix table 17—Rice production costs and returns, Gulf Coast, 1975–91

| Item | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gross value of production: | | | | | | | | | | | | | | | | | |
| (excluding direct Government payments): | | | | | | | | | | | | | | | | | |
| Harvest-period price (dollars/cwt.) | 8.27 | 6.96 | 9.40 | 8.09 | 10.41 | 11.24 | 10.64 | 7.77 | 8.98 | 8.23 | 7.94 | 3.86 | 4.89 | 7.03 | 7.63 | 6.27 | 7.69 |
| Yield (cwt./planted acre) | 41.60 | 43.51 | 39.96 | 42.09 | 40.30 | 38.40 | 43.82 | 44.40 | 40.48 | 45.15 | 48.36 | 52.65 | 50.63 | 50.61 | 48.11 | 52.15 | 52.11 |
| Gross value of production (dollars/acre) | 344.24 | 302.69 | 375.81 | 340.36 | 419.34 | 431.64 | 466.07 | 345.07 | 363.62 | 371.69 | 384.13 | 203.13 | 247.68 | 355.79 | 367.08 | 326.98 | 400.73 |
| | | | | | | | | Dollars per planted acre | | | | | | | | | |
| Cash expenses: | | | | | | | | | | | | | | | | | |
| Seed | 29.00 | 24.35 | 16.68 | 21.46 | 21.99 | 26.98 | 27.01 | 26.11 | 24.74 | 25.14 | 26.35 | 21.90 | 23.23 | 24.76 | 24.98 | 25.10 | 24.63 |
| Fertilizer | 51.41 | 32.06 | 22.53 | 29.03 | 31.22 | 40.37 | 45.27 | 42.61 | 39.59 | 40.05 | 38.74 | 40.36 | 36.42 | 43.15 | 47.24 | 41.91 | 43.04 |
| Chemicals | 20.19 | 26.50 | 26.56 | 20.37 | 21.33 | 22.70 | 24.49 | 25.57 | 27.07 | 4.45 | 4.52 | 40.08 | 38.83 | 39.78 | 41.03 | 43.02 | 46.75 |
| Custom operations | 17.74 | 19.94 | 19.87 | 22.36 | 24.01 | 26.91 | 28.84 | 29.47 | 30.33 | 53.31 | 53.02 | 33.96 | 34.79 | 32.19 | 34.16 | 35.12 | 35.98 |
| Fuel, lube, and electricity | 21.65 | 23.95 | 23.73 | 26.32 | 38.62 | 50.54 | 53.75 | 57.31 | 52.70 | 32.84 | 36.49 | 41.33 | 46.83 | 50.82 | 52.11 | 57.48 | 64.03 |
| Repairs | 13.88 | 14.16 | 13.06 | 14.29 | 17.96 | 20.03 | 22.05 | 23.39 | 24.77 | 25.20 | 25.29 | 19.58 | 19.62 | 23.88 | 25.14 | 26.71 | 28.46 |
| Hired labor | 17.42 | 20.67 | 12.49 | 15.85 | 18.19 | 19.51 | 21.69 | 23.25 | 23.32 | 18.64 | 26.31 | 41.34 | 41.62 | 32.62 | 33.15 | 33.81 | 33.50 |
| Purchased irrigation water | 8.76 | 9.84 | 9.81 | 11.04 | 12.90 | 13.74 | 14.56 | 53.96 | 54.15 | 55.09 | 54.65 | 16.17 | 15.69 | 17.14 | 17.82 | 17.85 | 1/ |
| Drying | 20.13 | 22.27 | 22.06 | 24.47 | 24.87 | 26.03 | 33.54 | 35.73 | 32.67 | 41.31 | 44.24 | 46.80 | 43.70 | 44.41 | 42.01 | 47.14 | 47.74 |
| Miscellaneous | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1.17 | 1.13 | 1.15 | 1.15 | 1.17 | 18.59 |
| Technical services | 0.81 | 0.79 | 0.79 | 0.82 | 0.78 | 0.80 | 1.50 | 1.42 | 1.39 | 3.40 | 3.40 | 0.22 | 0.21 | 0.23 | 0.24 | 0.24 | 1/ |
| Total, variable cash expenses | 200.99 | 194.52 | 167.58 | 186.01 | 211.87 | 247.61 | 272.70 | 318.81 | 310.74 | 299.43 | 313.01 | 302.91 | 302.07 | 310.13 | 319.03 | 329.55 | 342.72 |
| General farm overhead | 20.68 | 21.61 | 23.00 | 22.50 | 22.85 | 27.30 | 24.70 | 18.78 | 18.85 | 19.26 | 20.68 | 18.72 | 18.27 | 21.78 | 20.88 | 23.99 | 21.50 |
| Taxes and insurance | 4.78 | 5.18 | 6.14 | 7.04 | 8.52 | 9.04 | 8.34 | 9.06 | 9.98 | 9.63 | 10.49 | 8.89 | 9.58 | 10.44 | 10.61 | 10.81 | 10.88 |
| Interest on operating loans | 16.17 | 14.95 | 14.30 | 16.03 | 19.44 | 23.34 | 34.62 | 30.77 | 23.94 | 24.24 | 22.26 | 23.28 | 16.40 | 15.59 | 15.64 | 16.81 | 21.86 |
| Interest on real estate | 23.92 | 23.91 | 23.88 | 23.87 | 23.98 | 24.12 | 24.51 | 21.11 | 18.36 | 20.33 | 16.96 | 5.86 | 4.74 | 5.05 | 5.36 | 5.94 | 2/ |
| Total, fixed cash expenses | 65.55 | 65.66 | 67.32 | 69.43 | 74.79 | 83.80 | 92.17 | 79.72 | 71.13 | 73.46 | 70.39 | 56.75 | 48.99 | 52.86 | 52.49 | 57.55 | 54.24 |
| Total, cash expenses | 266.53 | 260.18 | 234.90 | 255.44 | 286.66 | 331.41 | 364.87 | 398.53 | 381.87 | 372.89 | 383.40 | 359.66 | 351.06 | 362.99 | 371.52 | 387.10 | 396.96 |
| Gross value of production less cash expenses | 77.70 | 42.51 | 140.91 | 84.92 | 132.68 | 100.23 | 101.20 | -53.46 | -18.25 | -1.20 | 0.73 | -156.53 | -103.38 | -7.20 | -4.44 | -60.12 | 3.77 |
| Economic (full ownership) costs: | | | | | | | | | | | | | | | | | |
| Variable cash expenses | 200.99 | 194.52 | 167.58 | 186.01 | 211.87 | 247.61 | 272.70 | 318.81 | 310.74 | 299.43 | 313.01 | 302.91 | 302.07 | 310.13 | 319.03 | 329.55 | 342.72 |
| General farm overhead | 20.68 | 21.61 | 23.00 | 22.50 | 22.85 | 27.30 | 24.70 | 18.78 | 18.85 | 19.26 | 20.68 | 18.72 | 18.27 | 21.78 | 20.88 | 23.99 | 21.50 |
| Taxes and insurance | 4.78 | 5.18 | 6.14 | 7.04 | 8.52 | 9.04 | 8.34 | 9.06 | 9.98 | 9.63 | 10.49 | 8.89 | 9.58 | 10.44 | 10.61 | 10.81 | 10.88 |
| Capital replacement | 27.13 | 22.86 | 24.27 | 35.57 | 42.82 | 45.47 | 50.21 | 53.10 | 56.13 | 39.80 | 41.09 | 33.84 | 33.90 | 38.10 | 40.04 | 42.14 | 45.39 |
| Operating capital | 4.86 | 3.95 | 2.80 | 5.07 | 7.32 | 9.53 | 12.68 | 10.37 | 8.10 | 8.67 | 6.90 | 4.71 | 5.32 | 10.73 | 12.83 | 12.31 | 9.32 |
| Other nonland capital | 7.32 | 5.77 | 5.47 | 7.49 | 8.86 | 8.63 | 8.55 | 8.64 | 8.27 | 8.22 | 8.13 | 6.55 | 6.44 | 15.95 | 19.22 | 21.11 | 23.89 |
| Land | 53.43 | 46.49 | 58.16 | 60.90 | 78.38 | 66.59 | 74.02 | 39.01 | 43.73 | 52.70 | 55.72 | 9.11 | 17.35 | 46.40 | 50.79 | 40.76 | 51.63 |
| Unpaid labor | 12.10 | 14.36 | 8.68 | 11.01 | 12.64 | 13.55 | 15.08 | 16.15 | 16.21 | 22.92 | 18.29 | 27.95 | 28.32 | 29.34 | 30.47 | 32.34 | 32.69 |
| Subtotal | 331.28 | 314.74 | 296.10 | 335.58 | 393.26 | 427.71 | 466.28 | 473.93 | 472.00 | 460.63 | 474.31 | 412.68 | 421.25 | 482.87 | 503.87 | 513.01 | 538.02 |
| Residual returns to management and risk | 12.96 | -12.05 | 79.71 | 4.79 | 26.08 | 3.93 | -0.21 | -128.86 | -108.38 | -88.94 | -90.18 | -209.55 | -173.57 | -127.08 | -136.79 | -186.03 | -137.29 |

1/ Included in the miscellaneous category.

2/ Included in the real estate interest category.

Note: Survey base changed in 1984 and 1986.

Appendix table 18--Estimated number of rice farms and average acreage per farm, 1982 and 1987

| State and region | 1982 | | 1987 | |
|---|---|---|---|---|
| | Farms 1/ | Acres 2/ | Farms 1/ | Acres 2/ |
| | | Number | | |
| Arkansas | 5,431 | 232 | 5,613 | 186 |
| Louisiana | 2,508 | 229 | 2,273 | 184 |
| Mississippi | 714 | 337 | 803 | 243 |
| Missouri | 303 | 217 | 449 | 148 |
| Texas | 1,154 | 451 | 1,212 | 247 |
| Southern States | 10,110 | 263 | 10,350 | 195 |
| California | 1,319 | 430 | 1,654 | 241 |
| United States | 11,431 | 283 | 12,013 | 202 |

1/ Farms reported in Census of Agriculture, U.S. Department of Commerce.

2/ Calculated by dividing total acres harvested by number of farms reported.

Appendix table 19—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 |
| 1992 | 39,966 | 14,434 | 76,887 | 196 | 131,483 | 3,580 | 855 | 1,882 | 6,317 |
| 1993 | 24,164 | 13,624 | 70,789 | 668 | 109,245 | 3,849 | 192 | 840 | 4,881 |
| 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 | 20,658 | 8,283 | 46,631 | 211 | 75,783 | 3,888 | 837 | 952 | 5,677 |
| 1993 | 22,397 | 11,900 | 57,197 | 187 | 91,681 | 3,474 | 643 | 1,075 | 5,192 |
| 1994 2/ | 11,703 | 15,056 | 52,697 | 147 | 79,603 | 4,232 | 1,010 | 563 | 5,805 |
| 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 |
| 1992 | 1,109 | 6,166 | 13,179 | 77 | 20,531 | 3,833 | 486 | 529 | 4,848 |
| 1993 | 1,708 | 7,055 | 21,786 | 35 | 30,584 | 4,179 | 658 | 1,365 | 6,202 |
| 1994 | 517 | 5,601 | 14,674 | 115 | 20,907 | 2,710 | 188 | 697 | 3,595 |

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 20—Onfarm and total rice stocks by State, December 1, 1988–93

| State | 1988 | | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Onfarm | Total | Onfarm | Total | Onfarm | Total | Onfarm | Total | Onfarm | Total | Onfarm | Total |
| | | | | | | 1,000 cwt | | | | | | |
| Rough rice: | | | | | | | | | | | | |
| Arkansas | 15,750 | 53,624 | 17,450 | 47,661 | 17,972 | 46,582 | 16,826 | 45,920 | 20,460 | 57,319 | 12,000 | 43,585 |
| California | 3,020 | 29,881 | 3,000 | 30,372 | 2,900 | 29,604 | 2,800 | 31,254 | 2,470 | 34,206 | 1,800 | 36,246 |
| Louisiana | 7,600 | 15,200 | 6,000 | 12,062 | 5,600 | 12,994 | 6,000 | 12,511 | 5,000 | 13,405 | 3,500 | 11,370 |
| Mississippi | * | 10,988 | * | 10,447 | * | 8,712 | * | 8,901 | * | 10,732 | * | 6,497 |
| Missouri | * | 3,428 | * | 3,046 | * | 2,839 | * | 2,178 | * | 3,814 | * | 2,765 |
| Texas | 3,759 | 18,567 | 3,853 | 12,785 | 3,889 | 12,436 | 4,000 | 13,026 | 3,354 | 12,007 | 1,609 | 8,782 |
| Unallocated | 9,452 | | 9,737 | | 7,301 | | 7,623 | | 8,682 | | 5,255 | |
| U.S. total | 39,581 | 131,688 | 40,040 | 116,373 | 37,662 | 113,167 | 37,249 | 113,790 | 39,966 | 131,483 | 24,164 | 109,245 |

| State | 1988 | | 1989 | | 1990 | | 1991 | | 1992 | | 1993 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | In mills | Total | In mills | Total | In mills | Total | In mills | Total | In mills | Total | In mills | Total |
| | | | | | | 1,000 cwt | | | | | | |
| Milled rice: | | | | | | | | | | | | |
| Arkansas | 1,621 | 1,757 | 1,825 | 1,831 | 1,667 | 1,667 | 1,368 | 1,402 | 1,478 | 2,016 | 1,541 | 1,705 |
| California | 899 | 899 | 928 | 928 | 906 | 906 | 755 | 755 | 702 | 702 | 799 | 799 |
| Louisiana | * | * | * | * | * | * | * | * | * | * | * | * |
| Mississippi | * | * | * | * | * | * | * | * | * | * | * | * |
| Missouri | * | * | * | * | * | * | * | * | * | * | * | * |
| Texas | 1,227 | 1,851 | 1,005 | 2,137 | 963 | 2,121 | 834 | 1,301 | 961 | 1,687 | 887 | 1,118 |
| Unallocated | 1,066 | 1,771 | 496 | 860 | 510 | 1,137 | 607 | 952 | 439 | 1,912 | 622 | 1,259 |
| U.S. total | 4,813 | 6,278 | 4,254 | 5,756 | 4,046 | 5,831 | 3,564 | 4,410 | 3,580 | 6,317 | 3,849 | 4,881 |

Source: National Agricultural Statistics Service, U.S. Department of Agriculture.

* = Included in unallocated to avoid disclosing individual operations.

Appendix table 21--Distribution of milled rice to principal domestic outlets 1/

| Year 2/ | Direct food use 3/ | Processed foods 4/ | Beer 4/ | Total 5/ |
|---|---|---|---|---|
| | | 1,000 cwt | | |
| 1960 | 10,486 | 2,171 | 2,765 | 15,421 |
| | 68.0 6/ | 14.1 | 17.9 | 100.0 |
| 1961 | 11,585 | 2,270 | 2,982 | 16,838 |
| | 68.8 | 13.5 | 17.7 | 100.0 |
| 1966 | 11,087 | 2,961 | 3,148 | 17,196 |
| | 64.5 | 17.2 | 18.3 | 100.0 |
| 1969 | 13,123 | 2,995 | 4,631 | 20,749 |
| | 63.2 | 14.4 | 22.3 | 100.0 |
| 1971 | 12,916 | 3,455 | 4,082 | 20,453 |
| | 63.1 | 16.9 | 20.0 | 100.0 |
| 1972 | 13,756 | 3,174 | 4,554 | 21,484 |
| | 64.0 | 14.8 | 21.2 | 100.0 |
| 1973 | 13,322 | 3,414 | 5,194 | 21,930 |
| | 60.7 | 15.6 | 23.7 | 100.0 |
| 1974 | 12,674 | 2,507 | 6,096 | 21,278 |
| | 59.6 | 11.8 | 28.7 | 100.0 |
| 1975 | 12,958 | 2,849 | 4,642 | 20,450 |
| | 63.4 | 13.9 | 22.7 | 100.0 |
| 1978 | 15,291 | 3,717 | 8,159 | 27,167 |
| | 56.3 | 13.7 | 30.0 | 100.0 |
| 1980 | 18,940 | 4,491 | 7,667 | 31,098 |
| | 60.9 | 14.4 | 24.7 | 100.0 |
| 1982 | 19,673 | 3,342 | 9,095 | 32,110 |
| | 61.3 | 10.4 | 28.3 | 100.0 |
| 1984 | 22,308 | 5,438 | 7,038 | 34,784 |
| | 64.1 | 15.6 | 20.2 | 100.0 |
| 1986 | 24,724 | 7,630 | 7,825 | 40,179 |
| | 61.5 | 19.0 | 19.5 | 100.0 |
| 1988 | 27,699 | 8,621 | 8,895 | 45,215 |
| | 61.3 | 19.1 | 19.7 | 100.0 |
| 1990 | 30,770 | 11,370 | 11,000 | 53,140 |
| | 57.9 | 21.4 | 20.7 | 100.0 |

1/ Excludes shipments to U.S. territories.

2/ Marketing year beginning August 1.

3/ Includes Government distribution to schools, institutions, welfare agencies, and for purchases for U.S. military mess halls and for overseas commissary resales.

4/ Does not include rice imports.

5/ Includes package mixes shipped directly by rice mills.

6/ Figures under estimates indicate percent of total.

Appendix table 22--Distribution of U.S. milled rice and imports by outlet

| Outlet/Year 1/ | 1969 | 1971 | 1973 | 1975 | 1978 | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 cwt | | | | | | |
| Domestic: | | | | | | | | | | | |
| Direct food use | 13,120 | 13,640 | 13,320 | 12,960 | 15,290 | 18,940 | 19,670 | 22,310 | 24,720 | 27,700 | 30,770 |
| Regular milled 2/ | 10,710 | 10,480 | 10,730 | 10,090 | 12,260 | 15,380 | 14,830 | 16,310 | 18,180 | 19,280 | 21,640 |
| Parboiled | 1,353 | 1,372 | 1,399 | 1,690 | 1,779 | 1,989 | 3,120 | 3,639 | 3,293 | 4,383 | 3,377 |
| Precooked 3/ | 808 | 850 | 820 | 823 | 936 | 1,029 | 870 | 953 | 662 | 523 | 870 |
| Precooked-parboiled | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Precooked-parboiled brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Brown rice | 88 | 134 | 167 | 257 | 237 | 375 | 216 | 270 | 407 | 729 | 1,595 |
| Aromatic | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Other | 26 | 3 | 65 | 104 | 6 | 16 | 140 | 24 | 230 | 23 | 96 |
| Processed food | 2,990 | 3,460 | 3,410 | 2,850 | 3,720 | 4,490 | 3,340 | 5,440 | 7,630 | 8,620 | 11,370 |
| Cereal | 2,100 | 2,102 | 2,789 | 1,921 | 2,090 | 2,588 | 2,503 | 3,577 | 4,800 | 3,937 | 4,144 |
| Package mixes | 299 | 421 | 151 | 331 | 1,096 | 1,366 | 221 | 567 | 1,505 | 1,705 | 3,324 |
| Pet food | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Baby food | 136 | 141 | 117 | 145 | 157 | 133 | 152 | 316 | 233 | 172 | 445 |
| Rice cakes | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Frozen dinners | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Soup | 211 | 646 | 103 | 106 | 16 | 147 | 176 | 241 | 76 | 119 | 117 |
| Candy | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Other | 249 | 145 | 254 | 346 | 358 | 257 | 290 | 270 | -329 | 334 | 659 |
| Total | 2,995 | 3,455 | 3,414 | 2,849 | 3,717 | 4,491 | 3,342 | 4,971 | 7,075 | 8,621 | 11,367 |
| Beer 4/ | 5,090 | 5,410 | 5,870 | 6,410 | 7,920 | 7,980 | 9,610 | 9,670 | 10,680 | 11,150 | 11,000 |
| Territories | 3,781 | 4,084 | 3,742 | 3,847 | 3,482 | 3,426 | 3,576 | 3,622 | 3,805 | 3,318 | 3,182 |
| Exports 5/ | 40,991 | 41,514 | 35,834 | 39,765 | 53,520 | 66,265 | 49,057 | 43,222 | 59,950 | 61,419 | 51,048 |
| Total | 65,972 | 68,108 | 62,176 | 65,832 | 83,932 | 101,101 | 85,253 | 84,264 | 106,785 | 112,207 | 107,370 |

1/ Marketing year beginning August 1.

2/ Includes imported rice in distribution.

3/ Includes precooked brown rice.

4/ Treasury Department data.

5/ Export data from USDA's Foreign Agricultural Service.

— Data on this product not included in survey questionnaire.

Appendix table 23--Domestic shipments of specialty rice by rice millers and repackagers 1/

| Item/Year 2/ | 1969 | 1971 | 1972 | 1973 | 1974 | 1975 | 1980 | 1982 | 1984 | 1986 | 1988 | 1990 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1,000 cwt | | | | | | |
| Long grain: | | | | | | | | | | | | |
| Parboiled | 1,350.1 | 1,371.9 | 1,605.9 | 1,393.7 | 1,421.0 | 1,387.9 | 1,975.7 | 3,120.3 | 3,639.4 | 3,266.3 | 4,336.0 | 3,377.5 |
| Precooked | 807.5 | 849.9 | 763.1 | 819.5 | 823.7 | 823.2 | 1,029.2 | 869.6 | 953.2 | 644.4 | 319.5 | 869.9 |
| Brown rice | 54.9 | 50.5 | 243.5 | 120.2 | 134.5 | 82.2 | 218.5 | 170.1 | 244.6 | 220.9 | 442.7 | 307.8 |
| Precooked-parboiled | -- | -- | -- | -- | -- | -- | -- | -- | -- | 72.4 | 347.3 | 678.9 |
| Precooked-brown rice | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.3 | 0.5 | 0.4 |
| Parboiled brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 1.1 |
| Precooked-parboiled brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 123.8 |
| Aromatic | -- | -- | -- | -- | -- | -- | -- | -- | -- | 25.4 | 22.5 | 55.5 |
| Aromatic brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 6.2 |
| Other | 25.8 | 2.9 | 58.0 | -- | -- | 79.5 | 15.5 | 108.9 | 12.1 | 191.7 | 0.0 | 0.0 |
| Total | 2,238.3 | 2,275.2 | 2,670.5 | 2,333.4 | 2,379.2 | 2,672.8 | 3,238.9 | 4,268.8 | 4,849.3 | 4,421.4 | 5,468.5 | 5,421.2 |
| Medium grain: | | | | | | | | | | | | |
| Parboiled | 0.0 | 0.0 | 0.0 | 2.5 | 0.5 | 2.3 | 13.0 | 0.0 | 0.0 | 26.9 | 46.8 | 0.0 |
| Precooked | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 17.6 | 1.8 | 0.0 |
| Brown rice | 9.0 | 11.0 | 19.5 | 18.8 | 44.1 | 103.5 | 91.5 | 23.1 | 23.8 | 153.1 | 59.4 | 938.7 |
| Precooked-parboiled | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 0.0 |
| Precooked-brown rice | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.1 | 0.0 | 0.0 |
| Parboiled brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 0.0 |
| Precooked-parboiled brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 4.6 |
| Aromatic | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 1.1 |
| Aromatic brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 0.0 |
| Other | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 24.8 | 0.0 | 10.4 | 12.0 | 36.5 | 0.0 | 0.0 |
| Total | 9.0 | 11.0 | 19.5 | 21.3 | 44.6 | 130.6 | 104.4 | 33.5 | 35.8 | 234.2 | 108.0 | 944.3 |
| Short grain: | | | | | | | | | | | | |
| Parboiled | 2.4 | 0.4 | 4.2 | 2.3 | 2.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Precooked | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 1.8 | 0.0 |
| Brown rice | 24.0 | 72.1 | 74.5 | 93.0 | 38.8 | 70.8 | 65.0 | 22.6 | 1.9 | 33.1 | 189.3 | 283.1 |
| Precooked-parboiled | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 0.0 |
| Precooked-brown rice | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 0.0 |
| Parboiled brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 0.0 |
| Precooked-parboiled brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 18.6 |
| Aromatic | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 29.2 |
| Aromatic brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 0.0 |
| Other | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 20.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| Total | 24.4 | 72.5 | 78.7 | 95.3 | 41.7 | 70.8 | 65.0 | 43.5 | 1.9 | 33.1 | 191.1 | 312.3 |
| Total: | | | | | | | | | | | | |
| Parboiled | 1,352.5 | 1,372.3 | 1,610.1 | 1,398.5 | 1,424.4 | 1,690.2 | 1,988.6 | 3,120.3 | 3,639.4 | 3,293.2 | 4,382.8 | 3,377.5 |
| Precooked | 807.5 | 849.9 | 763.1 | 819.5 | 823.7 | 823.2 | 1,029.2 | 869.6 | 953.2 | 662.0 | 523.1 | 869.9 |
| Brown rice | 87.9 | 133.6 | 337.5 | 232.0 | 217.4 | 256.5 | 375.0 | 215.7 | 270.3 | 407.1 | 691.4 | 1,529.6 |
| Precooked-parboiled | -- | -- | -- | -- | -- | -- | -- | -- | -- | 72.4 | 347.3 | 678.9 |
| Precooked brown rice | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 0.4 |
| Parboiled brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 1.1 |
| Precooked-parboiled brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.0 | 0.0 | 128.4 |
| Aromatic | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.4 | 0.5 | 85.9 |
| Aromatic brown | -- | -- | -- | -- | -- | -- | -- | -- | -- | 253.6 | 22.5 | 6.2 |
| Other | 25.8 | 2.9 | 58.0 | 0.0 | 0.0 | 104.2 | 15.5 | 140.2 | 24.1 | 0.0 | 0.0 | 0.0 |
| Total | 2,273.7 | 2,358.7 | 2,768.7 | 2,450.0 | 2,465.5 | 2,874.2 | 3,408.4 | 4,345.9 | 4,887.0 | 4,688.7 | 5,967.6 | 6,677.9 |

1/ Includes specialty rice shipped to U.S. territories.
2/ Marketing year beginning August 1.

Appendix table 24--Processed food use of rice

| Year 1/ | Cereal | Packag mixes | Pet food | Baby food | Rice cakes | Frozen dinners | Soup | Candy | Total 2/ |
|---|---|---|---|---|---|---|---|---|---|
| | | | | 1,000 cwt | | | | | |
| 1960 | 1,849 | 51 | -- | 159 | -- | -- | 111 | -- | 2,171 |
| 1961 | 1,991 | 80 | -- | 83 | -- | -- | 117 | -- | 2,270 |
| 1966 | 2,504 | 121 | -- | 226 | -- | -- | 110 | -- | 2,961 |
| 1969 | 2,099 | 299 | -- | 136 | -- | -- | 211 | -- | 2,995 |
| 1971 | 2,102 | 421 | -- | 141 | -- | -- | 646 | -- | 3,455 |
| 1972 | 2,372 | 210 | -- | 150 | -- | -- | 367 | -- | 3,174 |
| 1973 | 2,789 | 151 | -- | 117 | -- | -- | 103 | -- | 3,414 |
| 1974 | 1,837 | 227 | -- | 124 | -- | -- | 210 | -- | 2,507 |
| 1975 | 1,921 | 331 | -- | 145 | -- | -- | 106 | -- | 2,849 |
| 1978 | 2,090 | 1,096 | -- | 157 | -- | -- | 157 | -- | 3,717 |
| 1980 | 2,588 | 1,366 | -- | 133 | -- | -- | 147 | -- | 4,491 |
| 1982 | 2,503 | 221 | -- | 152 | -- | -- | 176 | -- | 3,342 |
| 1984 | 3,577 | 567 | -- | 316 | -- | -- | 241 | -- | 4,971 |
| 1986 | 4,800 | 1,505 | 426 | 233 | 288 | 61 | 76 | 147 | 7,075 |
| 1988 | 3,937 | 1,705 | 1,338 | 172 | 707 | 89 | 119 | 220 | 8,621 |
| 1990 | 4,144 | 3,324 | 1,922 | 445 | 411 | 240 | 117 | 105 | 11,367 |

1/ Marketing year beginning August 1.

2/ Includes shipments to processors without product specification.

— Product not included in survey questionnaire.

Appendix table 25—Proportion of direct food use rice distributed to major U.S. regions and per capita. 1/

| Item | 1960 | | 1961 | | 1966 | | 1969 | | 1971 | | 1972 | | 1973 | | 1974 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Proportion of total: | Percent | Rank | Percent | Rank | Percent | Rank | Percent | Rank | Percent | Rank | Percent | Rank | Percent | Rank | Percent | Rank |
| Middle Atlantic | 18.4 | 4 | 19.6 | 2 | 22.5 | 1 | 23.0 | 2 | 24.2 | 1 | 23.3 | 1 | 26.2 | 1 | 27.5 | 1 |
| Pacific | 23.8 | 1 | 23.5 | 1 | 19.6 | 2 | 25.2 | 1 | 21.3 | 2 | 21.4 | 2 | 22.5 | 2 | 23.3 | 2 |
| South Atlantic | 18.9 | 2 | 18.2 | 4 | 18.0 | 4 | 16.1 | 3 | 17.7 | 3 | 16.3 | 3 | 16.9 | 3 | 16.3 | 3 |
| West South Central | 18.7 | 3 | 18.5 | 3 | 18.1 | 3 | 15.0 | 4 | 14.2 | 4 | 16.3 | 4 | 13.1 | 4 | 12.7 | 4 |
| East North Central | 8.8 | 5 | 8.4 | 5 | 8.6 | 5 | 8.0 | 5 | 9.8 | 5 | 8.4 | 5 | 9.0 | 5 | 8.8 | 5 |
| East South Central | 5.6 | 6 | 5.9 | 6 | 4.4 | 6 | 3.8 | 7 | 4.9 | 6 | 3.3 | 6 | 4.4 | 6 | 3.7 | 6 |
| New England | 2.1 | 8 | 1.9 | 8 | 2.6 | 9 | 2.7 | 8 | 3.0 | 7 | 3.6 | 7 | 3.2 | 7 | 3.4 | 7 |
| West North Central | 2.3 | 7 | 2.5 | 7 | 3.2 | 7 | 4.6 | 6 | 3.3 | 8 | 5.7 | 8 | 2.9 | 8 | 2.5 | 8 |
| Mountain | 1.4 | 9 | 1.5 | 9 | 3.0 | 8 | 1.6 | 9 | 1.6 | 9 | 1.7 | 9 | 1.8 | 9 | 1.8 | 9 |
| U.S. total 3/ | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | | 100.0 | |
| Amount per capita: | Pounds | Rank | Pounds | Rank | Pounds | Rank | Pounds | Rank | Pounds | Rank | Pounds | Rank | Pounds | Rank | Pounds | Rank |
| Middle Atlantic | 5.5 | 4 | 6.3 | 4 | 6.8 | 4 | 8.0 | 3 | 8.3 | 3 | 8.3 | 3 | 9.2 | 2 | 8.7 | 2 |
| Pacific | 11.2 | 2 | 11.8 | 2 | 8.8 | 2 | 12.5 | 1 | 10.3 | 1 | 10.6 | 2 | 11.1 | 1 | 10.2 | 1 |
| South Atlantic | 7.4 | 3 | 7.6 | 3 | 6.9 | 3 | 6.9 | 4 | 7.4 | 4 | 6.8 | 4 | 7.0 | 4 | 6.2 | 4 |
| West South Central | 11.2 | 1 | 11.9 | 1 | 10.7 | 1 | 10.1 | 2 | 9.3 | 2 | 10.9 | 1 | 8.7 | 3 | 7.8 | 3 |
| East North Central | 2.5 | 6 | 2.6 | 6 | 2.4 | 8 | 2.6 | 8 | 3.1 | 6 | 2.8 | 7 | 2.9 | 8 | 2.7 | 7 |
| East South Central | 4.8 | 5 | 5.4 | 5 | 3.8 | 6 | 3.9 | 5 | 4.9 | 5 | 3.4 | 6 | 3.0 | 7 | 2.2 | 9 |
| New England | 2.1 | 7 | 2.0 | 7 | 2.6 | 7 | 2.9 | 7 | 3.2 | 7 | 2.5 | 8 | 3.6 | 5 | 3.5 | 5 |
| West North Central | 1.6 | 9 | 1.7 | 9 | 2.3 | 9 | 3.6 | 6 | 2.5 | 8 | 4.6 | 5 | 3.5 | 6 | 2.7 | 8 |
| Mountain | 2.0 | 8 | 2.3 | 8 | 4.4 | 5 | 2.5 | 9 | 2.5 | 9 | 2.5 | 9 | 2.6 | 9 | 2.8 | 6 |
| U.S. Total 3/ | 5.7 | | 6.1 | | 5.7 | | 6.4 | | 6.3 | | 6.4 | | 6.4 | | 5.8 | |

*Refer to footnotes at end of table*

*continued—*

Appendix table 25—Proportion of direct food use rice distributed to major U.S. regions and per capita. 1/—continued

| Item | 1975 | | 1978 | | 1980 | | 1982 | | 1984 | | 1986 | | 1988 | | 1990 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Proportion of total | Percent | Rank | Percent | Rank | Percent | Rank | Percent | Rank | Percent | Rank | Percent | Rank | Percent | Rank | Percent | Rank |
| Middle Atlantic | 23.3 | 1 | 23.7 | 2 | 22.3 | 2 | 25.3 | 1 | 25.5 | 1 | 21.6 | 2 | 26.2 | 1 | 24.5 | 2 |
| Pacific | 23.3 | 2 | 23.8 | 1 | 24.2 | 1 | 21.4 | 2 | 21.1 | 2 | 24.9 | 1 | 26.0 | 2 | 26.0 | 1 |
| South Atlantic | 15.9 | 4 | 14.8 | 4 | 17.1 | 3 | 15.4 | 4 | 15.4 | 4 | 20.2 | 3 | 19.3 | 3 | 18.4 | 3 |
| West South Central | 18.0 | 3 | 16.0 | 3 | 14.6 | 4 | 16.3 | 3 | 18.0 | 3 | 13.8 | 4 | 10.1 | 4 | 13.1 | 4 |
| East North Central | 8.7 | 5 | 9.4 | 5 | 8.4 | 5 | 9.2 | 5 | 7.9 | 5 | 7.7 | 5 | 6.6 | 5 | 7.3 | 5 |
| East South Central | 2.3 | 8 | 2.2 | 9 | 2.4 | 9 | 2.6 | 8 | 2.4 | 8 | 1.8 | 8 | 3.9 | 6 | 1.9 | 9 |
| New England | 3.6 | 6 | 2.9 | 8 | 2.7 | 8 | 3.3 | 7 | 3.3 | 7 | 3.8 | 7 | 3.4 | 7 | 3.0 | 7 |
| West North Central | 2.9 | 7 | 4.4 | 6 | 4.7 | 6 | 4.5 | 6 | 4.3 | 6 | 4.4 | 6 | 2.8 | 8 | 3.6 | 6 |
| Mountain | 1.9 | 9 | 2.9 | 7 | 3.7 | 7 | 1.9 | 9 | 2.1 | 9 | 1.8 | 9 | 1.8 | 9 | 2.1 | 8 |
| U.S. Total 3/ | 99.9 | | 100.1 | | 100.1 | | 99.9 | | 100.0 | | 100.0 | | 100.0 | | | |
| Amount per capita: | Pounds | Rank | Pounds | Rank | Pounds | Rank | Pounds | Rank | Pounds | Rank | Pounds | Rank | Pounds | Rank | Pounds | Rank |
| Middle Atlantic | 8.0 | 3 | 9.8 | 3 | 11.1 | 2 | 12.9 | 1 | 14.1 | 1 | 13.6 | 2 | 16.9 | 1 | 18.1 | 2 |
| Pacific | 11.2 | 2 | 11.9 | 1 | 13.7 | 1 | 12.2 | 2 | 12.4 | 3 | 16.2 | 1 | 16.7 | 2 | 18.3 | 1 |
| South Atlantic | 6.5 | 4 | 6.5 | 4 | 8.3 | 4 | 7.6 | 4 | 7.9 | 4 | 11.5 | 4 | 11.0 | 3 | 11.7 | 4 |
| West South Central | 11.7 | 1 | 10.8 | 2 | 11.0 | 3 | 12.1 | 3 | 14.0 | 2 | 12.0 | 3 | 9.1 | 4 | 13.6 | 3 |
| East North Central | 2.7 | 7 | 3.4 | 8 | 3.7 | 8 | 4.2 | 7 | 3.9 | 7 | 4.3 | 7 | 3.8 | 8 | 4.9 | 7 |
| East South Central | 2.3 | 8 | 2.3 | 9 | 3.1 | 9 | 3.3 | 8 | 3.2 | 8 | 2.8 | 9 | 6.2 | 6 | 3.5 | 8 |
| New England | 3.9 | 5 | 3.5 | 7 | 3.9 | 7 | 4.9 | 5 | 5.3 | 5 | 6.9 | 5 | 6.3 | 5 | 6.4 | 5 |
| West North Central | 2.3 | 9 | 3.9 | 6 | 5.0 | 5 | 4.9 | 6 | 5.1 | 6 | 5.9 | 6 | 3.8 | 7 | 5.7 | 6 |
| Mountain | 2.8 | 6 | 4.1 | 5 | 5.8 | 6 | 3.0 | 9 | 3.4 | 9 | 3.2 | 8 | 3.3 | 9 | 4.2 | 9 |
| U.S. total 3/ | 6.0 | | 6.2 | | 8.0 | | 8.1 | | 8.6 | | 9.7 | | 10.4 | | | |

1/ Marketing year beginning August 1.

2/ Includes only distribution for direct food use. Excludes Government distributions, military use, shipments to food processors and brewers, and imports since State destinations are not available.

3/ Totals may not add due to rounding.

Appendix table 26--Comparison of storage facilities in major rice-producing States

| State/item | Year | | |
|---|---|---|---|
| | 1973 | 1986 | 1992 |
| Arkansas | | | |
| Firms (No.) | 59 | 107 | 57 |
| Capacity (1,000 cwt) | 42,283 | 85,443 | 101,864 |
| Louisiana | | | |
| Firms (No.) | 50 | 67 | 59 |
| Capacity (1,000 cwt) | 15,526 | 27,009 | 31,830 |
| Mississippi | | | |
| Firms (No.) | 10 | 26 | 13 |
| Capacity (1,000 cwt) | 2,124 | 10,937 | 15,515 |
| Missouri | | | |
| Firms (No.) | na | 11 | 9 |
| Capacity (1,000 cwt) | na | 5,249 | 6,218 |
| Texas | | | |
| Firms (No.) | 69 | 52 | 39 |
| Capacity (1,000 cwt) | 25,591 | 28,467 | 26,309 |
| California | | | |
| Firms (No.) | 31 | 62 | 55 |
| Capacity (1,000 cwt) | 17,602 | 62,252 | 45,496 |
| U.S. total | | | |
| Firms (No.) | 219 | 325 | 221 |
| Capacity (1,000 cwt) | 103,126 | 219,357 | 227,232 |

Source: Holder and Grant 1979, and USDA/ASCS data on firms having Uniform Rice Storage Agreement.

Appendix table 27--Effect of rough rice moisture on milling yields

| Moisture content | Milling results | |
|---|---|---|
| | Milling yield | Broken kernels |
| | Percent | |
| 19.0 | 56.62 | 12.25 |
| 18.0 | 57.92 | 12.05 |
| 15.5 | 59.12 | 9.75 |
| 14.0 | 61.67 | 6.08 |
| 13.0 | 61.40 | 6.25 |
| 12.0 | 61.10 | 6.42 |
| 10.0 | 60.27 | 7.72 |

Source: Esmay and coauthors, 1979.

Appendix table 28--Cost comparison among six mill centers 1/

| State | Mill capacity | Rough equivalent milling cost | Milled equivalent cost | | | |
|---|---|---|---|---|---|---|
| | | | Long | Medium | Short | Weighted average 2/ |
| | cwt/hr | | Dollars/cwt | | | |
| Arkansas | 7,695 | 1.50 | 2.51 | 2.40 | 2.32 | 2.49 |
| California | 69,966 | 1.29 | 2.51 | 2.30 | 2.57 | 2.37 |
| Louisiana | 5,184 | 1.81 | 3.05 | 2.89 | 2.80 | 2.99 |
| Mississippi | 1,701 | 1.51 | 2.52 | 2.41 | 2.33 | 2.52 |
| Texas | 5,670 | 1.57 | 2.63 | 2.52 | 2.44 | 2.63 |
| United States | 27,216 | 1.52 | 2.64 | 2.50 | 2.50 | 2.58 |

Source: Wailes and Holder, 1987.

1/ Assumptions: Mills run 245 days/year and two shifts/day; output of mills of 70 percent packaged in cwt bags and 30 percent bulk; milled equivalent is based on 96 percent head rice/cwt of milled rice. Capacity is for white-rice mills only.

2/ Milled equivalent costs are weighted according to the proportions of long-, medium-, and short-grain rice milled in each State for the 1985 crop year.

Appendix table 29--Summary of rice mill costs, by State and grain type, 1985

| Grain type and cost item | Arkansas North | Arkansas South | Louisiana | Mississippi | Texas | California |
|---|---|---|---|---|---|---|
| | | | Dollars/cwt (milled basis) | | | |
| Long grain: | | | | | | |
| Grain input 1/ | 10.11 | 9.76 | 11.71 | 8.71 | 12.36 | 10.21 |
| Drying and storage 2/ | 2.08 | 2.08 | 2.47 | 2.56 | 2.22 | 2.29 |
| Assembly 3/ | 0.27 | 0.31 | 0.24 | 0.68 | 0.61 | 0.65 |
| Milling 4/ | 2.86 | 2.97 | 2.98 | 2.86 | 3.14 | 3.43 |
| Total cost | 15.32 | 15.12 | 17.40 | 14.81 | 18.33 | 16.58 |
| Medium grain: | | | | | | |
| Grain input 1/ | 9.35 | 9.03 | 12.03 | -- | 14.24 | 9.08 |
| Drying and storage 2/ | 1.99 | 1.99 | 2.37 | -- | 2.12 | 2.08 |
| Assembly 3/ | 0.27 | 0.31 | 0.24 | -- | 0.61 | 0.65 |
| Milling 4/ | 2.37 | 2.46 | 2.47 | -- | 2.57 | 2.69 |
| Total cost | 13.98 | 13.79 | 17.11 | -- | 19.54 | 14.50 |
| Short grain: | | | | | | |
| Grain input 1/ | 9.28 | 8.95 | -- | -- | -- | 9.42 |
| Drying and storage 2/ | 1.93 | 1.93 | -- | -- | -- | 2.34 |
| Assembly 3/ | 0.27 | 0.31 | -- | -- | -- | 0.65 |
| Milling 4/ | 2.04 | 2.11 | -- | -- | -- | 2.68 |
| Total cost | 13.52 | 13.30 | -- | -- | -- | 15.09 |

Source: Wailes and Holder, 1986.

1/ Amount paid per cwt (milled basis) for rice purchased by mills for processing into their final products.

2/ Conversion rates for long-, medium-, and short-grain rice are 1.67, 1.60, and 1.55 for southern States and 1.96, 1.78 and 2.00 for California.

3/ Derived by multiplying weighted-average production density by the average cost of transporting rice.

4/ Based on the package line distribution given in Appendix table 31.

Appendix table 30--Full package line distribution, by percentage output for the United States

| Percent of mill output | Package description |
|---|---|
| 2 | 1-lb carton in a 48-lb box on a pallet |
| 2 | 2-lb carton in a 48-lb box on a pallet |
| 35 | 100-lb polyweave bag on a pallet |
| 2 | 1-lb poly bag in a 24-lb bale on a pallet |
| 2 | 2-lb poly bag in a 24-lb bale on a pallet |
| 2 | 3-lb poly bag in a 60-lb bale on a pallet |
| 2 | 5-lb poly bag in a 60-lb bale on a pallet |
| 2 | 10-lb poly bag in a 60-lb bale on a pallet |
| 3 | 20-lb poly bag in a 60-lb bale on a pallet |
| 1 | 10-lb Kraft paper bag in a 60-lb bale on a pallet |
| 3 | 20-lb Kraft paper bag in a 60-lb bale on a pallet |
| 10 | 25-lb Kraft paper bag on a pallet |
| 34 | Bulk |

Source: Wailes and Holder, 1987.

Appendix table 31—Rough rice: Average price received by farmers, by month and crop year 1/

| Item/crop year | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 | 1972 | 1973 | 1974 | 1975 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Dollars/cwt | | | | | | | | |
| Month: | | | | | | | | | | | | | | | | |
| August | 4.30 | 4.71 | 4.68 | 4.97 | 4.82 | 4.81 | 5.03 | 4.74 | 5.06 | 4.71 | 5.16 | 5.15 | 5.34 | 10.90 | 10.20 | 9.83 |
| September | 4.31 | 4.91 | 4.73 | 4.94 | 4.72 | 4.85 | 4.86 | 4.74 | 4.92 | 4.99 | 5.18 | 5.24 | 6.37 | 13.30 | 10.90 | 9.19 |
| October | 4.62 | 5.20 | 5.12 | 5.01 | 4.88 | 4.94 | 5.03 | 5.08 | 5.03 | 5.23 | 5.26 | 5.46 | 7.05 | 14.80 | 11.30 | 8.87 |
| November | 4.98 | 5.39 | 5.19 | 5.03 | 4.99 | 4.93 | 5.02 | 5.04 | 5.09 | 5.05 | 5.19 | 5.25 | 7.42 | 16.70 | 11.60 | 8.59 |
| December | 4.83 | 5.30 | 5.19 | 4.96 | 5.02 | 5.09 | 5.12 | 5.08 | 4.92 | 4.98 | 5.09 | 5.30 | 7.64 | 15.50 | 10.90 | 8.51 |
| January | 4.93 | 5.39 | 5.28 | 5.08 | 5.13 | 5.20 | 5.16 | 5.16 | 4.72 | 4.99 | 5.31 | 5.53 | 7.84 | 15.80 | 10.80 | 7.95 |
| February | 4.95 | 5.48 | 5.18 | 5.14 | 5.09 | 5.15 | 5.15 | 5.32 | 4.84 | 4.96 | 5.44 | 5.55 | 8.14 | 16.90 | 11.30 | 7.54 |
| March | 5.13 | 5.70 | 5.21 | 5.17 | 5.18 | 5.15 | 5.13 | 5.36 | 4.80 | 5.01 | 5.36 | 5.60 | 8.26 | 17.20 | 11.10 | 6.17 |
| April | 4.93 | 5.60 | 5.18 | 5.25 | 5.12 | 5.12 | 5.13 | 5.37 | 4.78 | 5.00 | 5.33 | 5.58 | 8.51 | 15.90 | 11.00 | 7.15 |
| May | 4.77 | 5.48 | 5.05 | 5.20 | 4.97 | 5.09 | 5.18 | 5.34 | 4.90 | 4.98 | 5.30 | 5.57 | 8.56 | 17.20 | 11.00 | 7.06 |
| June | 4.87 | 5.26 | 5.08 | 5.10 | 4.97 | 5.08 | 5.17 | 5.37 | 4.80 | 5.10 | 5.20 | 5.58 | 8.74 | 17.50 | 11.20 | 6.82 |
| July | 4.86 | 5.08 | 5.14 | 5.03 | 4.93 | 5.14 | 5.04 | 5.33 | 4.63 | 4.80 | 5.33 | 5.35 | 10.80 | 11.90 | 10.00 | 7.45 |
| Season average price: | | | | | | | | | | | | | | | | |
| 12 months 1/ | 4.55 | 5.14 | 5.04 | 5.01 | 4.90 | 4.93 | 4.95 | 4.97 | 5.00 | 4.95 | 5.17 | 5.34 | 6.73 | 13.80 | 11.20 | 8.35 |
| 5 months 2/ | 4.61 | 5.10 | 4.98 | 4.98 | 4.89 | 4.92 | 5.01 | 4.94 | 5.00 | 4.99 | 5.18 | 5.28 | 6.76 | 14.24 | 10.98 | 9.00 |
| State: | | | | | | | | | | | | | | | | |
| Arkansas | 4.41 | 5.20 | 5.10 | 4.92 | 4.87 | 4.98 | 4.80 | 5.12 | 4.90 | 5.32 | 5.41 | 5.62 | 7.20 | 15.30 | 11.40 | 8.54 |
| California | 4.43 | 4.78 | 5.11 | 5.07 | 4.92 | 4.88 | 4.75 | 4.84 | 5.15 | 4.80 | 5.02 | 5.24 | 6.83 | 11.10 | 11.70 | 7.65 |
| Louisiana | 4.50 | 5.28 | 4.88 | 4.95 | 4.84 | 4.79 | 4.80 | 4.91 | 4.83 | 4.70 | 4.96 | 5.05 | 6.40 | 13.45 | 11.00 | 8.38 |
| Mississippi | 4.88 | 5.38 | 5.25 | 5.24 | 5.20 | 5.06 | 4.90 | 5.34 | 5.25 | 5.27 | 5.28 | 5.63 | 7.00 | 17.20 | 10.20 | 8.42 |
| Missouri | 4.39 | 5.02 | 4.87 | 4.68 | 5.08 | 4.98 | 5.00 | 5.09 | 5.08 | 5.30 | 5.40 | 5.40 | 7.10 | 15.50 | 11.90 | 8.53 |
| Texas | 4.85 | 5.31 | 5.03 | 5.09 | 4.94 | 5.04 | 5.10 | 4.94 | 4.90 | 4.88 | 5.25 | 5.35 | 6.44 | 14.80 | 10.90 | 8.81 |
| Type: | | | | | | | | | | | | | | | | |
| Long | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na |
| Medium/short | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na | na |

Refer to footnotes at end of table.

—continued

Appendix table 31—Rough rice: Average price received by farmers, by month and crop year 1/—continued

| Item | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Dollars/cwt | | | | | | | | | |
| Month: | | | | | | | | | | | | | | | | | | |
| August | 6.65 | 8.02 | 8.44 | 10.00 | 10.60 | 11.80 | 7.31 | 8.41 | 8.22 | 7.86 | 4.02 | 3.82 | 7.49 | 7.41 | 6.66 | 7.16 | 6.60 | 5.19 |
| September | 6.56 | 8.12 | 7.56 | 9.81 | 10.20 | 10.70 | 7.75 | 8.48 | 8.17 | 7.55 | 3.86 | 4.34 | 6.97 | 7.59 | 6.21 | 7.67 | 6.41 | 5.21 |
| October | 6.48 | 9.13 | 7.62 | 10.30 | 10.90 | 10.20 | 7.73 | 8.80 | 8.08 | 7.73 | 3.83 | 6.25 | 6.85 | 7.41 | 6.02 | 7.65 | 6.40 | 6.10 |
| November | 6.46 | 10.20 | 7.76 | 9.83 | 11.60 | 9.86 | 7.78 | 8.80 | 8.13 | 7.84 | 3.90 | 7.53 | 6.81 | 7.03 | 6.29 | 7.84 | 6.40 | 8.06 |
| December | 6.57 | 11.00 | 7.98 | 9.41 | 13.10 | 9.34 | 8.06 | 8.66 | 8.08 | 7.71 | 3.74 | 7.64 | 6.68 | 7.05 | 6.13 | 7.98 | 6.38 | 8.91 |
| January | 6.79 | 10.70 | 8.07 | 9.88 | 13.20 | 9.34 | 8.05 | 8.57 | 8.09 | 7.90 | 3.55 | 7.93 | 6.58 | 7.44 | 6.39 | 7.84 | 6.35 | 8.98 |
| February | 6.87 | 10.70 | 7.87 | 11.00 | 13.00 | 9.46 | 8.26 | 8.85 | 7.72 | 7.86 | 3.84 | 9.37 | 6.67 | 7.57 | 6.75 | 7.97 | 6.06 | 10.10 |
| March | 6.81 | 10.70 | 8.18 | 11.70 | 13.40 | 8.99 | 7.99 | 8.63 | 8.17 | 7.60 | 3.62 | 9.22 | 6.60 | 7.55 | 7.07 | 7.78 | 5.63 | 10.20 |
| April | 6.95 | 10.80 | 8.52 | 11.60 | 13.80 | 8.54 | 8.23 | 8.49 | 8.20 | 5.32 | 3.63 | 8.92 | 6.74 | 7.41 | 7.43 | 7.46 | 5.50 | 9.93 |
| May | 7.30 | 10.10 | 8.74 | 11.30 | 13.30 | 8.55 | 8.23 | 8.24 | 7.91 | 4.52 | 3.71 | 7.97 | 6.78 | 7.28 | 7.44 | 7.18 | 5.23 | 10.00 |
| June | 7.24 | 9.58 | 8.73 | 10.20 | 11.90 | 8.54 | 7.88 | 8.20 | 7.83 | 4.04 | 3.62 | 7.69 | 7.05 | 7.18 | 7.43 | 6.97 | 5.02 | 8.88 |
| July | 6.87 | 9.49 | 9.10 | 10.80 | 12.80 | 8.25 | 7.95 | 8.18 | 7.54 | 3.86 | 3.49 | 7.94 | 7.45 | 7.05 | 7.21 | 6.99 | 4.90 | 7.80 |
| Season average price: | | | | | | | | | | | | | | | | | | |
| 12 months 1/ | 7.02 | 9.49 | 8.16 | 10.50 | 12.80 | 9.05 | 7.91 | 8.57 | 8.04 | 6.53 | 3.75 | 7.27 | 6.83 | 7.35 | 6.68 | 7.58 | 5.89 | 8.25–8.75 3/ |
| 5 months 2/ | 6.55 | 9.08 | 7.75 | 9.87 | 11.30 | 10.40 | 7.69 | 8.63 | 8.14 | 7.73 | 3.87 | 5.71 | 6.84 | 7.24 | 6.25 | 7.64 | 6.44 | 6.73 |
| State: | | | | | | | | | | | | | | | | | | |
| Arkansas | 7.25 | 9.79 | 8.47 | 10.60 | 12.30 | 9.37 | 8.61 | 9.18 | 8.51 | 6.70 | 3.68 | 7.60 | 6.90 | 7.46 | 6.75 | 7.69 | 5.93 | 9.00 |
| California | 6.91 | 9.15 | 7.06 | 9.55 | 14.10 | 7.35 | 6.65 | 6.96 | 6.43 | 5.33 | 3.18 | 6.72 | 6.15 | 6.27 | 5.93 | 6.65 | 5.64 | 10.05 |
| Louisiana | 6.53 | 8.49 | 7.50 | 10.60 | 12.00 | 9.36 | 8.05 | 8.90 | 8.20 | 7.24 | 4.03 | 7.65 | 6.90 | 7.81 | 6.73 | 7.67 | 5.88 | 8.00 |
| Mississippi | 6.79 | 10.20 | 7.98 | 10.30 | 12.70 | 9.14 | 8.66 | 9.53 | 8.88 | 7.10 | 3.91 | 7.90 | 7.02 | 7.57 | 6.99 | 8.48 | 5.82 | 9.45 |
| Missouri | 7.49 | 9.70 | 8.75 | 10.70 | 12.30 | 9.50 | 8.65 | 9.49 | 8.70 | 7.05 | 3.57 | 7.41 | 7.22 | 7.54 | 7.21 | 7.81 | 5.91 | 9.00 |
| Texas | 7.21 | 9.55 | 9.27 | 11.60 | 12.80 | 10.40 | 8.94 | 9.97 | 8.90 | 7.38 | 4.22 | 8.07 | 7.24 | 8.02 | 7.41 | 8.15 | 6.17 | 9.25 |
| Type: | | | | | | | | | | | | | | | | | | |
| Long | na | na | na | 10.90 | 12.50 | 9.70 | 8.56 | 9.36 | 8.66 | 6.75 | 3.82 | 7.77 | 6.96 | 7.59 | 6.94 | 7.83 | 5.90 | na |
| Medium/short | na | na | na | 10.60 | 13.30 | 8.06 | 6.91 | 7.13 | 6.66 | 5.87 | 3.55 | 6.36 | 6.47 | 6.71 | 6.19 | 7.00 | 5.87 | na |

na = Not available.

1/ August 1–July 31. 2/ First 5 months of marketing year—August–December.

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

Appendix table 32--Retail price for long-grain milled rice, 1960-92

| Crop year | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Simple average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Cents/pound | | | | | | | |
| 1960 | 0.21 | 0.20 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 |
| 1961 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 |
| 1962 | 0.22 | 0.22 | 0.22 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.21 | 0.22 | 0.22 | 0.21 |
| 1963 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| 1964 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| 1965 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| 1966 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| 1967 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| 1968 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 | 0.22 |
| 1969 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 | 0.23 |
| 1970 | 0.23 | 0.23 | 0.23 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| 1971 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 |
| 1972 | 0.24 | 0.24 | 0.24 | 0.24 | 0.24 | 0.25 | 0.25 | 0.26 | 0.26 | 0.27 | 0.27 | 0.28 | 0.25 |
| 1973 | 0.28 | 0.30 | 0.34 | 0.46 | 0.49 | 0.50 | 0.52 | 0.52 | 0.53 | 0.53 | 0.54 | 0.53 | 0.46 |
| 1974 | 0.53 | 0.52 | 0.51 | 0.49 | 0.48 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.49 |
| 1975 | 0.47 | 0.47 | 0.46 | 0.46 | 0.46 | 0.45 | 0.45 | 0.44 | 0.44 | 0.44 | 0.44 | 0.44 | 0.45 |
| 1976 | 0.43 | 0.42 | 0.42 | 0.41 | 0.41 | 0.41 | 0.40 | 0.40 | 0.40 | 0.39 | 0.40 | 0.40 | 0.41 |
| 1977 | 0.40 | 0.40 | 0.40 | 0.40 | 0.42 | 0.44 | 0.46 | 0.46 | 0.47 | 0.47 | 0.48 | 0.48 | 0.44 |
| 1978 | na | na | na | na | na | na | na | na | na | na | na | na | na |
| 1979 | na | na | na | na | na | 0.48 | 0.49 | 0.49 | 0.51 | 0.51 | 0.52 | 0.52 | na |
| 1980 | 0.52 | 0.52 | 0.52 | 0.52 | 0.54 | 0.55 | 0.55 | 0.56 | 0.57 | 0.58 | 0.57 | 0.57 | 0.55 |
| 1981 | 0.58 | 0.57 | 0.56 | 0.55 | 0.55 | 0.55 | 0.55 | 0.52 | 0.50 | 0.51 | 0.50 | 0.50 | 0.53 |
| 1982 | 0.49 | 0.49 | 0.49 | 0.49 | 0.48 | 0.49 | 0.47 | 0.47 | 0.47 | 0.47 | 0.47 | 0.48 | 0.48 |
| 1983 | 0.47 | 0.48 | 0.47 | 0.47 | 0.48 | 0.48 | 0.49 | 0.48 | 0.47 | 0.47 | 0.48 | 0.48 | 0.48 |
| 1984 | 0.48 | 0.48 | 0.48 | 0.48 | 0.47 | 0.48 | 0.47 | 0.48 | 0.48 | 0.47 | 0.47 | 0.47 | 0.47 |
| 1985 | 0.47 | 0.47 | 0.47 | 0.47 | 0.45 | 0.46 | 0.46 | 0.45 | 0.45 | 0.45 | 0.45 | 0.45 | 0.46 |
| 1986 | 0.44 | 0.43 | 0.44 | 0.43 | 0.43 | 0.42 | 0.41 | 0.39 | 0.40 | 0.40 | 0.39 | 0.39 | 0.41 |
| 1987 | 0.40 | 0.40 | 0.40 | 0.41 | 0.42 | 0.45 | 0.46 | 0.47 | 0.49 | 0.50 | 0.49 | 0.51 | 0.45 |
| 1988 | 0.51 | 0.50 | 0.48 | 0.49 | 0.48 | 0.49 | 0.50 | 0.49 | 0.48 | 0.49 | 0.49 | 0.51 | 0.49 |
| 1989 | 0.51 | 0.52 | 0.51 | 0.50 | 0.50 | 0.48 | 0.48 | 0.48 | 0.48 | 0.48 | 0.48 | 0.49 | 0.49 |
| 1990 | 0.49 | 0.49 | 0.48 | 0.48 | 0.48 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.50 |
| 1991 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 | 0.53 |
| 1992 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 |

na = Not available.

Source: U.S. Department of Labor, Bureau of Labor Statistics, Washington, D.C.

Appendix table 33--Monthly average price for U.S. No. 2, long-grain milled rice, Arkansas, 1960-93

| Crop year 1/ | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Season average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Dollars per cwt | | | | | | | |
| 1960 | 9.10 | 9.10 | 9.05 | 9.15 | 9.15 | 9.20 | 9.35 | 9.40 | 9.40 | 9.45 | 9.60 | 9.60 | 9.30 |
| 1961 | 9.40 | 9.45 | 9.80 | 9.85 | 9.90 | 9.95 | 10.10 | 10.10 | 10.10 | 10.15 | 10.10 | 9.90 | 9.90 |
| 1962 | 9.80 | 9.65 | 9.65 | 9.70 | 9.95 | 10.05 | 10.15 | 10.15 | 10.10 | 10.10 | 10.05 | 10.00 | 10.05 |
| 1963 | 9.90 | 9.95 | 9.90 | 9.90 | 9.90 | 10.00 | 10.15 | 10.15 | 10.15 | 10.15 | 10.10 | 10.10 | 10.05 |
| 1964 | 10.05 | 9.90 | 9.90 | 9.90 | 9.90 | 9.95 | 9.95 | 10.00 | 10.10 | 10.10 | 10.10 | 10.10 | 10.00 |
| 1965 | 10.10 | 9.75 | 9.80 | 9.85 | 9.85 | 9.85 | 9.85 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 |
| 1966 | 9.90 | 9.90 | 9.90 | 9.95 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 |
| 1967 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.95 | 9.95 | 10.20 | 10.25 | 10.25 | 10.25 | 10.25 | 10.05 |
| 1968 | 10.25 | 10.15 | 9.20 | 9.85 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.85 | 9.90 |
| 1969 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 10.00 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.00 |
| 1970 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 |
| 1971 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.25 |
| 1972 | 10.40 | 11.20 | 12.20 | 13.50 | 13.50 | 13.50 | 15.00 | 15.00 | 16.45 | 17.25 | 17.25 | 17.10 | 14.35 |
| 1973 | 19.75 | 25.60 | 30.10 | 33.00 | 33.00 | 33.60 | 34.50 | 34.25 | 34.00 | 32.50 | 30.60 | 29.00 | 30.80 |
| 1974 | 25.90 | 22.40 | 21.90 | 23.00 | 23.00 | 22.75 | 22.10 | 22.50 | 21.55 | 21.25 | 21.25 | 21.25 | 22.40 |
| 1975 | 20.90 | 20.05 | 19.50 | 18.50 | 18.25 | 18.00 | 17.70 | 17.10 | 16.50 | 17.00 | 17.00 | 16.75 | 18.10 |
| 1976 | 16.00 | 15.25 | 15.20 | 15.20 | 14.50 | 14.00 | 14.00 | 14.25 | 15.45 | 16.75 | 16.75 | 16.50 | 15.30 |
| 1977 | 16.15 | 15.95 | 19.00 | 23.10 | 25.00 | 25.00 | 25.00 | 23.50 | 23.50 | 23.15 | 21.60 | 20.55 | 21.80 |
| 1978 | 19.55 | 17.10 | 17.00 | 17.00 | 17.00 | 16.70 | 16.90 | 18.75 | 21.50 | 21.50 | 21.50 | 21.50 | 18.85 |
| 1979 | 21.50 | 23.50 | 24.00 | 23.00 | 21.35 | 20.10 | 22.40 | 24.00 | 23.75 | 22.25 | 21.50 | 20.50 | 22.30 |
| 1980 | 20.60 | 22.00 | 23.40 | 24.90 | 26.10 | 26.10 | 25.75 | 26.70 | 27.50 | 28.00 | 27.90 | 27.50 | 25.55 |
| 1981 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 16.85 | 16.55 | 16.50 | 17.40 | 17.30 | 17.25 | 17.25 | 17.00 | 16.90 | 16.20 | 15.70 | 15.50 | 16.70 |
| 1992 | 15.65 | 15.45 | 15.40 | 15.40 | 15.05 | 13.80 | 13.65 | 13.50 | 13.50 | 12.95 | 12.75 | 12.75 | 14.15 |
| 1993 | 13.00 | 13.25 | 16.15 | 23.85 | 25.00 | 25.00 | 24.75 | 23.70 | 22.15 | 20.20 | 18.15 | 15.65 | 20.05 |

1/ Crop year August 1 to July 31.

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

Appendix table 34--Monthly average price for U.S. No. 2, long-grain milled rice, Southwest Louisiana, 1960-93

| Crop year 1/ | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Season average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Dollars per cwt | | | | | | | |
| 1960 | 9.30 | 9.15 | 9.25 | 9.35 | 9.40 | 9.50 | 9.60 | 9.75 | 9.75 | 9.75 | 9.75 | 9.75 | 9.50 |
| 1961 | 9.60 | 9.70 | 10.15 | 10.10 | 10.10 | 10.10 | 10.25 | 10.50 | 10.45 | 10.40 | 10.35 | 10.20 | 10.15 |
| 1962 | 9.95 | 9.65 | 9.75 | 9.90 | 10.00 | 10.00 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.05 |
| 1963 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 |
| 1964 | 10.15 | 10.00 | 10.00 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 |
| 1965 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 |
| 1966 | 10.15 | 10.15 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.95 |
| 1967 | 9.90 | 9.60 | 9.70 | 9.70 | 9.70 | 9.80 | 10.00 | 10.10 | 10.10 | 10.15 | 10.15 | 10.15 | 9.90 |
| 1968 | 9.65 | 9.25 | 9.50 | 9.50 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.55 |
| 1969 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 |
| 1970 | 9.60 | 9.60 | 9.75 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.85 |
| 1971 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.95 | 10.10 | 10.10 | 10.10 | 9.95 |
| 1972 | 10.10 | 10.90 | 11.85 | 13.50 | 14.00 | 14.60 | 14.75 | 14.75 | 16.25 | 17.25 | 17.25 | 17.25 | 14.35 |
| 1973 | 20.20 | 24.90 | 28.35 | 33.00 | 33.00 | 33.50 | 33.50 | 33.50 | 33.50 | 33.50 | 30.00 | 28.10 | 30.40 |
| 1974 | 26.67 | N/A | 20.19 | 21.00 | 22.00 | 21.50 | 21.50 | 21.50 | 21.50 | 20.00 | 20.90 | 21.50 | 21.50 |
| 1975 | 20.55 | 18.30 | 18.00 | 18.00 | 17.60 | 17.40 | 16.50 | 15.50 | 15.30 | 16.60 | 16.50 | 16.25 | 17.20 |
| 1976 | 14.70 | 13.85 | 14.00 | 13.75 | 13.60 | 13.25 | 13.50 | 13.95 | 15.65 | 16.45 | 16.25 | 16.25 | 14.60 |
| 1977 | 15.95 | 16.20 | 17.75 | 22.10 | 24.15 | 24.00 | 24.00 | 23.75 | 23.50 | 22.00 | 21.50 | 20.40 | 21.30 |
| 1978 | 18.75 | 15.75 | 16.15 | 16.25 | 16.40 | 16.30 | 16.75 | 18.60 | 21.50 | 21.50 | 21.50 | 21.50 | 18.40 |
| 1979 | 21.50 | 21.50 | 22.05 | 22.50 | 21.00 | 20.60 | 22.50 | 24.30 | 24.00 | 23.25 | 21.80 | 20.90 | 22.15 |
| 1980 | 20.75 | 22.00 | 23.40 | 25.00 | 26.75 | 27.00 | 27.25 | 27.70 | 28.25 | 28.00 | 27.90 | 27.50 | 25.95 |
| 1981 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 16.40 | 16.55 | 16.60 | 17.15 | 17.35 | 17.30 | 17.30 | 16.60 | 16.45 | 15.70 | 15.10 | 15.20 | 16.50 |
| 1992 | 15.00 | 14.75 | 14.70 | 14.45 | 14.25 | 13.40 | 13.00 | 12.60 | 12.15 | 11.90 | 11.75 | 11.75 | 13.30 |
| 1993 | 12.05 | 12.60 | 15.70 | 23.75 | 26.25 | 26.25 | 25.40 | 23.65 | 22.75 | 21.00 | 18.15 | 16.15 | 20.30 |

1/ Crop year August 1 to July 31.

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

Appendix table 35--Monthly average price for U.S. No.2, long-grain milled rice, Texas, 1960-93

| Crop year 1/ | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Season average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Dollars per cwt | | | | | | | |
| 1960 | 9.40 | 9.20 | 9.25 | 9.35 | 9.40 | 9.55 | 9.60 | 9.65 | 9.80 | 9.80 | 9.80 | 9.70 | 9.55 |
| 1961 | 9.60 | 9.80 | 10.10 | 10.10 | 10.10 | 10.20 | 10.40 | 10.50 | 10.50 | 10.50 | 10.50 | 10.45 | 10.25 |
| 1962 | 10.10 | 9.45 | 9.75 | 9.90 | 10.05 | 10.10 | 10.15 | 10.15 | 10.15 | 10.00 | 10.15 | 10.15 | 10.00 |
| 1963 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.20 | 10.25 | 10.35 | 10.50 | 10.50 | 10.50 | 10.50 | 10.30 |
| 1964 | 10.15 | 10.05 | 10.05 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 |
| 1965 | 10.05 | 9.65 | 9.80 | 10.00 | 10.00 | 10.10 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.05 |
| 1966 | 10.05 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.10 | 10.05 | 10.00 | 9.90 | 10.00 |
| 1967 | 9.50 | 9.55 | 9.70 | 10.00 | 10.05 | 10.15 | 10.15 | 10.35 | 10.50 | 10.25 | 10.25 | 10.25 | 10.05 |
| 1968 | 9.95 | 9.50 | 9.60 | 9.75 | 9.75 | 9.75 | 9.75 | 9.75 | 9.90 | 10.00 | 10.00 | 10.00 | 9.80 |
| 1969 | 9.75 | 9.75 | 9.75 | 9.30 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 9.90 |
| 1970 | 10.00 | 9.90 | 10.00 | 10.00 | 10.00 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.05 |
| 1971 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.20 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.20 |
| 1972 | 10.55 | 11.55 | 12.40 | 13.50 | 13.50 | 13.75 | 15.00 | 15.00 | 16.50 | 17.25 | 17.25 | 17.25 | 14.45 |
| 1973 | 20.20 | 28.80 | 32.20 | 34.50 | 33.85 | 33.10 | 34.25 | 33.25 | 33.40 | 33.25 | 32.60 | 31.50 | 31.75 |
| 1974 | 22.50 | 21.00 | 20.90 | 22.40 | 21.75 | 22.50 | 22.40 | 22.25 | 22.25 | 22.25 | 22.25 | 22.25 | 22.05 |
| 1975 | 21.40 | 20.50 | 19.25 | 19.25 | 19.25 | 18.30 | 18.00 | 17.10 | 17.00 | 17.00 | 16.60 | 16.40 | 18.35 |
| 1976 | 15.50 | 14.50 | 14.75 | 14.80 | 14.10 | 13.85 | 13.90 | 14.00 | 15.45 | 16.25 | 16.25 | 16.25 | 14.95 |
| 1977 | 16.05 | 16.50 | 18.30 | 22.60 | 24.15 | 25.00 | 25.00 | 24.00 | 23.25 | 22.10 | 21.75 | 21.50 | 21.70 |
| 1978 | 19.00 | 16.50 | 16.60 | 16.20 | 16.35 | 16.30 | 16.60 | 18.20 | 21.00 | 21.00 | 21.00 | 21.00 | 18.30 |
| 1979 | 21.00 | 21.25 | 22.30 | 22.10 | 21.10 | 20.10 | 22.75 | 24.80 | 24.10 | 23.00 | 21.00 | 21.00 | 22.05 |
| 1980 | 21.00 | 21.70 | 23.10 | 24.75 | 26.55 | 26.55 | 25.75 | 27.10 | 27.75 | 28.00 | 27.40 | 27.00 | 25.55 |
| 1981 | 25.00 | 24.85 | 235.50 | 22.60 | 22.00 | 21.75 | 20.20 | 19.20 | 19.00 | 19.00 | 18.75 | 17.75 | 21.15 |
| 1982 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 17.00 | 17.00 | 16.65 | 17.00 | 17.50 | 17.50 | 17.50 | 17.50 | 17.50 | 17.25 | 16.70 | 16.50 | 17.15 |
| 1992 | 16.50 | 16.50 | 16.50 | 16.10 | 15.80 | 15.25 | 15.15 | 15.00 | 15.00 | 14.30 | 13.60 | 12.00 | 15.15 |
| 1993 | 13.50 | 13.50 | 16.13 | 23.35 | 25.50 | 25.50 | 25.50 | 25.00 | 23.25 | 21.40 | 19.40 | 17.25 | 20.75 |

1/ Crop year August 1 to July 31.

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

Appendix table 36--Monthly average price for U.S. No. 2, medium-grain milled rice, Arkansas, 1960-93

| Crop year 1/ | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Season average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Dollars per cwt | | | | | | | |
| 1960 | 7.65 | 7.35 | 7.40 | 7.70 | 8.00 | 8.15 | 8.20 | 8.35 | 8.45 | 8.55 | 8.55 | 8.50 | 8.05 |
| 1961 | 8.25 | 8.35 | 8.75 | 8.85 | 9.00 | 9.30 | 9.75 | 9.75 | 9.75 | 9.75 | 9.65 | 9.35 | 9.20 |
| 1962 | 8.70 | 8.40 | 8.85 | 9.20 | 9.45 | 9.50 | 9.50 | 9.50 | 9.35 | 9.20 | 9.15 | 9.00 | 9.15 |
| 1963 | 8.80 | 8.65 | 8.45 | 8.40 | 8.40 | 8.50 | 8.65 | 8.65 | 8.65 | 8.65 | 8.60 | 8.50 | 8.55 |
| 1964 | 8.40 | 8.05 | 7.95 | 7.95 | 7.95 | 8.15 | 8.15 | 8.20 | 8.40 | 8.40 | 8.40 | 8.40 | 8.20 |
| 1965 | 8.40 | 7.90 | 7.90 | 7.90 | 8.00 | 8.00 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.10 |
| 1966 | 8.15 | 8.15 | 8.10 | 8.15 | 8.15 | 8.15 | 8.25 | 8.20 | 8.20 | 8.20 | 8.25 | 8.25 | 8.20 |
| 1967 | 8.25 | 8.25 | 8.15 | 8.15 | 8.25 | 8.35 | 8.50 | 9.05 | 9.25 | 9.25 | 9.25 | 9.25 | 8.65 |
| 1968 | 9.25 | 9.10 | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 | 8.45 | 8.55 |
| 1969 | 8.45 | 8.45 | 8.60 | 8.60 | 8.60 | 8.60 | 8.60 | 8.55 | 8.55 | 8.55 | 8.55 | 8.55 | 8.55 |
| 1970 | 8.55 | 8.70 | 8.90 | 8.90 | 8.90 | 9.05 | 9.10 | 9.10 | 9.10 | 9.10 | 9.10 | 9.10 | 8.95 |
| 1971 | 9.10 | 9.10 | 9.10 | 9.10 | 9.10 | 9.10 | 9.40 | 9.40 | 9.40 | 9.40 | 9.40 | 9.40 | 9.25 |
| 1972 | 9.40 | 10.15 | 11.60 | 13.00 | 13.00 | 13.00 | 14.00 | 14.00 | 15.45 | 16.25 | 16.25 | 15.00 | 13.45 |
| 1973 | 16.20 | 19.50 | 25.00 | 28.50 | 28.50 | 28.70 | 29.00 | 29.50 | 30.00 | 29.00 | 28.75 | 27.50 | 26.70 |
| 1974 | 25.40 | 20.80 | 20.75 | 21.50 | 21.50 | 21.40 | 21.00 | 21.00 | 20.45 | 20.20 | 20.00 | 20.00 | 21.15 |
| 1975 | 15.10 | 19.20 | 18.45 | 17.50 | 17.00 | 17.00 | 16.70 | 16.10 | 15.75 | 16.00 | 16.00 | 15.75 | 17.10 |
| 1976 | 15.10 | 14.25 | 14.20 | 14.20 | 13.40 | 13.25 | 13.25 | 13.40 | 14.40 | 15.75 | 15.75 | 15.75 | 14.40 |
| 1977 | 15.30 | 15.20 | 17.75 | 21.95 | 23.50 | 23.50 | 23.30 | 22.50 | 22.25 | 21.70 | 20.40 | 19.50 | 20.55 |
| 1978 | 18.95 | 16.90 | 16.00 | 16.00 | 15.65 | 15.20 | 15.40 | 16.25 | 17.00 | 17.00 | 16.50 | 18.70 | 16.65 |
| 1979 | 19.50 | 22.25 | 22.50 | 22.40 | 21.50 | 21.40 | 22.60 | 24.00 | 23.90 | 22.25 | 21.55 | 20.50 | 22.05 |
| 1980 | 20.60 | 21.30 | 22.50 | 24.00 | 25.75 | 26.10 | 25.75 | 26.70 | 27.40 | 28.00 | 28.00 | 27.50 | 25.30 |
| 1981 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 16.60 | 16.10 | 16.10 | 16.70 | 16.65 | 16.65 | 16.65 | 16.35 | 16.40 | 15.65 | 15.35 | 15.25 | 16.20 |
| 1992 | 15.50 | 15.45 | 15.40 | 15.40 | 15.05 | 13.55 | 13.65 | 13.70 | 13.75 | 13.40 | 13.25 | 13.25 | 14.30 |
| 1993 | 13.25 | 13.50 | 16.05 | 23.90 | 25.00 | 25.00 | 24.85 | 24.70 | 24.75 | 23.75 | 21.70 | 18.00 | 21.20 |

1/ Crop year August 1 to July 31.

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

Appendix table 37--Monthly average price for U.S. No. 2, medium-grain milled rice, Louisiana, 1960-93

| Crop year 1/ | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Season average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Dollars per cwt | | | | | | | |
| 1960 | 7.60 | 7.30 | 7.40 | 7.70 | 8.05 | 8.20 | 8.30 | 8.40 | 8.50 | 8.60 | 8.65 | 8.55 | 8.10 |
| 1961 | 8.20 | 8.30 | 8.80 | 9.00 | 9.25 | 9.55 | 9.85 | 9.85 | 9.85 | 9.85 | 9.70 | 9.35 | 9.30 |
| 1962 | 8.20 | 8.50 | 8.95 | 9.30 | 9.50 | 9.70 | 9.70 | 9.70 | 9.70 | 9.20 | 9.15 | 9.15 | 9.25 |
| 1963 | 8.80 | 8.75 | 8.55 | 8.45 | 8.55 | 8.65 | 8.70 | 8.85 | 8.90 | 8.90 | 8.90 | 8.90 | 8.75 |
| 1964 | 8.55 | 8.10 | 8.00 | 8.05 | 8.20 | 8.35 | 8.40 | 8.40 | 8.45 | 8.45 | 8.45 | 8.45 | 8.30 |
| 1965 | 8.35 | 8.10 | 7.95 | 7.95 | 7.95 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.10 |
| 1966 | 8.10 | 8.00 | 8.10 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 | 8.15 |
| 1967 | 8.15 | 7.90 | 8.10 | 8.40 | 8.40 | 8.45 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.35 |
| 1968 | 8.30 | 8.15 | 8.40 | 8.40 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.45 |
| 1969 | 8.50 | 8.55 | 8.55 | 8.55 | 8.55 | 8.55 | 8.55 | 8.55 | 8.55 | 8.55 | 8.55 | 8.55 | 8.55 |
| 1970 | 8.55 | 8.70 | 8.70 | 8.70 | 8.70 | 8.70 | 8.70 | 8.70 | 8.70 | 8.70 | 8.70 | 8.70 | 8.70 |
| 1971 | 8.70 | 8.70 | 8.70 | 8.70 | 8.75 | 8.90 | 8.90 | 8.90 | 8.95 | 9.10 | 9.10 | 9.10 | 8.90 |
| 1972 | 9.10 | 9.90 | 10.55 | 12.00 | 12.50 | 12.80 | 12.90 | 12.00 | 14.30 | 15.25 | 15.25 | 15.25 | 12.70 |
| 1973 | 17.10 | 19.60 | 22.65 | 29.50 | 29.85 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 25.00 | 23.00 | 26.40 |
| 1974 | 22.00 | 18.60 | 19.10 | 20.00 | 20.70 | 20.65 | 20.75 | 20.50 | 20.50 | 19.00 | 19.30 | 19.50 | 20.05 |
| 1975 | 18.90 | 16.80 | 16.75 | 17.00 | 16.70 | 15.60 | 14.75 | 13.50 | 13.95 | 15.50 | 15.50 | 15.25 | 15.85 |
| 1976 | 13.70 | 12.85 | 13.00 | 12.30 | 11.90 | 11.25 | 11.70 | 12.20 | 14.10 | 15.60 | 15.50 | 15.25 | 13.30 |
| 1977 | 14.60 | 14.95 | 16.30 | 20.75 | 21.85 | 21.50 | 21.50 | 21.00 | 20.50 | 19.00 | 18.75 | 18.50 | 19.10 |
| 1978 | 16.90 | 14.50 | 14.50 | 14.50 | 14.65 | 14.15 | 14.00 | 14.85 | 16.50 | 16.50 | 16.50 | 17.50 | 15.40 |
| 1979 | 19.40 | 20.00 | 20.40 | 20.50 | 19.60 | 20.00 | 22.60 | 23.80 | 24.00 | 23.60 | 21.80 | 20.90 | 21.40 |
| 1980 | 20.50 | 20.80 | 21.60 | 24.40 | 26.40 | 27.00 | 27.10 | 27.50 | 27.55 | 28.00 | 28.00 | 27.75 | 25.55 |
| 1981 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 15.85 | 16.00 | 16.00 | 16.00 | 16.00 | 16.00 | 15.90 | 15.50 | 15.50 | 15.15 | 14.50 | 14.50 | 15.60 |
| 1992 | 14.50 | 14.00 | 14.50 | 14.15 | 13.40 | 13.40 | 13.00 | 12.80 | 12.40 | 11.94 | 12.00 | 12.00 | 13.15 |
| 1993 | 12.25 | 12.45 | 15.65 | 21.95 | 24.00 | 24.00 | 23.88 | 23.80 | 24.00 | 23.70 | 22.25 | 20.00 | 20.65 |

1/ Crop year August 1 to July 31.

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

Appendix table 38--Monthly average price for U.S. No. 2, medium-grain milled rice, f.o.b. mill, California, 1960-93

| Crop year 1/ | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Season average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Dollars per cwt | | | | | | | |
| 1960 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.25 | 9.25 | 9.25 | 9.25 | 9.25 | 9.25 | 9.25 | 9.15 |
| 1961 | 9.25 | 9.25 | 9.50 | 9.50 | 9.50 | 9.75 | 9.75 | 9.75 | 9.90 | 10.00 | 10.00 | 10.00 | 9.70 |
| 1962 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.15 |
| 1963 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 | 10.25 |
| 1964 | 10.20 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 | 10.10 |
| 1965 | 10.10 | 10.10 | 10.15 | 10.15 | 10.15 | 10.30 | 10.35 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.30 |
| 1966 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 |
| 1967 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.40 | 10.50 | 10.90 | 10.90 | 10.50 |
| 1968 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 |
| 1969 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 |
| 1970 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.90 | 10.95 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 10.95 |
| 1971 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 10.50 | 10.50 | 10.50 | 10.60 | 10.75 | 10.75 | 10.75 | 10.80 |
| 1972 | 10.75 | 10.75 | 11.25 | 11.25 | 11.25 | 10.25 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.80 | 11.50 |
| 1973 | 13.00 | 16.75 | 18.50 | 24.00 | 27.50 | 27.50 | 27.50 | 29.50 | 29.50 | 29.50 | 29.50 | 29.50 | 25.15 |
| 1974 | 29.50 | 28.70 | 26.25 | 26.25 | 26.25 | 26.25 | 26.25 | 26.25 | 26.25 | 26.25 | 26.25 | 26.25 | 26.70 |
| 1975 | 26.25 | 26.25 | 24.25 | 24.25 | 24.25 | 23.50 | 22.70 | 19.65 | 18.70 | 19.00 | 19.00 | 16.80 | 22.05 |
| 1976 | 16.80 | 16.80 | 16.60 | 16.60 | 16.60 | 16.60 | 16.60 | 16.60 | 16.60 | 17.00 | 17.30 | 17.40 | 16.80 |
| 1977 | 17.40 | 17.40 | 18.10 | 20.55 | 23.00 | 23.60 | 23.60 | 23.60 | 23.60 | 23.60 | 23.60 | 23.60 | 21.80 |
| 1978 | 21.50 | 20.55 | 20.10 | 19.75 | 19.75 | 19.75 | 18.25 | 18.40 | 19.50 | 20.75 | 21.00 | 21.00 | 20.00 |
| 1979 | 22.50 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 | 25.10 | 24.70 | 23.00 | 23.00 | 23.00 | 23.00 | 23.30 |
| 1980 | 23.00 | 23.20 | 24.75 | 25.00 | 26.75 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 27.70 |
| 1981 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 17.65 | 17.50 | 17.00 | 17.80 | 18.00 | 18.00 | 18.05 | 18.25 | 18.25 | 18.25 | 18.35 | 18.50 | 17.95 |
| 1992 | 18.25 | 18.25 | 18.25 | 18.25 | 18.25 | 18.25 | 18.25 | 18.05 | 17.50 | 17.50 | 17.30 | 17.00 | 17.95 |
| 1993 | 16.80 | 16.20 | 16.25 | 19.00 | 22.50 | 22.50 | 22.70 | 23.40 | 26.75 | 27.50 | 26.88 | 24.25 | 22.05 |

1/ Crop year August 1 to July 31.

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

Appendix table 39--Monthly average price for U.S. No. 2, short-grain milled rice, California, 1960-93

| Crop year 1/ | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Season average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Dollars per cwt | | | | | | | |
| 1960 | 9.00 | 9.00 | 8.75 | 8.75 | 8.75 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 9.00 | 8.95 |
| 1961 | 9.75 | 9.75 | 9.25 | 9.25 | 9.25 | 9.50 | 9.50 | 9.65 | 9.75 | 9.75 | 9.75 | 9.75 | 9.60 |
| 1962 | 10.00 | 10.00 | 9.75 | 9.75 | 9.75 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 9.95 |
| 1963 | 9.95 | 9.90 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 | 10.00 |
| 1964 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 | 9.90 |
| 1965 | 10.15 | 10.15 | 9.90 | 9.90 | 9.90 | 10.05 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.10 |
| 1966 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 |
| 1967 | 10.60 | 10.60 | 10.15 | 10.15 | 10.15 | 10.15 | 10.15 | 10.25 | 10.60 | 10.60 | 10.60 | 10.60 | 10.40 |
| 1968 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 |
| 1969 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 |
| 1970 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.60 | 10.65 | 10.75 | 11.00 | 11.00 | 11.00 | 11.00 | 10.75 |
| 1971 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 11.20 | 11.20 | 11.20 | 11.05 |
| 1972 | 11.20 | 11.20 | 11.75 | 11.75 | 11.75 | 11.75 | 12.00 | 12.00 | 12.00 | 12.00 | 12.00 | 12.25 | 11.80 |
| 1973 | 13.00 | 16.75 | 18.50 | 22.25 | 26.00 | 26.00 | 28.00 | 28.00 | 28.00 | 28.00 | 28.00 | 28.00 | 24.20 |
| 1974 | 28.00 | 26.80 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.00 | 25.40 |
| 1975 | 25.00 | 25.00 | 23.00 | 23.00 | 23.00 | 22.25 | 21.40 | 17.85 | 17.15 | 17.50 | 17.50 | 15.15 | 20.65 |
| 1976 | 15.15 | 15.15 | 14.85 | 14.75 | 14.75 | 14.75 | 14.75 | 14.75 | 14.95 | 15.50 | 16.05 | 16.25 | 15.15 |
| 1977 | 16.25 | 16.25 | 16.65 | 19.20 | 22.00 | 22.00 | 22.00 | 22.00 | 22.00 | 22.00 | 22.00 | 22.00 | 20.35 |
| 1978 | 20.25 | 19.00 | 18.20 | 17.40 | 17.50 | 17.50 | 16.75 | 16.80 | 18.20 | 19.00 | 19.00 | 19.00 | 18.20 |
| 1979 | 20.50 | 21.00 | 21.00 | 21.00 | 21.00 | 21.00 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 | 23.00 | 21.95 |
| 1980 | 23.00 | 23.20 | 24.75 | 25.00 | 26.75 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 30.00 | 27.70 |
| 1981 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 17.65 | 17.40 | 17.00 | 17.80 | 18.00 | 18.00 | 18.05 | 18.25 | 18.25 | 18.25 | 18.25 | 18.25 | 17.95 |
| 1992 | 18.25 | 18.25 | 18.25 | 18.25 | 18.25 | 18.25 | 18.25 | 18.05 | 17.50 | 17.50 | 17.30 | 17.00 | 17.95 |
| 1993 | 16.80 | 16.20 | 16.25 | 19.00 | 22.50 | 22.50 | 22.70 | 23.45 | 26.75 | 27.50 | 26.90 | 24.25 | 22.05 |

1/ Crop year August 1 to July 31.

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

Appendix table 40--Monthly average price for long-grain rice, second heads, bagged, f.o.b. mill, Southwest Louisiana, 1960-93 1/

| Crop year 2/ | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Season average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Dollars per cwt 3/ | | | | | | | |
| 1960 | 5.90 | 5.90 | 5.90 | 5.90 | 5.70 | 5.65 | 5.50 | 5.50 | 5.55 | 5.75 | 5.75 | 5.80 | 5.75 |
| 1961 | 5.75 | 5.80 | 5.90 | 6.10 | 6.15 | 6.30 | 6.30 | 6.30 | 6.30 | 6.35 | 6.35 | 6.15 | 6.15 |
| 1962 | 6.15 | 5.95 | 5.85 | 5.65 | 5.65 | 5.65 | 5.65 | 5.65 | 5.65 | 5.65 | 5.65 | 5.75 | 5.75 |
| 1963 | 5.80 | 6.00 | 6.00 | na | na | 6.00 | 6.00 | 6.15 | 6.15 | 6.00 | 6.00 | 6.00 | 6.00 |
| 1964 | 5.75 | 5.65 | 5.75 | 5.90 | 5.95 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.85 |
| 1965 | 5.70 | 5.70 | 5.75 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.85 |
| 1966 | 5.85 | 5.75 | 5.75 | 5.75 | 5.75 | 5.75 | 5.75 | 5.95 | 6.00 | 6.00 | 6.00 | 6.00 | 5.85 |
| 1967 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 |
| 1968 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 | 6.00 |
| 1969 | 6.00 | 5.95 | 5.75 | 5.75 | 5.80 | 5.80 | 5.80 | 5.80 | 5.80 | 5.80 | 5.80 | 5.80 | 5.80 |
| 1970 | 5.80 | 5.80 | 5.90 | 5.90 | 5.90 | 5.90 | 5.95 | 6.10 | 6.10 | 6.10 | 6.10 | 6.10 | 5.95 |
| 1971 | 6.10 | 6.10 | 6.10 | 6.10 | 6.05 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 5.90 | 6.00 |
| 1972 | 5.90 | 6.00 | 6.60 | 7.90 | 8.00 | 8.00 | 8.00 | 8.00 | 8.50 | 8.00 | 8.00 | 8.00 | 7.60 |
| 1973 | 9.00 | 10.00 | 12.05 | 14.60 | 15.50 | 15.50 | 15.50 | 16.00 | 16.00 | 16.00 | 15.00 | 13.50 | 14.05 |
| 1974 | 12.75 | 11.55 | 12.00 | 12.00 | 13.10 | 13.75 | 13.80 | 13.35 | 12.75 | 11.90 | 12.10 | 10.50 | 12.45 |
| 1975 | 9.25 | 9.75 | 9.75 | 9.00 | 8.10 | 6.90 | 6.95 | 6.75 | 7.75 | 8.00 | 8.25 | 8.45 | 8.25 |
| 1976 | 7.00 | 6.80 | 7.05 | 6.80 | 6.75 | 6.15 | 6.20 | 6.25 | 6.50 | 6.95 | 7.25 | 7.25 | 6.75 |
| 1977 | 6.85 | 6.95 | 7.15 | 7.95 | 8.50 | 8.50 | 9.00 | 9.50 | 9.50 | 9.25 | 9.25 | 9.25 | 8.45 |
| 1978 | 8.90 | 8.50 | 8.50 | 8.50 | 8.50 | 8.15 | 7.90 | 8.00 | 8.25 | 8.25 | 8.25 | 8.25 | 8.35 |
| 1979 | 8.25 | 8.45 | 9.00 | 9.50 | 9.50 | 10.10 | 11.00 | 11.90 | 12.50 | 12.50 | 12.50 | 12.25 | 10.60 |
| 1980 | 11.05 | 10.70 | 11.00 | 11.15 | 12.45 | 12.90 | 12.75 | 13.55 | 13.40 | 14.45 | 14.55 | 14.10 | 12.65 |
| 1981 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 9.95 | 9.65 | 9.00 | 8.10 | 8.00 | 8.00 | 8.50 | 8.50 | 8.50 | 8.50 | 8.50 | 8.40 | 8.63 |
| 1990 | 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 | 8.65 | 8.50 | 9.20 | 9.50 | 9.50 | 9.50 | 9.15 | 8.75 | 8.80 | 8.75 | 9.00 | 9.00 | 9.05 |
| 1992 | 9.00 | 9.00 | 8.90 | 8.90 | 8.75 | 8.40 | 7.80 | 7.75 | 7.65 | 7.50 | 7.35 | 7.35 | 8.20 |
| 1993 | 7.35 | 7.35 | 7.71 | 8.05 | 8.25 | 8.25 | 8.20 | 8.20 | 9.00 | 8.70 | 8.90 | 9.00 | 8.25 |

na = Not available.

2/ Crop year August 1 to July 31.

1/ U.S. No. 4 or better.

3/ Prices quoted as bulk.

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

Appendix table 41--Monthly average price for rice bran, f.o.b. mills, Southwest Louisiana, 1963-93

| Crop year | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Season average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Dollars per ton 2/ | | | | | | | |
| 1963 | 34.15 | 31.30 | 36.40 | 39.55 | 42.20 | 43.20 | 35.50 | 30.00 | 29.50 | 29.40 | 30.00 | 32.50 | 34.45 |
| 1964 | 31.80 | 30.00 | 31.75 | 34.40 | 41.45 | 42.40 | 40.65 | 37.20 | 34.15 | 33.50 | 35.30 | 35.00 | 35.65 |
| 1965 | 36.40 | 37.00 | 37.50 | 37.10 | 38.50 | 40.80 | 42.25 | 43.25 | 43.25 | 39.50 | 34.90 | 35.15 | 38.80 |
| 1966 | 38.00 | 38.30 | 39.10 | 43.25 | 47.75 | 47.70 | 46.25 | 42.25 | 35.50 | 34.40 | 40.25 | 40.20 | 41.10 |
| 1967 | 39.75 | 31.75 | 34.00 | 34.00 | 36.90 | 38.60 | 32.70 | 31.50 | 31.00 | 30.00 | 30.60 | 31.00 | 33.50 |
| 1968 | 32.00 | 25.10 | 25.00 | 25.50 | 33.40 | 35.50 | 35.50 | 35.50 | 33.90 | 24.50 | 21.20 | 21.50 | 29.05 |
| 1969 | 22.50 | 24.30 | 30.00 | 32.75 | 35.50 | 39.00 | 39.50 | 34.10 | 30.50 | 27.50 | 28.50 | 28.50 | 31.05 |
| 1970 | 28.75 | 33.40 | 35.00 | 40.50 | 46.50 | 48.00 | 45.40 | 47.40 | 50.00 | 50.00 | 45.30 | 43.00 | 42.75 |
| 1971 | 37.00 | 29.60 | 30.00 | 30.80 | 39.50 | 40.50 | 40.50 | 33.25 | 34.00 | 34.00 | 34.00 | 34.00 | 34.75 |
| 1972 | 32.40 | 31.40 | 36.60 | 42.10 | 51.00 | 63.40 | 60.00 | 51.00 | 39.25 | 53.25 | 58.00 | 58.00 | 48.05 |
| 1973 | 61.10 | 56.40 | 62.80 | 71.50 | 83.40 | 87.50 | 71.80 | 76.25 | 72.30 | 74.25 | 64.30 | 59.20 | 70.05 |
| 1974 | 83.75 | 78.50 | 78.75 | 80.00 | 83.10 | 85.00 | 76.90 | 57.50 | 57.50 | 56.75 | 59.50 | 63.50 | 71.70 |
| 1975 | 64.00 | 68.00 | 60.60 | 69.40 | 87.00 | 92.50 | 71.50 | 68.00 | 62.00 | 54.85 | 60.50 | 62.50 | 68.40 |
| 1976 | 68.50 | 71.00 | 68.00 | 73.10 | 73.30 | 71.20 | 74.75 | 66.10 | 54.00 | 51.75 | 45.50 | 44.50 | 63.45 |
| 1977 | 42.10 | 33.10 | 31.90 | 51.90 | 62.50 | 58.00 | 53.25 | 51.90 | 38.75 | 41.50 | 60.90 | 61.60 | 48.95 |
| 1978 | 47.60 | 34.40 | 38.50 | 64.50 | 72.85 | 67.50 | 65.60 | 52.80 | 38.90 | 41.60 | 52.50 | 62.50 | 53.25 |
| 1979 | 58.00 | 61.50 | 79.80 | 85.90 | 88.85 | 94.15 | 60.75 | 51.60 | 52.00 | 62.75 | 65.50 | 66.75 | 68.95 |
| 1980 | 76.90 | 84.70 | 86.40 | 95.50 | na | 101.90 | 73.60 | 59.10 | 57.50 | 60.00 | 71.60 | 69.15 | 76.05 |
| 1981 | 51.50 | 49.60 | 52.75 | 59.90 | 73.65 | 82.50 | 64.35 | 50.40 | 55.50 | 57.50 | 61.10 | na | 59.90 |
| 1982 | 52.80 | 53.00 | 54.00 | 77.65 | 85.00 | 77.50 | 52.15 | 47.25 | 59.65 | 70.30 | 61.25 | na | 62.80 |
| 1983 | 62.15 | 70.00 | 94.00 | 108.35 | 120.85 | 98.50 | 57.50 | 50.00 | 67.50 | 60.00 | na | 59.00 | 77.10 |
| 1984 | 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 | 43.35 | 40.00 | 20.00 | 42.50 | 62.50 | 86.00 | 65.00 | 51.65 | na | 25.75 | 20.00 | 18.35 | 43.20 |
| 1986 | 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 | 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 | 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 | 55.75 | 55.40 | 60.25 | 69.00 | 76.20 | 84.40 | 51.00 | 49.65 | 51.50 | 71.50 | 75.35 | 75.90 | 64.66 |
| 1990 | 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 | 42.85 | 36.80 | 43.00 | 54.50 | 72.00 | 75.00 | 56.50 | 44.65 | 41.40 | 40.90 | 42.25 | 45.40 | 49.60 |
| 1992 | 43.75 | 38.40 | 41.15 | 58.60 | 72.65 | 79.25 | 59.50 | 51.50 | 49.40 | 31.50 | 40.00 | 43.90 | 50.80 |
| 1993 | 37.10 | 41.65 | 49.25 | 62.50 | 76.00 | 86.40 | 93.25 | 82.50 | 56.40 | 59.60 | 58.50 | 47.50 | 62.55 |

na = Not available.

1/ Crop year August 1 to July 31.

2/ Prices quoted as bulk.

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

Appendix table 42--Monthly average price of rice millfeed, f.o.b. mills, bagged, 1963-93

| Crop year | Aug. | Sept. | Oct. | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | June | July | Season average |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Dollars per ton 2/ | | | | | | | |
| 1963 | 16.65 | 17.00 | 17.10 | 18.20 | 20.75 | 21.65 | 18.15 | 17.90 | 15.40 | 14.25 | 14.00 | 15.00 | 17.15 |
| 1964 | 15.25 | 15.50 | 15.50 | 15.50 | 16.25 | 17.50 | 18.25 | 16.90 | 16.15 | 15.00 | 15.00 | 15.00 | 16.00 |
| 1965 | 15.00 | 15.25 | 15.50 | 15.50 | 16.90 | 17.30 | 17.50 | 17.50 | 17.50 | 17.25 | 17.00 | 17.00 | 16.60 |
| 1966 | 17.40 | 18.00 | 18.10 | 19.50 | 22.15 | 23.60 | 23.65 | 19.90 | 16.90 | 17.20 | 17.00 | 17.00 | 19.20 |
| 1967 | 17.75 | 17.50 | 18.80 | 18.50 | 19.00 | 19.20 | 18.90 | 18.50 | 17.40 | 14.75 | 16.00 | 16.60 | 17.75 |
| 1968 | 17.00 | 16.30 | 15.50 | 15.75 | 17.50 | 18.00 | 19.50 | 21.00 | 19.90 | 15.50 | 15.50 | 15.50 | 17.25 |
| 1969 | 15.50 | 15.50 | 18.00 | 19.75 | 21.50 | 28.00 | 28.00 | 22.70 | 18.50 | 16.00 | 16.40 | 18.25 | 19.85 |
| 1970 | 18.90 | 21.50 | 21.50 | 23.30 | 27.35 | 28.00 | 26.90 | 30.10 | 35.00 | 35.00 | 38.70 | 25.00 | 26.75 |
| 1971 | 15.10 | 11.00 | 8.50 | 11.40 | 19.00 | 21.00 | 14.10 | 11.00 | 11.00 | 11.00 | 11.00 | 11.00 | 12.95 |
| 1972 | 11.00 | 11.00 | 13.60 | 18.90 | 26.00 | 35.40 | 31.25 | 21.00 | 19.00 | 24.75 | 26.25 | 25.00 | 21.95 |
| 1973 | 24.00 | 18.00 | 20.70 | 33.25 | 44.15 | 37.90 | 20.25 | 25.25 | 22.40 | 23.00 | 23.10 | 22.90 | 26.25 |
| 1974 | 38.50 | 35.10 | 26.60 | 28.25 | 30.50 | 31.15 | 22.25 | 14.50 | 14.10 | 14.75 | 16.60 | 23.00 | 24.60 |
| 1975 | 24.65 | 32.20 | 30.50 | 28.25 | 40.25 | 48.10 | 41.25 | 28.10 | 17.50 | 17.85 | 23.70 | 33.35 | 30.45 |
| 1976 | 23.90 | 22.10 | 22.50 | 30.90 | 38.35 | 25.25 | 25.25 | 19.10 | 14.50 | 11.25 | 11.00 | 9.50 | 21.15 |
| 1977 | 9.85 | 8.90 | 7.00 | 15.50 | 18.50 | 15.75 | 12.40 | 12.40 | 9.90 | 11.70 | 15.50 | 15.50 | 12.75 |
| 1978 | 13.25 | 6.40 | 8.10 | 19.50 | 24.15 | 24.10 | 23.00 | 18.15 | 8.50 | na | na | 17.15 | 16.25 |
| 1979 | 20.35 | 19.25 | 25.90 | 30.25 | 40.65 | 45.65 | 18.15 | 13.50 | 11.00 | 11.25 | 11.10 | 15.25 | 21.85 |
| 1980 | 29.50 | 37.40 | 35.00 | 36.90 | 48.40 | 54.00 | 15.00 | 11.00 | 14.95 | 17.00 | 27.00 | 31.40 | 29.80 |
| 1981 | 22.60 | 10.90 | 17.75 | 22.00 | 30.65 | 29.75 | 16.50 | 13.15 | 13.40 | 15.40 | 19.40 | na | 19.25 |
| 1982 | 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 | 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 | 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 | 13.00 | 13.00 | 8.00 | 15.40 | 19.50 | 34.10 | na | 19.50 | 20.85 | 8.50 | 5.00 | 4.50 | 14.65 |
| 1986 | 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 | 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 | 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 | 17.15 | 16.75 | 14.00 | 22.65 | 23.70 | 27.70 | 14.20 | 14.65 | 16.50 | 22.40 | 25.00 | 25.00 | 19.97 |
| 1990 | 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 | 12.15 | 11.20 | 13.40 | 19.90 | 39.50 | 37.15 | 17.50 | 14.65 | 14.75 | 14.15 | 15.00 | 16.15 | 18.80 |
| 1992 | 14.75 | 13.50 | 14.50 | 17.50 | 27.40 | 37.15 | 25.40 | 18.70 | 17.00 | 8.90 | 8.80 | 8.75 | 17.70 |
| 1993 | 10.50 | 11.85 | 12.65 | 19.70 | 26.65 | 42.50 | 50.65 | 42.50 | 27.15 | 26.20 | 26.00 | 24.00 | 26.70 |

na = Not available.

1/ Crop year August 1 to July 31.

2/ Prices quoted as bulk.

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

Appendix table 43--Rough and milled rice (rough equivalent): Marketing year supply and disappearance, 1962-94

| Crop Year 1/ | Supply | | | | Domestic use | | | | Disappearance | | | CCC inventory 2/ | Ending stocks—July 31 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Beginning stocks | Production | Imports | Total | Food | Seed | Brewers | Total | Exports | Residual | Total disappearance | | Free | Total |
| | Million cwt | | | | | | | | | | | | | |
| 1962 | 5.4 | 66.0 | 0.0 | 71.4 | 21.5 | 2.4 | 4.1 | 28.0 | 35.5 | 0.2 | 63.7 | 1.8 | 5.9 | 7.7 |
| 1963 | 7.7 | 70.3 | 0.0 | 78.0 | 22.5 | 2.4 | 3.8 | 28.7 | 41.8 | 0.0 | 70.5 | 1.4 | 6.1 | 7.5 |
| 1964 | 7.5 | 73.2 | 0.5 | 81.2 | 24.2 | 2.5 | 4.3 | 31.0 | 42.5 | 0.0 | 73.5 | 1.1 | 6.6 | 7.7 |
| 1965 | 7.7 | 76.3 | 0.6 | 84.6 | 23.5 | 2.7 | 4.7 | 30.9 | 43.3 | 2.2 | 76.4 | 0.6 | 7.6 | 8.2 |
| 1966 | 8.2 | 85.0 | 0.1 | 93.3 | 23.9 | 2.7 | 5.3 | 32.0 | 51.6 | 1.2 | 84.8 | 0.2 | 8.3 | 8.5 |
| 1967 | 8.5 | 89.4 | 0.0 | 97.9 | 25.0 | 3.2 | 5.4 | 33.6 | 56.9 | 0.6 | 91.1 | 0.1 | 6.7 | 6.8 |
| 1968 | 6.8 | 104.1 | 0.0 | 110.9 | 27.0 | 2.9 | 5.8 | 35.7 | 56.1 | 2.9 | 94.7 | 5.5 | 10.7 | 16.2 |
| 1969 | 16.2 | 90.8 | 1.3 | 108.3 | 23.5 | 2.5 | 7.1 | 33.1 | 56.9 | 1.9 | 91.9 | 6.4 | 10.0 | 16.4 |
| 1970 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 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 | 31.4 | 159.9 | 3.8 | 195.1 | 57.4 | 3.4 | 15.6 | 76.4 | 85.9 | 6.0 | 168.3 | 0.0 | 26.7 | 26.7 |
| 1989 | 26.7 | 154.5 | 4.4 | 185.6 | 60.0 | 3.6 | 15.4 | 79.0 | 77.2 | 3.0 | 159.2 | 0.0 | 26.4 | 26.4 |
| 1990 | 26.4 | 156.1 | 4.8 | 187.2 | 63.8 | 3.6 | 15.3 | 82.7 | 70.9 | 9.0 | 162.7 | 0.1 | 24.5 | 24.6 |
| 1991 | 24.6 | 157.5 | 5.3 | 187.3 | 65.2 | 3.9 | 15.4 | 84.5 | 66.4 | 9.0 | 159.9 | 0.4 | 27.0 | 27.4 |
| 1992 | 27.4 | 179.7 | 6.1 | 213.2 | 69.0 | 3.6 | 15.1 | 87.7 | 77.0 | 9.0 | 173.7 | 0.1 | 39.3 | 39.4 |
| 1993 3/ | 39.4 | 156.1 | 7.0 | 202.6 | 71.3 | 4.2 | 15.0 | 90.5 | 80.0 | 6.0 | 176.5 | 0.1 | 25.9 | 26.0 |
| 1994 4/ | 26.0 | 190.3 | 8.0 | 224.3 | 74.0 | 4.0 | 15.0 | 93.0 | 83.0 | 9.0 | 185.0 | 0.1 | 39.2 | 39.3 |

1/ Crop year August 1 to July 31.

2/ Commodity Credit Corporation. 3/ Preliminary. 4/ Projected.

Appendix table 44--Prices and ending stocks for rice, 1960-93

| Crop year 1/ | Ending stocks CCC 2/ | Ending stocks Free | Ending stocks Total | Farm price | Loan rate | Target price | Direct payment |
|---|---|---|---|---|---|---|---|
| | Million cwt | | | Dollars per cwt | | | |
| 1960 | 4.1 | 5.9 | 10.0 | 4.55 | 4.42 | --- | --- |
| 1961 | 0.3 | 5.0 | 5.3 | 5.14 | 4.71 | --- | --- |
| 1962 | 1.8 | 5.9 | 7.7 | 5.04 | 4.71 | --- | --- |
| 1963 | 1.4 | 6.1 | 7.5 | 5.01 | 4.71 | --- | --- |
| 1964 | 1.1 | 6.6 | 7.7 | 4.90 | 4.71 | --- | --- |
| 1965 | 0.6 | 7.6 | 8.2 | 4.93 | 4.50 | --- | --- |
| 1966 | 0.2 | 8.3 | 8.5 | 4.77 | 4.50 | --- | --- |
| 1967 | 0.1 | 6.7 | 6.8 | 4.97 | 4.55 | --- | --- |
| 1968 | 5.5 | 10.7 | 16.2 | 5.00 | 4.60 | --- | --- |
| 1969 | 6.4 | 10.0 | 16.4 | 4.95 | 4.72 | --- | --- |
| 1970 | 9.5 | 9.1 | 18.6 | 5.17 | 4.86 | --- | --- |
| 1971 | 2.7 | 8.7 | 11.4 | 5.34 | 5.07 | --- | --- |
| 1972 | 0.1 | 5.0 | 5.1 | 6.73 | 5.27 | --- | --- |
| 1973 | 0.0 | 7.8 | 7.8 | 13.80 | 6.07 | --- | --- |
| 1974 | 0.0 | 7.1 | 7.1 | 11.20 | 7.54 | --- | --- |
| 1975 | 18.7 | 18.2 | 36.9 | 8.35 | 8.52 | --- | --- |
| 1976 | 18.6 | 21.9 | 40.5 | 7.02 | 6.19 | 8.25 | 0.00 |
| 1977 | 10.8 | 16.6 | 27.4 | 9.49 | 6.19 | 8.25 | 0.00 |
| 1978 | 8.3 | 23.2 | 31.6 | 8.16 | 6.40 | 8.53 | 0.78 |
| 1979 | 1.7 | 24.0 | 25.7 | 10.50 | 6.79 | 9.05 | 0.00 |
| 1980 | 0.0 | 16.5 | 16.5 | 12.80 | 7.12 | 9.49 | 0.00 |
| 1981 | 17.5 | 31.5 | 49.0 | 9.05 | 8.01 | 10.68 | 0.28 |
| 1982 | 22.3 | 49.2 | 71.5 | 7.91 | 8.14 | 10.85 | 2.71 |
| 1983 | 25.0 | 21.9 | 46.9 | 8.57 | 8.14 | 11.40 | 2.77 |
| 1984 | 44.3 | 20.4 | 64.7 | 8.04 | 8.00 | 11.90 | 3.76 |
| 1985 | 43.6 | 33.7 | 77.3 | 6.53 | 8.00 | 11.90 | 3.90 |
| 1986 | 8.7 | 42.7 | 51.4 | 3.75 | 7.20 | 11.90 | 4.70 |
| 1987 | 0.0 | 31.4 | 31.4 | 7.27 | 6.84 | 11.66 | 4.82 |
| 1988 | 0.0 | 26.7 | 26.7 | 6.83 | 6.63 | 11.15 | 4.31 |
| 1989 | 0.0 | 26.4 | 26.4 | 7.35 | 6.50 | 10.80 | 3.56 |
| 1990 | 0.1 | 24.5 | 24.6 | 6.68 | 6.50 | 10.71 | 4.16 |
| 1991 | 0.4 | 27.0 | 27.4 | 7.58 | 6.50 | 10.71 | 3.07 |
| 1992 | 0.1 | 39.3 | 39.4 | 5.89 | 6.50 | 10.71 | 4.21 |
| 1993 3/ | 0.1 | 22.8 | 22.9 | 8.25-8.45 | 6.50 | 10.71 | 3.98 |

--- = Not applicable.

1/ August 1 to July 31. 2/ Commodity Credit Corporation. 3/ Preliminary.

Appendix table 45--Quantity and proportion of U.S. rough rice sold domestically and for export, 1960-93

| Crop year 1/ | Domestic 2/ | Export | Total | Share of total: Domestic | Share of total: Export |
|---|---|---|---|---|---|
| | Million cwt | | | Percent | |
| 1960 | 26.9 | 29.5 | 56.4 | 48 | 52 |
| 1961 | 29.6 | 29.2 | 58.8 | 50 | 50 |
| 1962 | 28.0 | 35.5 | 63.5 | 44 | 56 |
| 1963 | 28.7 | 41.8 | 70.5 | 41 | 59 |
| 1964 | 31.0 | 42.5 | 73.5 | 42 | 58 |
| 1965 | 30.9 | 43.3 | 74.2 | 42 | 58 |
| 1966 | 32.0 | 51.6 | 83.6 | 38 | 62 |
| 1967 | 33.6 | 56.9 | 90.5 | 37 | 63 |
| 1968 | 35.7 | 56.1 | 91.8 | 39 | 61 |
| 1969 | 33.1 | 56.9 | 90.0 | 37 | 63 |
| 1970 | 34.4 | 46.5 | 80.9 | 43 | 57 |
| 1971 | 35.4 | 56.9 | 92.3 | 38 | 62 |
| 1972 | 35.8 | 54.0 | 89.8 | 40 | 60 |
| 1973 | 37.8 | 49.7 | 87.5 | 43 | 57 |
| 1974 | 41.0 | 69.5 | 110.5 | 37 | 63 |
| 1975 | 40.3 | 56.5 | 96.8 | 42 | 58 |
| 1976 | 42.7 | 65.6 | 108.3 | 39 | 61 |
| 1977 | 37.7 | 72.8 | 110.5 | 34 | 66 |
| 1978 | 49.2 | 75.7 | 124.9 | 39 | 61 |
| 1979 | 49.2 | 82.6 | 131.8 | 37 | 63 |
| 1980 | 54.5 | 91.4 | 145.9 | 37 | 63 |
| 1981 | 59.6 | 82.0 | 141.6 | 42 | 58 |
| 1982 | 54.0 | 68.9 | 122.9 | 44 | 56 |
| 1983 | 49.3 | 70.3 | 119.6 | 41 | 59 |
| 1984 | 52.5 | 62.1 | 114.6 | 46 | 54 |
| 1985 | 62.3 | 58.7 | 121.0 | 51 | 49 |
| 1986 | 70.7 | 84.2 | 154.9 | 46 | 54 |
| 1987 | 73.9 | 72.2 | 146.1 | 51 | 49 |
| 1988 | 76.4 | 85.9 | 162.3 | 47 | 53 |
| 1989 | 79.0 | 77.2 | 156.2 | 51 | 49 |
| 1990 | 82.7 | 70.9 | 153.6 | 54 | 46 |
| 1991 | 84.5 | 66.4 | 150.9 | 56 | 44 |
| 1992 | 87.7 | 77.0 | 164.7 | 53 | 47 |
| 1993 | 89.7 | 81.0 | 170.7 | 53 | 47 |

1/ Crop year August 1 to July 31.

2/ Includes use for seed and shipments to Territories.

Source: Rice S & O, Econ. Res. Serv., USDA.

Appendix table 46—U.S. exports of total rice, 1976–92

| Country/crop year 1/ | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Milled tons | | | | | | | | | |
| Canada | 78,607 | 77,643 | 79,350 | 82,384 | 98,233 | 106,242 | 106,413 | 99,597 | 103,706 | 88,565 | 67,562 | 87,058 | 93,534 | 112,717 | 131,549 | 137,789 | 144,742 |
| St.Pierre-Miquelon | 0 | 0 | 0 | 204 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 |
| Mexico | 1,050 | 873 | 8,592 | 27,008 | 43,316 | 1,806 | 255 | 87 | 326 | 1,156 | 658 | 1,622 | 58,567 | 223,410 | 96,749 | 142,109 | 241,648 |
| North America | 79,657 | 78,516 | 87,942 | 109,596 | 141,549 | 108,048 | 106,668 | 99,684 | 104,032 | 89,721 | 68,220 | 88,683 | 152,101 | 336,127 | 228,298 | 279,898 | 386,390 |
| Belize | 644 | 945 | 777 | 11 | 0 | 0 | 9 | 29 | 181 | 0 | 665 | 678 | 819 | 1,334 | 3,179 | 1,662 | 2,932 |
| Costa Rica | 23 | 102 | 181 | 62 | 79 | 46 | 23,818 | 11,333 | 421 | 4,634 | 0 | 10,562 | 51,704 | 0 | 31 | 49,692 | 18,351 |
| El Salvador | 1 | 627 | 965 | 1,950 | 5,772 | 2,601 | 4,418 | 8,565 | 5,057 | 6,150 | 10,016 | 14,514 | 7,449 | 8,969 | 20,199 | 13,307 | 8,877 |
| Guatemala | 65 | 214 | 2,118 | 2,080 | 4,000 | 1,631 | 131 | 214 | 40 | 1,023 | 1,851 | 891 | 6,352 | 2,401 | 23,430 | 12,287 | 24,879 |
| Honduras | 390 | 1,646 | 4,902 | 6,313 | 979 | 858 | 5,453 | 2,148 | 1,214 | 2,644 | 3,367 | 4,045 | 1,959 | 2,704 | 10,920 | 34,157 | 3,897 |
| Nicaragua | 147 | 46 | 551 | 16,889 | 259 | 246 | 0 | 0 | 85 | 0 | 0 | 0 | 18 | 65 | 15,905 | 10,156 | 28,986 |
| Panama | 20 | 14 | 30 | 13 | 205 | 182 | 303 | 29 | 88 | 243 | 171 | 188 | 1,417 | 666 | 207 | 205 | 243 |
| Central America | 1,290 | 3,594 | 9,524 | 27,318 | 11,294 | 5,564 | 34,132 | 22,318 | 7,086 | 14,694 | 16,070 | 30,878 | 69,718 | 16,139 | 73,871 | 121,466 | 88,165 |
| Bahamas | 5,346 | 5,421 | 5,154 | 5,606 | 5,634 | 5,922 | 5,521 | 5,144 | 5,898 | 6,294 | 5,112 | 4,939 | 6,033 | 6,486 | 7,298 | 6,390 | 6,040 |
| Barbados | 605 | 1,227 | 1,042 | 2,743 | 3,134 | 3,178 | 4,310 | 4,370 | 3,417 | 2,936 | 1,645 | 1,878 | 4,973 | 4,790 | 7,077 | 8,345 | 4,798 |
| Bermuda | 291 | 356 | 278 | 276 | 270 | 354 | 278 | 350 | 390 | 235 | 336 | 325 | 442 | 425 | 354 | 298 | 324 |
| Cayman Islands | 109 | 143 | 172 | 248 | 284 | 188 | 353 | 427 | 465 | 398 | 161 | 290 | 395 | 269 | 154 | 137 | 192 |
| Dominican Republic | 14,928 | 11,371 | 8 | 41,983 | 44,551 | 24,422 | 3,047 | 11 | 14 | 52,128 | 56,905 | 6,753 | 20,738 | 46,971 | 35,873 | 2,062 | 351 |
| French W. Indies | 516 | 814 | 443 | 790 | 658 | 875 | 793 | 402 | 195 | 243 | 1,240 | 80 | 219 | 161 | 331 | 341 | 234 |
| Haiti | 38,470 | 4,218 | 14,546 | 22,375 | 7,672 | 8,471 | 1,237 | 5,331 | 3,822 | 11,604 | 81,245 | 62,347 | 81,553 | 82,884 | 108,930 | 126,424 | 150,522 |
| Jamaica | 5,052 | 8,167 | 5,450 | 3,423 | 1,942 | 30,710 | 41,848 | 49,906 | 55,088 | 41,034 | 60,846 | 57,114 | 75,637 | 67,620 | 78,606 | 55,579 | 32,341 |
| Leeward & Windward Islands | 719 | 1,350 | 841 | 1,595 | 1,250 | 1,933 | 2,445 | 4,312 | 3,197 | 2,155 | 3,543 | 7,036 | 5,836 | 8,659 | 9,904 | 8,620 | 11,326 |
| Netherlands Antilles | 4,757 | 4,441 | 4,184 | 4,017 | 5,956 | 6,249 | 6,279 | 7,363 | 8,837 | 11,675 | 11,439 | 11,979 | 10,487 | 11,377 | 11,643 | 8,232 | 12,015 |
| Trinidad & Tobago | 90 | 91 | 102 | 93 | 8,386 | 6,811 | 10,494 | 13,109 | 18,000 | 25,810 | 26,648 | 34,986 | 39,823 | 31,133 | 33,689 | 26,378 | 33,986 |
| Turks-Caicos Islands | 191 | 122 | 141 | 161 | 156 | 227 | 122 | 172 | 240 | 216 | 262 | 145 | 199 | 226 | 242 | 202 | 169 |
| Caribbean | 71,074 | 37,721 | 32,361 | 83,310 | 79,893 | 89,340 | 76,727 | 90,897 | 99,563 | 154,728 | 249,382 | 187,872 | 246,335 | 261,001 | 294,101 | 243,008 | 252,298 |
| Argentina | 50 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 1,500 | 0 | 0 | 17 | 8 | 4 | 72 | 888 |
| Bolivia | 23 | 0 | 0 | 47 | 50 | 0 | 250 | 54,604 | 2,250 | 166 | 0 | 0 | 0 | 270 | 0 | 0 | 248 |
| Brazil | 0 | 653 | 369 | 30,046 | 4,910 | 203 | 0 | 557 | 301 | 119,180 | 471,142 | 0 | 2,967 | 1,996 | 277,002 | 196,293 | 1,059 |
| Chile | 1,692 | 2,525 | 17,220 | 3,300 | 8,156 | 7,285 | 217 | 3,779 | 0 | 0 | 10,704 | 18,983 | 1,020 | 1,002 | 5,964 | 991 | 2,565 |
| Colombia | 0 | 3,938 | 0 | 74 | 122 | 346 | 857 | 538 | 94 | 19 | 149 | 126 | 735 | 57 | 0 | 8,006 | 63 |
| Ecuador | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 5,000 | 2,597 | 303 | 257 | 398 | 66,153 | 0 | 7 | 40 | 0 |
| French Guiana | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 44 | 0 | 0 | 0 | 0 |
| Guyana | 1,690 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 41 | 0 | 0 | 0 | 0 | 0 | 0 |
| Paraguay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 16 | 17 |
| Peru | 13 | 115 | 91,533 | 56,468 | 132,371 | 2,662 | 87,196 | 101,413 | 32,734 | 2,066 | 65,429 | 2,167 | 31,388 | 166,762 | 59,790 | 42,993 | 55,368 |
| Uruguay | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,500 | 15,397 | 39 |
| Venezuela | 3 | 10 | 4 | 141 | 14 | 13 | 5 | 3 | 4 | 3 | 11 | 3,015 | 67,312 | 0 | 66 | 571 | 152 |
| South America | 3,487 | 7,241 | 109,135 | 90,076 | 145,623 | 10,512 | 88,525 | 165,894 | 37,980 | 123,237 | 547,733 | 24,709 | 169,636 | 170,095 | 348,333 | 264,379 | 60,399 |

Refer to footnotes at end of table.

—Continued

Appendix table 46—U.S. exports of total rice, 1976–92—continued

| Country/crop year 1/ | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Milled tons | | | | | | | | | |
| Austria | 1,944 | 1,859 | 2,344 | 2,718 | 1,973 | 916 | 2,047 | 2,303 | 1,958 | 2,631 | 1,013 | 1,113 | 1,740 | 2,814 | 6,071 | 2,914 | 9,109 |
| Finland | 680 | 979 | 1,416 | 1,186 | 941 | 7,899 | 1,834 | 1,262 | 1,042 | 1,611 | 1,723 | 1,958 | 2,027 | 2,421 | 2,779 | 5,691 | 9,083 |
| Gibraltar | 19 | 15 | 13 | 35 | 34 | 51 | 68 | 67 | 51 | 32 | 52 | 68 | 117 | 67 | 169 | 28 | 61 |
| Iceland | 292 | 282 | 281 | 330 | 416 | 496 | 280 | 396 | 207 | 372 | 351 | 411 | 536 | 457 | 397 | 438 | 347 |
| Malta, Gozo | 264 | 218 | 228 | 16 | 3 | 43 | 84 | 11 | 0 | 74 | 68 | 306 | 484 | 416 | 527 | 548 | 407 |
| Norway | 759 | 1,251 | 1,184 | 1,039 | 1,300 | 1,876 | 2,101 | 1,863 | 2,293 | 2,192 | 3,718 | 2,965 | 3,609 | 6,255 | 5,976 | 4,515 | 5,211 |
| Sweden | 9,555 | 8,562 | 9,898 | 9,394 | 10,817 | 13,383 | 14,760 | 15,494 | 13,872 | 12,038 | 16,215 | 16,880 | 15,609 | 14,850 | 14,997 | 14,147 | 16,805 |
| Switzerland | 51,224 | 31,660 | 54,445 | 68,580 | 72,439 | 96,597 | 58,347 | 66,847 | 57,307 | 42,360 | 71,077 | 76,468 | 99,270 | 99,796 | 106,875 | 94,769 | 64,174 |
| Other Western Europe | 64,737 | 44,826 | 69,809 | 83,298 | 87,923 | 121,261 | 79,521 | 88,243 | 76,730 | 61,310 | 94,217 | 100,169 | 123,392 | 127,076 | 137,791 | 123,050 | 105,197 |
| Belgium and Luxembourg | 27,175 | 20,340 | 45,600 | 93,319 | 112,990 | 120,021 | 125,018 | 146,581 | 135,425 | 96,206 | 117,261 | 113,259 | 133,187 | 104,713 | 72,282 | 58,866 | 47,769 |
| Denmark | 278 | 622 | 2,027 | 1,231 | 1,588 | 1,721 | 41 | 118 | 50 | 135 | 107 | 253 | 368 | 161 | 298 | 163 | 86 |
| France | 9,001 | 6,554 | 10,419 | 18,328 | 10,190 | 18,087 | 14,074 | 13,907 | 8,784 | 4,206 | 8,855 | 1,509 | 11,359 | 13,416 | 16,861 | 4,533 | 7,897 |
| Germany | 67,037 | 65,366 | 30,590 | 24,634 | 24,389 | 32,945 | 14,112 | 17,436 | 17,288 | 12,970 | 36,639 | 22,319 | 42,148 | 49,198 | 56,210 | 47,261 | 60,015 |
| Greece | 112 | 18 | 36 | 19 | 46 | 5,414 | 18 | 0 | 0 | 102 | 102 | 94 | 109 | 94 | 19 | 111 | 51 |
| Ireland | 0 | 13 | 84 | 36 | 11 | 36 | 38 | 67 | 87 | 66 | 11 | 656 | 595 | 1,231 | 1,616 | 2,596 | 4,606 |
| Italy | 46,959 | 216,585 | 173,172 | 58,946 | 15,973 | 272,389 | 14,549 | 70,762 | 106,101 | 38 | 27,857 | 21,174 | 9,684 | 1,447 | 243 | 51 | 12,997 |
| Netherlands | 54,713 | 27,105 | 28,784 | 45,209 | 34,480 | 50,319 | 34,043 | 41,691 | 32,262 | 19,480 | 94,093 | 57,252 | 74,350 | 55,296 | 104,637 | 66,464 | 110,233 |
| Portugal | 75,876 | 13,426 | 64,280 | 34,508 | 81 | 7,032 | 6,700 | 34,913 | 52,285 | 5,958 | 6,927 | 73 | 6,816 | 13,611 | 773 | 182 | 80 |
| Spain, including Canary Islands | 12 | 0 | 5,254 | 32 | 29 | 4,694 | 5,085 | 95,020 | 19,072 | 11,670 | 62,642 | 50,964 | 167,541 | 83,549 | 37,874 | 11,052 | 37,224 |
| United Kingdon | 34,472 | 13,336 | 52,959 | 32,040 | 19,650 | 31,482 | 26,760 | 4,482 | 10,225 | 17,098 | 31,554 | 17,420 | 28,513 | 35,297 | 39,234 | 57,870 | 65,792 |
| European Union | 315,635 | 363,365 | 413,205 | 308,302 | 219,427 | 544,140 | 240,438 | 424,977 | 381,579 | 167,929 | 386,048 | 284,973 | 474,670 | 358,013 | 330,047 | 249,149 | 346,750 |
| Albania | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 272 | 0 |
| Bulgaria | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 0 |
| Czech Republic | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 148 | 0 | 0 | 0 | 4,245 | 17,041 | 31,549 |
| Hungary | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,991 | 2,000 | 454 | 5,923 | 0 |
| Poland | 2,849 | 0 | 34,910 | 0 | 32,119 | 3,073 | 11,060 | 11,530 | 3,320 | 2,591 | 2,767 | 0 | 8,419 | 4,000 | 18,674 | 11,121 | 10,422 |
| Romania | 0 | 0 | 0 | 0 | 5 | 2 | 991 | 3 | 2 | 0 | 7 | 3 | 3 | 0 | 0 | 6 | 5,130 |
| USSR | 54,923 | 42,787 | 11,313 | 17,844 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 54,504 | 75,601 |
| Yugoslavia | 0 | 17 | 0 | 0 | 0 | 209 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 83 | 526 | 1,520 |
| USSR and Eastern Europe | 57,772 | 42,804 | 46,223 | 17,846 | 32,124 | 3,284 | 12,051 | 11,533 | 3,322 | 2,591 | 2,922 | 3 | 10,413 | 6,000 | 23,456 | 89,413 | 124,222 |
| Bahrain | 126 | 92 | 1,166 | 278 | 236 | 185 | 452 | 408 | 374 | 190 | 191 | 116 | 164 | 245 | 207 | 392 | 510 |
| Cyprus | 120 | 60 | 411 | 954 | 137 | 154 | 123 | 231 | 171 | 216 | 205 | 242 | 346 | 293 | 8,954 | 316 | 476 |
| Iran | 457,244 | 343,723 | 348,132 | 31,105 | 0 | 147,168 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 819 | 147,002 |
| Iraq | 36,959 | 89,894 | 148,152 | 310,492 | 71,369 | 221,123 | 280,750 | 274,783 | 382,146 | 455,774 | 527,418 | 433,175 | 525,371 | 318,753 | 0 | 0 | 0 |
| Israel | 2,432 | 3,701 | 10,434 | 3,794 | 4,478 | 17,064 | 243 | 123 | 511 | 852 | 18,716 | 10,757 | 4,589 | 7,202 | 12,065 | 5,425 | 25,568 |
| Jordan | 198 | 831 | 2,396 | 840 | 44,035 | 42,987 | 11,987 | 10,098 | 1,493 | 37,910 | 18,408 | 40,315 | 87,185 | 67,109 | 50,635 | 42,071 | 32,979 |
| Kuwait | 1,737 | 2,259 | 9,321 | 14,957 | 1,890 | 4,168 | 18,262 | 15,315 | 6,420 | 6,548 | 5,256 | 5,979 | 4,249 | 2,412 | 139 | 1,665 | 2,127 |
| Lebanon | 87 | 5,608 | 407 | 460 | 673 | 1,759 | 867 | 791 | 870 | 331 | 6,535 | 6,394 | 8,078 | 12,779 | 10,679 | 11,001 | 6,941 |

Refer to footnotes at end of table.

—Continued

Appendix table 46—U.S. exports of total rice, 1976–92—continued

| Country/crop year 1/ | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Milled tons | | | | | | | | | |
| Oman | 94 | 132 | 772 | 71 | 123 | 104 | 158 | 193 | 146 | 395 | 353 | 444 | 448 | 135 | 0 | 16 | 0 |
| Qatar | 154 | 112 | 6,047 | 6,345 | 156 | 457 | 5,320 | 8,868 | 165 | 303 | 2,526 | 111 | 4,165 | 112 | 64 | 40 | 83 |
| Republic of Yemen | 15,085 | 3,563 | 10,985 | 19,086 | 20,287 | 25,294 | 34,789 | 47,158 | 26,387 | 0 | 44,451 | 10,206 | 45,380 | 13,353 | 29,235 | 13,468 | 0 |
| Saudi Arabia | 71,682 | 169,753 | 234,724 | 169,589 | 257,096 | 277,754 | 279,076 | 285,944 | 240,880 | 174,276 | 214,864 | 220,017 | 182,520 | 159,612 | 200,229 | 169,691 | 232,613 |
| Syria | 37,356 | 18,022 | 42,160 | 14,568 | 0 | 0 | 0 | 0 | 0 | 0 | 26,117 | 13,650 | 0 | 0 | 0 | 16 | 32 |
| Turkey | 0 | 0 | 0 | 6 | 35 | 9,457 | 22,528 | 9,553 | 11,970 | 33,457 | 70,831 | 77,310 | 117,955 | 142,411 | 137,822 | 142,461 | 191,414 |
| United Arab Emirates | 1,582 | 4,068 | 62,382 | 117,375 | 65,507 | 10,467 | 6,411 | 5,223 | 5,902 | 4,525 | 10,993 | 6,686 | 21,154 | 3,843 | 3,229 | 4,764 | 5,505 |
| Middle East | 624,856 | 641,818 | 877,489 | 689,920 | 466,022 | 758,141 | 660,966 | 658,688 | 677,435 | 714,777 | 946,864 | 825,402 | 1,001,604 | 728,259 | 453,258 | 392,145 | 645,250 |
| Bangladesh | 23,417 | 82,608 | 3,000 | 0 | 0 | 22,634 | 67,310 | 55,663 | 80,311 | 0 | 89,743 | 85,344 | 0 | 28,252 | 752 | 0 | 0 |
| India | 9,827 | 7,835 | 5 | 58 | 61 | 124 | 78 | 8,867 | 8,872 | 7,041 | 0 | 20 | 8,913 | 12,457 | 14,366 | 2 | 5,478 |
| Pakistan | 1 | 1 | 0 | 2 | 2 | 4 | 3 | 4 | 3 | 0 | 0 | 0 | 9 | 0 | 0 | 7 | 30 |
| Sri Lanka | 20,766 | 0 | 0 | 0 | 1 | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 19 |
| South Asia | 54,011 | 90,444 | 3,005 | 60 | 64 | 22,762 | 67,392 | 64,536 | 89,186 | 7,043 | 89,743 | 85,364 | 8,922 | 40,709 | 15,118 | 9 | 5,527 |
| Burma | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 65 | 0 | 0 | 0 | 0 | 0 | 0 |
| Cambodia | 0 | 0 | 0 | 27,539 | 31,364 | 15,132 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Indonesia | 411,697 | 476,511 | 260,422 | 225,341 | 138,846 | 15,764 | 63,440 | 81,583 | 3,036 | 1,951 | 429 | 3,583 | 61,155 | 10,694 | 11,406 | 7,912 | 7,320 |
| Laos | 0 | 0 | 6,509 | 251 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Malaysia | 0 | 0 | 0 | 5,941 | 20 | 0 | 0 | 0 | 0 | 0 | 276 | 0 | 0 | 0 | 507 | 500 | 0 |
| Philippines | 34 | 16 | 60 | 13 | 119 | 66 | 128 | 5,939 | 18,989 | 138,126 | 37 | 118,697 | 34,506 | 98 | 13 | 322 | 1,108 |
| Singapore | 0 | 0 | 159 | 7,783 | 736 | 4,539 | 1,509 | 1,125 | 1,053 | 1,348 | 2,017 | 2,243 | 2,941 | 4,206 | 2,499 | 2,672 | 2,789 |
| Thailand | 0 | 24 | 1,732 | 433 | 48 | 80 | 18 | 74 | 0 | 72 | 0 | 2,400 | 154 | 5 | 39 | 102 | 0 |
| Southeast Asia | 411,731 | 476,551 | 268,882 | 267,301 | 171,133 | 35,581 | 65,095 | 88,721 | 23,078 | 141,497 | 2,824 | 126,923 | 98,756 | 15,003 | 14,464 | 11,508 | 11,217 |
| China | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 | 19 | 0 | 0 | 0 | 28 | 12 | 14 | 13 | 37 |
| Hong Kong | 20 | 641 | 1,831 | 74 | 492 | 74 | 49 | 235 | 62 | 263 | 8,502 | 11,759 | 6,835 | 7,489 | 5,386 | 1,844 | 2,143 |
| Japan | 960 | 2,607 | 1,808 | 1,410 | 1,244 | 389 | 1,553 | 1,454 | 910 | 686 | 437 | 1,350 | 893 | 1,064 | 1,347 | 1,714 | 1,480 |
| Macao | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 20 |
| South Korea | 83,573 | 7 | 43,702 | 607,994 | 1,182,424 | 317,181 | 213,326 | 112,352 | 138 | 104 | 462 | 166 | 194 | 379 | 14,573 | 147 | 1,033 |
| Taiwan | 0 | 0 | 0 | 0 | 25 | 0 | 0 | 215 | 106 | 273 | 4,203 | 400 | 329 | 327 | 645 | 255 | 505 |
| East Asia | 84,553 | 3,255 | 47,341 | 609,478 | 1,184,185 | 317,644 | 214,928 | 114,276 | 1,235 | 1,326 | 13,604 | 13,675 | 8,279 | 9,271 | 21,965 | 3,973 | 5,218 |
| Australia | 794 | 1,430 | 186 | 466 | 476 | 386 | 614 | 909 | 1,046 | 1,083 | 1,187 | 4,337 | 1,154 | 1,560 | 1,424 | 1,508 | 1,732 |
| French Pacific Islands | 1,040 | 817 | 1,826 | 789 | 1,768 | 2,195 | 468 | 1,470 | 1,394 | 9 | 1,698 | 4,790 | 1,352 | 1,878 | 79 | 4 | 0 |
| Micronesia | 4,371 | 5,703 | 6,579 | 7,108 | 6,504 | 8,894 | 6,727 | 9,062 | 9,033 | 6,601 | 5,477 | 7,465 | 8,965 | 8,984 | 9,858 | 11,279 | 11,487 |
| New Zealand | 1,302 | 907 | 1,122 | 927 | 1,043 | 5,165 | 1,108 | 1,293 | 881 | 1,343 | 1,544 | 1,544 | 1,608 | 1,672 | 1,518 | 1,406 | 1,414 |
| Other Pacific Islands, NEC | 0 | 0 | 29 | 0 | 16 | 21 | 106 | 54 | 30 | 50 | 0 | 38 | 152 | 31 | 54 | 0 | 26 |
| Papua New Guinea | 30 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,888 | 15,900 | 2,615 | 523 | 0 | 500 | 0 |
| South Pacific Islands, NEC | 8 | 11 | 101 | 7 | 24 | 1,615 | 523 | 74 | 14 | 913 | 0 | 0 | 5,006 | 5,907 | 10,913 | 3,850 | 0 |
| Western Samoa | 54 | 0 | 211 | 36 | 72 | 247 | 18 | 498 | 106 | 39 | 70 | 0 | 0 | 0 | 0 | 9 | 747 |
| Oceania | 7,599 | 8,868 | 10,054 | 9,333 | 9,903 | 18,523 | 9,564 | 13,360 | 12,504 | 10,038 | 17,864 | 34,074 | 20,852 | 20,555 | 23,846 | 18,556 | 15,406 |

Refer to footnotes at end of table.

—Continued

Appendix table 46—U.S. exports of total rice, 1976–92—continued

| Country/crop year 1/ | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Milled tons | | | | | | | | | |
| Algeria | 3,743 | 60 | 0 | 1,016 | 0 | 5,399 | 108 | 33 | 10 | 0 | 11,637 | 0 | 18,450 | 26,177 | 15,010 | 6,420 | 23,837 |
| Egypt | 373 | 0 | 1,239 | 0 | 1 | 34 | 6 | 17 | 1,713 | 0 | 6 | 0 | 700 | 0 | 0 | 17 | 51 |
| Libya | 963 | 1,733 | 2,667 | 3,508 | 1,506 | 1,004 | 4,743 | 89 | 868 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Morocco | 4 | 5,971 | 2,574 | 2,597 | 57 | 76 | 5,240 | 21,007 | 10,508 | 10,052 | 11,206 | 10,038 | 1,133 | 37,613 | 30,512 | 63 | 170 |
| Tunisia | 0 | 533 | 236 | 193 | 218 | 218 | 38 | 131 | 224 | 0 | 17 | 0 | 18 | 17 | 133 | 67 | 225 |
| North Africa | 5,083 | 8,297 | 6,716 | 7,314 | 1,782 | 6,731 | 10,135 | 21,277 | 13,323 | 10,052 | 22,866 | 10,038 | 20,301 | 63,807 | 45,655 | 6,567 | 24,283 |
| Benin | 109 | 24 | 33 | 113 | 872 | 16,468 | 423 | 415 | 12,240 | 389 | 507 | 75 | 859 | 1,755 | 18 | 93 | 413 |
| Burkina Faso | 470 | 69 | 2,512 | 4,417 | 5,857 | 1,414 | 16 | 0 | 39,275 | 16 | 40 | 40 | 1,794 | 333 | 600 | 5,222 | 268 |
| Cape Verde | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,360 | 495 | 0 | 0 |
| Equitorial Guinea | 0 | 0 | 0 | 0 | 0 | 969 | 0 | 665 | 200 | 0 | 0 | 0 | 18 | 0 | 0 | 0 | 0 |
| Ghana | 2,317 | 5,201 | 34 | 7,720 | 23,955 | 374 | 17,553 | 5,097 | 1,113 | 18,120 | 11,533 | 24,909 | 47,783 | 14,504 | 12,684 | 5,844 | 23,202 |
| Guinea | 12,561 | 24,310 | 10,514 | 8,376 | 27,112 | 4,558 | 19,139 | 20,492 | 22,069 | 48,919 | 47,963 | 32,517 | 35,626 | 29,927 | 5,274 | 33,524 | 26,057 |
| Guinea-Bissau | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,388 | 80 | 0 | 0 |
| Ivory Coast | 16,615 | 45,846 | 69,763 | 3,826 | 4,957 | 30,921 | 2,848 | 7,004 | 1,667 | 2,723 | 6,011 | 8,772 | 17,618 | 37,731 | 85,946 | 64,326 | 97,238 |
| Liberia | 52,216 | 41,969 | 41,054 | 63,084 | 85,744 | 88,937 | 91,983 | 84,379 | 52,662 | 81,136 | 76,288 | 72,519 | 82,342 | 69,768 | 96,718 | 66,996 | 41,194 |
| Mali | 0 | 63 | 600 | 801 | 500 | 18 | 5,101 | 4,115 | 73,505 | 27,972 | 0 | 16,841 | 0 | 5,999 | 0 | 10,514 | 17 |
| Mauritania | 0 | 25,975 | 0 | 6,580 | 91 | 4,753 | 0 | 100 | 651 | 0 | 0 | 0 | 198 | 0 | 152 | 0 | 0 |
| Niger | 54 | 20 | 1,778 | 9 | 18 | 88 | 0 | 0 | 18 | 0 | 0 | 0 | 70 | 72 | 125 | 53 | 104 |
| Nigeria | 130,610 | 172,146 | 183,609 | 137,945 | 283,461 | 412,894 | 168,754 | 82,776 | 533 | 35 | 50 | 74 | 14 | 0 | 17 | 0 | 0 |
| Senegal | 22,801 | 78,625 | 1,254 | 15,623 | 23,610 | 1,050 | 24,896 | 11,431 | 59,074 | 91,630 | 24,948 | 120,126 | 95,860 | 71,601 | 63,159 | 52,318 | 100,841 |
| Sierra Leone | 334 | 225 | 16 | 5,212 | 5,118 | 2,086 | 20,263 | 5,866 | 6,396 | 11,779 | 21,298 | 34,407 | 28,495 | 4,559 | 21,416 | 17,070 | 7,987 |
| The Gambia | 6,578 | 1,033 | 31 | 1,536 | 266 | 758 | 726 | 9,093 | 5,134 | 2,814 | 7,591 | 42,564 | 2,506 | 4,536 | 3,084 | 1,317 | 5,839 |
| Togo | 2,919 | 7,753 | 2,621 | 560 | 1,605 | 2,936 | 762 | 1,087 | 993 | 496 | 661 | 638 | 935 | 129 | 55 | 203 | 62 |
| West Africa, NEC | 4,697 | 15,456 | 256 | 3,654 | 6,813 | 5,180 | 1,582 | 8,387 | 3,370 | 7,694 | 3,924 | 3,014 | 0 | 0 | 0 | 0 | 0 |
| West Africa | 252,281 | 418,715 | 314,075 | 259,456 | 469,979 | 573,404 | 354,046 | 240,907 | 278,900 | 293,723 | 200,814 | 356,496 | 314,118 | 248,662 | 289,823 | 257,480 | 303,222 |
| Cameroon | 136 | 1,222 | 3,429 | 1,961 | 601 | 542 | 185 | 100 | 7,430 | 2,227 | 5,166 | 4,026 | 18 | 74 | 17 | 79 | 36 |
| Central African Republic | 6 | 5 | 12 | 3 | 9 | 0 | 0 | 5 | 0 | 20 | 0 | 18 | 0 | 0 | 0 | 0 | 0 |
| Chad | 0 | 499 | 2,924 | 0 | 0 | 0 | 0 | 5,000 | 5,000 | 0 | 0 | 0 | 0 | 405 | 765 | 0 | 2,769 |
| Congo | 60 | 446 | 4,823 | 2,485 | 1,239 | 3,047 | 6,834 | 18 | 2,638 | 383 | 0 | 0 | 17 | 405 | 7,155 | 14,963 | 5,182 |
| Gabon | 293 | 577 | 1,718 | 1,129 | 2,114 | 4,289 | 3,940 | 1,858 | 810 | 631 | 81 | 451 | 3,177 | 36 | 18 | 93 | 18 |
| Sao Tome & Principe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,678 | 0 | 876 | 499 | 0 |
| Zaire | 3,303 | 14,981 | 30,438 | 17,403 | 13,427 | 6,737 | 900 | 1,094 | 7,060 | 0 | 37,361 | 10,066 | 33,788 | 1,089 | 0 | 0 | 0 |
| Central Africa | 3,798 | 17,730 | 43,344 | 22,981 | 17,390 | 14,615 | 11,859 | 8,075 | 22,938 | 3,261 | 42,608 | 14,561 | 39,678 | 2,009 | 8,831 | 15,634 | 8,005 |
| Burundi | 4 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Djibouti | 3,902 | 2,916 | 7,386 | 17,521 | 10,070 | 4,498 | 6,793 | 3,856 | 5,281 | 1,026 | 5,863 | 2,344 | 2,598 | 1,980 | 3,795 | 80 | 1,671 |
| Ethiopia | 64 | 125 | 154 | 5 | 19 | 65 | 0 | 0 | 563 | 279 | 51 | 612 | 23,693 | 23,549 | 240 | 251 | 201 |
| French Indian Ocean Areas | 0 | 0 | 0 | 524 | 0 | 550 | 653 | 3 | 0 | 46 | 68 | 6,235 | 18 | 34 | 53 | 1,400 | 33 |

Refer to footnotes at end of table.

—continued

Appendix table 46—U.S. exports of total rice, 1976–92—continued

| Country/crop year 1/ | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Milled tons | | | | | | | | | |
| Kenya | 0 | 59 | 0 | 11,296 | 5,173 | 9,013 | 20,260 | 2,718 | 1,051 | 210 | 16,750 | 0 | 0 | 4,197 | 6 | 18 | 7,560 |
| Rwanda | 603 | 125 | 65 | 535 | 3,884 | 730 | 526 | 1,078 | 2,243 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Seychelles | 0 | 0 | 1,350 | 0 | 181 | 91 | 272 | 409 | 387 | 346 | 323 | 200 | 201 | 0 | 16 | 0 | 0 |
| Somalia | 2 | 6,913 | 14,268 | 16,460 | 21,275 | 4,490 | 33,514 | 17,107 | 19,032 | 24,584 | 0 | 907 | 992 | 0 | 0 | 14,998 | 27,493 |
| Sudan | 2 | 0 | 23 | 28 | 209 | 4,858 | 91 | 904 | 214 | 0 | 0 | 0 | 0 | 1,175 | 1,769 | 0 | 0 |
| Tanzania | 17,887 | 19,596 | 0 | 11,909 | 0 | 350 | 12,539 | 15,737 | 138 | 508 | 0 | 15,400 | 5,000 | 0 | 0 | 0 | 0 |
| Uganda | 0 | 0 | 0 | 0 | 0 | 370 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| East Africa | 22,464 | 29,738 | 23,248 | 58,280 | 40,811 | 25,015 | 74,648 | 41,812 | 28,909 | 26,999 | 23,055 | 25,698 | 32,502 | 30,935 | 5,879 | 16,747 | 36,958 |
| Angola | 4 | 0 | 11,474 | 502 | 0 | 576 | 420 | 295 | 404 | 28 | 14 | 37 | 173 | 121 | 228 | 62 | 0 |
| Lesotho | 340 | 0 | 0 | 0 | 0 | 0 | 59 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,264 | 0 |
| Madagascar | 0 | 756 | 1,578 | 1,355 | 298 | 37,869 | 28,943 | 35,555 | 54,531 | 26,598 | 33,014 | 5,014 | 1,649 | 948 | 2,338 | 17,357 | 1,778 |
| Malawi | 3 | 4 | 168 | 1,109 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17,400 | 0 | 0 | 0 |
| Mauritius | 6 | 3 | 1,174 | 13,197 | 4,282 | 16,152 | 0 | 7,943 | 0 | 59 | 271 | 11,902 | 20 | 84 | 46 | 0 | 0 |
| Mozambique | 16 | 6,018 | 17,953 | 8,050 | 0 | 190 | 16,120 | 3,600 | 21,159 | 26,409 | 10,003 | 9,981 | 0 | 19,377 | 0 | 5,000 | 0 |
| Namibia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 157 | 1,221 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Republic of South Africa | 96,520 | 73,164 | 105,239 | 106,033 | 113,234 | 114,584 | 109,309 | 155,398 | 83,883 | 61,365 | 88,947 | 93,921 | 87,590 | 123,937 | 104,331 | 124,701 | 134,965 |
| Swaziland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zambia | 0 | 0 | 4,069 | 17,848 | 0 | 3 | 12,730 | 0 | 6,952 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Zimbabwe | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 82 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Africa | 96,889 | 79,945 | 141,655 | 148,094 | 117,814 | 169,374 | 167,581 | 203,073 | 167,086 | 115,680 | 132,264 | 120,855 | 89,432 | 161,867 | 106,943 | 148,384 | 136,743 |
| World | 2,156,917 | 2,353,428 | 2,504,008 | 2,791,963 | 3,196,916 | 2,823,939 | 2,274,276 | 2,358,271 | 2,024,886 | 1,938,606 | 2,857,098 | 2,330,373 | 2,880,709 | 2,595,528 | 2,421,679 | 2,241,366 | 2,555,250 |

1/ Crop year August 1 to July 31.

Appendix table 47—World rice supply and utilization, 1961-93

| Crop 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 | 115.7 | 1.86 | 215.7 | 147.3 | 6.3 | 149.2 | 8.5 | 5.7 |
| 1962 | 119.6 | 1.91 | 228.2 | 155.2 | 7.3 | 151.3 | 12.4 | 8.2 |
| 1963 | 121.5 | 2.04 | 248.4 | 169.1 | 7.7 | 165.2 | 16.2 | 9.8 |
| 1964 | 125.4 | 2.12 | 265.6 | 180.8 | 8.2 | 179.8 | 17.3 | 9.6 |
| 1965 | 124.0 | 2.05 | 253.5 | 172.9 | 7.9 | 172.2 | 18.0 | 10.4 |
| 1966 | 125.7 | 2.09 | 262.1 | 179.0 | 7.8 | 178.4 | 18.6 | 10.4 |
| 1967 | 127.0 | 2.18 | 276.9 | 188.9 | 7.2 | 186.5 | 20.9 | 11.2 |
| 1968 | 128.6 | 2.22 | 285.8 | 194.9 | 7.5 | 191.0 | 24.8 | 13.0 |
| 1969 | 131.4 | 2.25 | 295.2 | 201.1 | 8.2 | 199.7 | 26.1 | 13.1 |
| 1970 | 132.7 | 2.36 | 312.5 | 213.0 | 8.6 | 210.4 | 28.8 | 13.7 |
| 1971 | 134.8 | 2.35 | 316.6 | 215.8 | 8.7 | 216.2 | 28.4 | 13.1 |
| 1972 | 132.7 | 2.31 | 306.2 | 208.9 | 8.4 | 213.9 | 23.4 | 10.9 |
| 1973 | 136.3 | 2.45 | 333.8 | 227.6 | 7.7 | 222.4 | 28.5 | 12.8 |
| 1974 | 137.8 | 2.40 | 331.1 | 225.7 | 7.3 | 226.0 | 28.2 | 12.5 |
| 1975 | 142.9 | 2.50 | 357.4 | 243.1 | 8.4 | 232.5 | 38.9 | 16.7 |
| 1976 | 141.4 | 2.45 | 346.8 | 235.8 | 10.6 | 236.9 | 37.8 | 16.0 |
| 1977 | 143.4 | 2.57 | 368.7 | 250.6 | 9.6 | 244.5 | 43.9 | 18.0 |
| 1978 | 143.6 | 2.68 | 385.4 | 262.4 | 11.9 | 252.2 | 54.1 | 21.5 |
| 1979 | 141.2 | 2.67 | 376.6 | 256.8 | 12.1 | 258.1 | 52.8 | 20.5 |
| 1980 | 144.2 | 2.73 | 393.8 | 267.8 | 12.0 | 272.7 | 47.8 | 17.5 |
| 1981 | 144.9 | 2.81 | 407.6 | 277.4 | 10.8 | 281.4 | 43.7 | 15.5 |
| 1982 | 140.4 | 2.96 | 416.1 | 283.6 | 11.0 | 283.9 | 43.4 | 15.3 |
| 1983 | 144.1 | 3.11 | 448.5 | 305.3 | 11.5 | 301.9 | 46.8 | 15.5 |
| 1984 | 144.1 | 3.22 | 463.6 | 315.9 | 10.7 | 307.2 | 55.5 | 18.1 |
| 1985 | 145.0 | 3.22 | 466.6 | 317.5 | 11.7 | 318.0 | 55.0 | 17.3 |
| 1986 | 145.1 | 3.21 | 465.5 | 316.7 | 12.9 | 320.8 | 50.9 | 15.9 |
| 1987 | 141.7 | 3.27 | 463.8 | 314.5 | 11.2 | 319.9 | 45.5 | 14.2 |
| 1988 | 145.5 | 3.35 | 487.5 | 330.1 | 13.9 | 327.7 | 47.8 | 14.6 |
| 1989 | 146.6 | 3.45 | 506.6 | 343.1 | 11.7 | 336.5 | 54.5 | 16.2 |
| 1990 | 146.7 | 3.53 | 518.0 | 350.7 | 12.0 | 345.9 | 59.2 | 17.1 |
| 1991 | 146.1 | 3.57 | 521.0 | 352.3 | 14.1 | 356.0 | 55.6 | 15.6 |
| 1992 | 145.2 | 3.59 | 521.4 | 352.5 | 14.8 | 354.1 | 54.0 | 15.2 |
| 1993 7/ | 143.1 | 3.59 | 513.5 | 346.5 | 15.5 | 355.2 | 45.3 | 12.8 |

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. Trade data has been adjusted (July 1993) to exclude EC intratrade for the years 1980 to the present. 4/ For countries for which stock data are not available, utilization estimates represent apparent utilization, for example, they include annual stock level adjustment. 5/ Stocks data are based on an aggregate of different market years and should bnot be construed as representing world stock levels at a fixed point in time. Stocks data are not available for all countries and exclude the FSU (Former Soviet Union), North Korea, and parts of Eastern Europe. 6/ Stocks-to-use represents the ratio of marketing year ending stocks to total utilization. 7/ Preliminary.

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

Appendix table 48—World rice area harvested, 1960–93

| Country or region 1/ Calendar year | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 hectares | | | | | | |
| World | 120,138 | 115,817 | 119,719 | 121,564 | 125,403 | 123,967 | 125,679 | 126,990 | 128,593 | 131,416 | 132,654 |
| United States | 645 | 643 | 718 | 717 | 723 | 725 | 796 | 797 | 952 | 861 | 734 |
| Foreign | 119,493 | 115,174 | 119,001 | 120,847 | 124,680 | 123,242 | 124,883 | 126,193 | 127,641 | 130,555 | 131,920 |
| Less developed | 77,224 | 77,922 | 80,957 | 82,011 | 83,751 | 82,250 | 83,272 | 84,655 | 86,566 | 88,839 | 88,624 |
| Centrally planned | 36,762 | 31,728 | 32,525 | 33,364 | 35,398 | 35,427 | 36,027 | 35,935 | 35,515 | 36,074 | 38,035 |
| Newly industrializing | 1,901 | 1,926 | 1,944 | 1,912 | 1,969 | 2,010 | 2,029 | 2,028 | 1,951 | 2,015 | 1,984 |
| Latin America | 4,478 | 4,701 | 5,151 | 5,502 | 6,081 | 5,521 | 5,849 | 6,055 | 6,135 | 6,650 | 6,337 |
| Mexico | 143 | 146 | 134 | 135 | 133 | 138 | 153 | 168 | 138 | 153 | 150 |
| Central America | 199 | 201 | 207 | 210 | 235 | 240 | 245 | 258 | 265 | 251 | 192 |
| Nicaragua | 21 | 24 | 23 | 21 | 22 | 25 | 26 | 25 | 32 | 25 | 25 |
| Costa Rica | 53 | 46 | 48 | 51 | 52 | 53 | 54 | 56 | 57 | 70 | 43 |
| Panama | 89 | 100 | 100 | 103 | 121 | 133 | 132 | 130 | 129 | 126 | 93 |
| Caribbean | 270 | 264 | 279 | 209 | 203 | 186 | 183 | 200 | 253 | 310 | 291 |
| Cuba | 158 | 150 | 164 | 85 | 71 | 38 | 32 | 44 | 88 | 146 | 128 |
| Haiti | 45 | 48 | 54 | 55 | 60 | 65 | 70 | 70 | 72 | 75 | 75 |
| Dominican Republic | 60 | 58 | 53 | 60 | 65 | 76 | 76 | 81 | 88 | 84 | 83 |
| South America Ex., Braz., | 646 | 687 | 757 | 712 | 823 | 905 | 915 | 899 | 770 | 855 | 863 |
| Colombia | 227 | 237 | 275 | 254 | 303 | 375 | 350 | 290 | 277 | 251 | 233 |
| Venezuela | 42 | 58 | 69 | 74 | 91 | 105 | 110 | 114 | 115 | 119 | 130 |
| Guyana | 89 | 102 | 104 | 81 | 110 | 115 | 117 | 136 | 96 | 113 | 111 |
| Surinam | 26 | 26 | 27 | 28 | 30 | 34 | 29 | 34 | 35 | 39 | 36 |
| Ecuador | 91 | 95 | 112 | 113 | 109 | 103 | 101 | 114 | 60 | 109 | 85 |
| Peru | 86 | 81 | 87 | 73 | 82 | 75 | 96 | 107 | 76 | 110 | 140 |
| Bolivia | 23 | 24 | 27 | 29 | 31 | 33 | 34 | 31 | 34 | 49 | 50 |
| Chile | 39 | 39 | 28 | 31 | 31 | 28 | 37 | 33 | 33 | 16 | 25 |
| Brazil | 3,174 | 3,350 | 3,722 | 4,182 | 4,619 | 4,005 | 4,291 | 4,459 | 4,621 | 4,979 | 4,764 |
| Paraguay | 7 | 7 | 7 | 8 | 8 | 5 | 7 | 9 | 10 | 13 | 22 |
| Uruguay | 16 | 18 | 21 | 21 | 28 | 32 | 34 | 31 | 34 | 36 | 31 |
| Argentina | 46 | 53 | 52 | 54 | 68 | 47 | 62 | 71 | 88 | 102 | 77 |

*Refer to footnotes at end of table.*

*—continued*

Appendix table 48—World rice area harvested, 1960–93—continued

| Country or region 1/ Calendar year | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 hectares | | | | | | |
| EC-12 | 279 | 277 | 268 | 264 | 277 | 274 | 271 | 281 | 295 | 313 | 316 |
| France | 33 | 33 | 31 | 30 | 30 | 30 | 28 | 27 | 25 | 22 | 21 |
| Spain | 66 | 61 | 63 | 63 | 64 | 59 | 59 | 60 | 60 | 64 | 64 |
| Portugal | 37 | 38 | 37 | 37 | 38 | 35 | 35 | 32 | 33 | 38 | 42 |
| Italy | 129 | 123 | 118 | 115 | 120 | 126 | 132 | 144 | 156 | 169 | 173 |
| Greece | 14 | 22 | 19 | 19 | 25 | 24 | 17 | 18 | 21 | 20 | 16 |
| Eastern Europe | 65 | 51 | 42 | 50 | 57 | 56 | 58 | 62 | 65 | 74 | 76 |
| Hungary | 28 | 22 | 19 | 19 | 18 | 17 | 19 | 20 | 21 | 22 | 23 |
| Romania | 21 | 11 | 6 | 14 | 20 | 19 | 20 | 22 | 25 | 29 | 28 |
| FSU-15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| USSR | 95 | 118 | 119 | 147 | 191 | 217 | 248 | 281 | 312 | 328 | 350 |
| USSR+FSU15 | 95 | 118 | 119 | 147 | 191 | 217 | 248 | 281 | 312 | 328 | 350 |
| Turkmenistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ukraine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Uzbekistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kazakhstan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Russia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Middle East | 435 | 411 | 444 | 463 | 414 | 415 | 425 | 426 | 477 | 525 | 528 |
| Turkey | 42 | 59 | 81 | 55 | 35 | 50 | 65 | 60 | 45 | 57 | 67 |
| Iraq | 76 | 69 | 61 | 106 | 77 | 82 | 78 | 103 | 109 | 106 | 75 |
| Iran | 315 | 280 | 300 | 300 | 300 | 280 | 280 | 261 | 318 | 360 | 384 |
| Asia | 111,353 | 106,781 | 109,793 | 111,217 | 114,326 | 113,550 | 114,636 | 115,481 | 116,731 | 118,933 | 120,382 |
| South Asia | 46,053 | 46,258 | 47,488 | 48,430 | 48,989 | 48,057 | 47,664 | 49,740 | 50,292 | 51,618 | 51,108 |
| Afghanistan | 207 | 210 | 210 | 210 | 220 | 220 | 220 | 205 | 205 | 206 | 200 |
| India | 34,128 | 34,694 | 35,695 | 35,809 | 36,462 | 35,470 | 35,251 | 36,437 | 36,967 | 37,680 | 37,592 |
| Pakistan | 1,181 | 1,214 | 1,186 | 1,286 | 1,356 | 1,393 | 1,410 | 1,420 | 1,555 | 1,622 | 1,503 |
| Nepal | 1,116 | 1,088 | 1,099 | 1,090 | 1,101 | 1,111 | 1,100 | 1,154 | 1,162 | 1,173 | 1,182 |
| Bangladesh | 8,857 | 8,483 | 8,694 | 9,008 | 9,229 | 9,360 | 9,071 | 9,890 | 9,742 | 10,314 | 9,912 |
| Sri Lanka | 564 | 569 | 604 | 1,027 | 621 | 503 | 612 | 634 | 661 | 623 | 719 |
| Southeast Asia | 28,091 | 28,500 | 29,601 | 29,338 | 29,941 | 29,833 | 30,580 | 29,424 | 30,714 | 30,984 | 31,389 |
| Burma | 4,055 | 4,254 | 4,654 | 4,877 | 4,979 | 4,848 | 4,513 | 4,706 | 4,764 | 4,671 | 4,809 |
| Vietnam | 4,602 | 4,763 | 4,889 | 4,902 | 4,983 | 4,759 | 4,612 | 4,566 | 4,644 | 4,630 | 4,631 |
| Thailand | 5,643 | 6,179 | 6,191 | 6,354 | 5,971 | 5,960 | 7,000 | 5,807 | 6,336 | 7,259 | 6,854 |
| Laos | 627 | 620 | 590 | 600 | 916 | 916 | 930 | 960 | 656 | 665 | 665 |
| Khmer Rep | 2,150 | 2,182 | 2,286 | 2,233 | 2,377 | 2,344 | 2,182 | 2,020 | 2,324 | 1,944 | 2,399 |
| Malaysia | 528 | 463 | 544 | 551 | 532 | 566 | 553 | 542 | 633 | 685 | 697 |
| Indonesia | 7,285 | 6,857 | 7,283 | 6,731 | 6,980 | 7,328 | 7,691 | 7,516 | 8,021 | 8,014 | 8,135 |
| Philippines | 3,198 | 3,179 | 3,161 | 3,087 | 3,200 | 3,109 | 3,096 | 3,304 | 3,332 | 3,113 | 3,195 |
| China, Peoples Rep. | 31,500 | 26,276 | 26,935 | 27,715 | 29,607 | 29,825 | 30,529 | 30,436 | 29,894 | 30,432 | 32,358 |

*Refer to footnotes at end of table.*

*—continued*

Appendix table 48—World rice area harvested, 1960–93—continued

| Country or region 1/ Calendar year | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 hectares | | | | | | |
| East Asia | 5,709 | 5,747 | 5,769 | 5,734 | 5,789 | 5,835 | 5,863 | 5,881 | 5,831 | 5,899 | 5,527 |
| Japan | 3,308 | 3,301 | 3,285 | 3,272 | 3,260 | 3,255 | 3,254 | 3,263 | 3,280 | 3,274 | 2,923 |
| Taiwan | 766 | 783 | 794 | 749 | 765 | 773 | 789 | 787 | 790 | 787 | 776 |
| Korea, South | 1,121 | 1,128 | 1,139 | 1,155 | 1,195 | 1,228 | 1,231 | 1,235 | 1,151 | 1,220 | 1,203 |
| Korea, North | 500 | 520 | 540 | 550 | 560 | 570 | 580 | 590 | 600 | 610 | 620 |
| Australia | 19 | 20 | 22 | 24 | 25 | 26 | 30 | 31 | 34 | 40 | 38 |
| Africa | 2,769 | 2,815 | 3,162 | 3,180 | 3,309 | 3,183 | 3,366 | 3,576 | 3,592 | 3,692 | 3,893 |
| North Africa | 304 | 233 | 356 | 409 | 410 | 362 | 363 | 459 | 517 | 514 | 489 |
| Egypt | 297 | 226 | 349 | 403 | 404 | 356 | 355 | 452 | 507 | 502 | 480 |
| Subsaharan Africa | 2,465 | 2,582 | 2,806 | 2,771 | 2,899 | 2,821 | 3,003 | 3,117 | 3,075 | 3,178 | 3,404 |
| West Africa | 1,459 | 1,599 | 1,676 | 1,703 | 1,789 | 1,685 | 1,753 | 1,850 | 1,795 | 1,908 | 1,953 |
| Guinea-Bissau | 61 | 61 | 65 | 65 | 65 | 60 | 45 | 35 | 30 | 30 | 30 |
| Senegal | 68 | 73 | 72 | 75 | 87 | 83 | 88 | 101 | 78 | 104 | 93 |
| Mali | 170 | 170 | 182 | 200 | 160 | 165 | 165 | 192 | 170 | 172 | 166 |
| Guinea | 216 | 260 | 260 | 260 | 303 | 303 | 316 | 336 | 352 | 411 | 408 |
| Sierra Leone | 283 | 283 | 255 | 264 | 264 | 301 | 327 | 350 | 320 | 310 | 332 |
| Ivory Coast | 218 | 206 | 260 | 245 | 271 | 261 | 258 | 302 | 300 | 288 | 289 |
| Ghana | 28 | 28 | 32 | 32 | 42 | 32 | 33 | 44 | 46 | 51 | 59 |
| Gambia | 24 | 24 | 25 | 25 | 27 | 27 | 27 | 18 | 29 | 27 | 28 |
| Togo | 12 | 15 | 25 | 20 | 27 | 29 | 30 | 28 | 29 | 26 | 26 |
| Nigeria | 185 | 185 | 179 | 193 | 202 | 210 | 242 | 220 | 193 | 234 | 254 |
| Burkina | 38 | 54 | 67 | 33 | 35 | 33 | 35 | 36 | 46 | 40 | 40 |
| Liberia | 124 | 200 | 210 | 239 | 255 | 132 | 133 | 134 | 140 | 147 | 154 |
| Central Africa | 80 | 70 | 73 | 60 | 55 | 102 | 114 | 131 | 130 | 130 | 258 |
| Cameroon | 0 | 7 | 10 | 14 | 13 | 11 | 14 | 15 | 14 | 15 | 17 |
| Chad | 22 | 22 | 23 | 27 | 27 | 27 | 28 | 25 | 31 | 36 | 40 |
| Zaire | 80 | 70 | 73 | 60 | 55 | 102 | 114 | 131 | 130 | 130 | 258 |
| East Africa | 78 | 89 | 89 | 121 | 79 | 61 | 130 | 112 | 133 | 137 | 161 |
| Tanzania | 71 | 82 | 83 | 115 | 76 | 57 | 127 | 107 | 128 | 129 | 151 |
| Southern Africa, Ex. S. A | 848 | 824 | 968 | 887 | 976 | 973 | 1,006 | 1,024 | 1,017 | 1,003 | 1,032 |
| Mozambique | 80 | 80 | 90 | 90 | 100 | 100 | 100 | 100 | 80 | 74 | 75 |
| Madagascar | 742 | 717 | 857 | 775 | 854 | 848 | 882 | 900 | 913 | 912 | 930 |
| Malawi | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*Refer to footnotes at end of table.*

*--continued*

Appendix table 48—World rice area harvested, 1960–93—continued

| Country or region 1/ Calendar year | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 hectares | | | | | | |
| World | 134,825 | 132,665 | 136,288 | 137,796 | 142,890 | 141,429 | 143,412 | 143,645 | 141,230 | 144,153 | 144,856 |
| United States | 736 | 736 | 878 | 1,024 | 1,140 | 1,004 | 910 | 1,202 | 1,161 | 1,340 | 1,535 |
| Foreign | 134,089 | 131,929 | 135,410 | 136,772 | 141,750 | 140,425 | 142,502 | 142,443 | 140,069 | 142,813 | 143,321 |
| Less developed | 88,273 | 85,816 | 89,197 | 89,838 | 94,723 | 92,490 | 95,132 | 96,591 | 95,046 | 97,446 | 98,398 |
| Centrally planned | 40,819 | 41,171 | 41,290 | 41,834 | 41,883 | 42,767 | 42,196 | 40,854 | 40,144 | 40,713 | 40,347 |
| Newly industrializing | 1,948 | 1,937 | 1,909 | 1,984 | 2,009 | 2,002 | 2,009 | 1,982 | 1,954 | 1,870 | 1,891 |
| Latin America | 6,404 | 6,337 | 6,175 | 7,129 | 7,998 | 7,281 | 7,203 | 7,379 | 8,471 | 8,134 | 8,133 |
| Mexico | 153 | 165 | 170 | 173 | 214 | 145 | 170 | 125 | 160 | 130 | 180 |
| Central America | 203 | 206 | 239 | 266 | 289 | 242 | 247 | 255 | 248 | 266 | 264 |
| Nicaragua | 26 | 26 | 24 | 32 | 41 | 27 | 25 | 28 | 19 | 42 | 39 |
| Costa Rica | 35 | 32 | 65 | 80 | 67 | 65 | 70 | 76 | 81 | 74 | 72 |
| Panama | 96 | 105 | 105 | 112 | 115 | 97 | 105 | 110 | 99 | 98 | 104 |
| Caribbean | 286 | 302 | 361 | 377 | 336 | 366 | 387 | 328 | 319 | 320 | 328 |
| Cuba | 130 | 140 | 190 | 195 | 200 | 220 | 220 | 154 | 142 | 147 | 144 |
| Haiti | 75 | 76 | 76 | 76 | 40 | 40 | 51 | 51 | 50 | 50 | 55 |
| Domincan Republic | 75 | 80 | 88 | 97 | 87 | 97 | 106 | 109 | 113 | 112 | 115 |
| South America Ex., Braz., | 858 | 793 | 859 | 974 | 1,072 | 1,037 | 1,104 | 1,144 | 1,193 | 1,236 | 1,284 |
| Colombia | 254 | 274 | 291 | 355 | 372 | 366 | 325 | 406 | 442 | 416 | 413 |
| Venezuela | 113 | 65 | 113 | 117 | 114 | 93 | 170 | 166 | 172 | 225 | 243 |
| Guyana | 102 | 80 | 93 | 106 | 116 | 84 | 136 | 115 | 90 | 95 | 88 |
| Surinam | 40 | 37 | 45 | 44 | 48 | 48 | 50 | 55 | 59 | 65 | 66 |
| Ecuador | 80 | 80 | 83 | 101 | 126 | 125 | 103 | 85 | 103 | 127 | 130 |
| Peru | 147 | 131 | 110 | 115 | 118 | 129 | 125 | 100 | 131 | 96 | 150 |
| Bolivia | 48 | 46 | 41 | 51 | 75 | 72 | 69 | 63 | 51 | 66 | 63 |
| Chile | 27 | 26 | 19 | 13 | 23 | 29 | 36 | 33 | 47 | 41 | 31 |
| Brazil | 4,821 | 4,794 | 4,463 | 5,250 | 6,000 | 5,400 | 5,200 | 5,425 | 6,469 | 6,100 | 5,963 |
| Paraguay | 16 | 19 | 21 | 25 | 28 | 34 | 32 | 52 | 31 | 38 | 32 |
| Uruguay | 31 | 35 | 43 | 47 | 52 | 57 | 58 | 69 | 67 | 67 | 68 |
| Argentina | 83 | 77 | 83 | 89 | 87 | 91 | 95 | 102 | 82 | 82 | 114 |

*Refer to footnotes at end of table.*

—continued

Appendix table 48—World rice area harvested, 1960–93—continued

| Country or region 1/ Calendar year | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 hectares | | | | | | |
| EC-12 | 313 | 320 | 324 | 316 | 296 | 295 | 317 | 322 | 312 | 303 | 284 |
| France | 20 | 20 | 17 | 14 | 10 | 8 | 10 | 11 | 7 | 7 | 6 |
| Spain | 61 | 59 | 61 | 61 | 62 | 64 | 68 | 68 | 69 | 68 | 69 |
| Portugal | 42 | 43 | 39 | 33 | 30 | 22 | 34 | 33 | 35 | 35 | 25 |
| Italy | 175 | 183 | 190 | 188 | 174 | 182 | 186 | 191 | 183 | 176 | 169 |
| Greece | 15 | 15 | 17 | 20 | 20 | 19 | 19 | 19 | 18 | 17 | 15 |
| Eastern Europe | 79 | 77 | 73 | 75 | 74 | 74 | 73 | 71 | 67 | 61 | 58 |
| Hungary | 26 | 28 | 27 | 28 | 27 | 28 | 28 | 24 | 20 | 15 | 13 |
| Romania | 28 | 27 | 23 | 23 | 22 | 21 | 20 | 22 | 23 | 20 | 20 |
| FSU-15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| USSR | 390 | 421 | 462 | 495 | 500 | 522 | 548 | 580 | 610 | 666 | 634 |
| USSR+FSU15 | 390 | 421 | 462 | 495 | 500 | 522 | 548 | 580 | 610 | 666 | 634 |
| Turkmenistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ukraine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Uzbekistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kazakhstan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Russia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Middle East | 505 | 466 | 450 | 423 | 430 | 475 | 451 | 446 | 525 | 574 | 596 |
| Turkey | 65 | 51 | 60 | 60 | 55 | 54 | 58 | 70 | 75 | 50 | 73 |
| Iraq | 109 | 94 | 64 | 31 | 33 | 54 | 66 | 60 | 60 | 65 | 55 |
| Iran | 330 | 320 | 325 | 330 | 340 | 365 | 325 | 315 | 389 | 458 | 467 |
| Asia | 122,430 | 120,356 | 123,782 | 123,938 | 127,731 | 127,169 | 129,182 | 128,794 | 125,357 | 128,254 | 128,784 |
| South Asia | 50,664 | 49,740 | 51,786 | 51,417 | 53,630 | 52,314 | 54,349 | 54,938 | 53,765 | 54,701 | 55,489 |
| Afghanistan | 200 | 200 | 210 | 210 | 210 | 210 | 210 | 210 | 206 | 212 | 230 |
| India | 37,758 | 36,688 | 38,286 | 37,889 | 39,475 | 38,511 | 40,282 | 40,482 | 39,414 | 40,152 | 40,708 |
| Pakistan | 1,457 | 1,480 | 1,513 | 1,604 | 1,710 | 1,749 | 1,899 | 2,026 | 2,034 | 1,933 | 1,976 |
| Nepal | 1,300 | 1,104 | 1,227 | 1,240 | 1,256 | 1,262 | 1,264 | 1,263 | 1,254 | 1,276 | 1,297 |
| Bangladesh | 9,257 | 9,629 | 9,878 | 9,793 | 10,329 | 9,882 | 10,028 | 10,114 | 10,064 | 10,309 | 10,459 |
| Sri Lanka | 692 | 639 | 672 | 681 | 650 | 700 | 666 | 843 | 793 | 819 | 819 |
| Southeast Asia | 31,580 | 30,266 | 31,740 | 31,661 | 32,959 | 33,217 | 33,901 | 34,229 | 33,157 | 34,788 | 35,193 |
| Burma | 4,764 | 4,528 | 4,880 | 4,884 | 5,030 | 4,912 | 4,864 | 5,011 | 4,442 | 4,801 | 4,811 |
| Vietnam | 4,807 | 4,900 | 5,030 | 5,112 | 4,940 | 5,314 | 5,409 | 5,142 | 5,483 | 5,468 | 5,722 |
| Thailand | 7,095 | 6,780 | 7,680 | 7,512 | 8,357 | 8,167 | 8,750 | 8,935 | 8,654 | 9,200 | 9,105 |
| Laos | 665 | 665 | 665 | 686 | 660 | 680 | 690 | 665 | 724 | 739 | 731 |
| Khmer Rep | 1,880 | 1,548 | 811 | 555 | 1,050 | 1,400 | 1,500 | 1,400 | 672 | 1,417 | 1,317 |
| Malaysia | 710 | 750 | 739 | 740 | 750 | 730 | 723 | 583 | 738 | 696 | 679 |
| Indonesia | 8,324 | 7,898 | 8,404 | 8,537 | 8,495 | 8,369 | 8,360 | 8,929 | 8,804 | 9,005 | 9,382 |
| Philippines | 3,332 | 3,194 | 3,528 | 3,632 | 3,674 | 3,641 | 3,602 | 3,561 | 3,637 | 3,459 | 3,443 |
| China, Peoples Rep. | 34,918 | 35,143 | 35,090 | 35,512 | 35,729 | 36,217 | 35,526 | 34,421 | 33,344 | 33,878 | 33,293 |

*Refer to footnotes at end of table.*

—continued

Appendix table 48—World rice area harvested, 1960–93—continued

| Country or region 1/ Calendar year | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 hectares | | | | | | |
| East Asia | 5,268 | 5,207 | 5,166 | 5,348 | 5,413 | 5,421 | 5,406 | 5,206 | 5,091 | 4,887 | 4,809 |
| Japan | 2,695 | 2,640 | 2,622 | 2,724 | 2,764 | 2,779 | 2,757 | 2,584 | 2,497 | 2,377 | 2,278 |
| Taiwan | 753 | 742 | 724 | 778 | 790 | 786 | 778 | 752 | 721 | 637 | 667 |
| Korea, South | 1,190 | 1,191 | 1,182 | 1,204 | 1,218 | 1,215 | 1,230 | 1,230 | 1,233 | 1,233 | 1,224 |
| Korea, North | 625 | 630 | 635 | 640 | 640 | 640 | 640 | 640 | 640 | 640 | 640 |
| Australia | 41 | 45 | 68 | 76 | 75 | 92 | 91 | 110 | 116 | 104 | 123 |
| Africa | 3,927 | 3,907 | 4,076 | 4,320 | 4,646 | 4,517 | 4,637 | 4,741 | 4,611 | 4,717 | 4,709 |
| North Africa | 489 | 485 | 455 | 449 | 449 | 459 | 444 | 443 | 442 | 415 | 408 |
| Egypt | 487 | 481 | 450 | 442 | 442 | 453 | 437 | 433 | 435 | 408 | 402 |
| Subsaharan Africa | 3,438 | 3,422 | 3,621 | 3,871 | 4,197 | 4,058 | 4,193 | 4,298 | 4,169 | 4,302 | 4,301 |
| West Africa | 2,016 | 1,998 | 2,020 | 2,176 | 2,255 | 2,306 | 2,215 | 2,491 | 2,399 | 2,493 | 2,522 |
| Guinea-Bissau | 30 | 30 | 35 | 38 | 42 | 46 | 40 | 38 | 40 | 38 | 38 |
| Senegal | 84 | 50 | 65 | 86 | 94 | 89 | 63 | 91 | 79 | 67 | 69 |
| Mali | 182 | 165 | 135 | 140 | 129 | 152 | 140 | 200 | 130 | 185 | 172 |
| Guinea | 415 | 415 | 425 | 470 | 450 | 450 | 402 | 406 | 400 | 400 | 380 |
| Sierra Leone | 356 | 348 | 351 | 370 | 380 | 420 | 420 | 400 | 375 | 400 | 400 |
| Ivory Coast | 282 | 290 | 295 | 350 | 410 | 364 | 409 | 428 | 448 | 360 | 340 |
| Ghana | 55 | 71 | 71 | 67 | 78 | 77 | 75 | 123 | 105 | 99 | 116 |
| Gambia | 28 | 30 | 30 | 40 | 22 | 20 | 14 | 30 | 45 | 40 | 28 |
| Togo | 26 | 25 | 20 | 10 | 10 | 15 | 12 | 20 | 20 | 20 | 20 |
| Nigeria | 263 | 275 | 280 | 285 | 300 | 310 | 325 | 414 | 400 | 550 | 600 |
| Burkina | 40 | 40 | 39 | 33 | 42 | 45 | 32 | 35 | 40 | 37 | 39 |
| Liberia | 162 | 170 | 182 | 201 | 191 | 201 | 206 | 194 | 201 | 197 | 210 |
| Central Africa | 258 | 276 | 303 | 310 | 310 | 273 | 321 | 333 | 280 | 280 | 290 |
| Cameroon | 16 | 18 | 15 | 15 | 30 | 35 | 25 | 25 | 35 | 25 | 30 |
| Chad | 55 | 52 | 55 | 50 | 50 | 47 | 17 | 50 | 50 | 42 | 46 |
| Zaire | 258 | 276 | 303 | 310 | 310 | 273 | 321 | 333 | 280 | 280 | 290 |
| East Africa | 122 | 110 | 144 | 112 | 331 | 281 | 311 | 196 | 216 | 204 | 165 |
| Tanzania | 111 | 98 | 131 | 99 | 315 | 260 | 295 | 180 | 200 | 190 | 150 |
| Southern Africa, Ex. S. A | 1,042 | 1,038 | 1,154 | 1,273 | 1,301 | 1,198 | 1,346 | 1,278 | 1,274 | 1,325 | 1,324 |
| Mozambique | 75 | 75 | 75 | 75 | 65 | 65 | 65 | 65 | 75 | 75 | 70 |
| Madagascar | 943 | 938 | 1,055 | 1,172 | 1,177 | 1,063 | 1,210 | 1,140 | 1,125 | 1,180 | 1,185 |
| Malawi | 0 | 0 | 0 | 0 | 40 | 45 | 47 | 47 | 47 | 43 | 42 |

*Refer to footnotes at end of table.*

—continued

Appendix table 48—World rice area harvested, 1960–93—continued

| Country or region 1/ Calendar year | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1,000 hectares | | | | | | |
| World | 140,364 | 144,147 | 144,059 | 144,954 | 145,097 | 141,690 | 145,470 | 146,637 | 146,737 | 145,742 | 145,154 | 145,128 |
| United States | 1,320 | 878 | 1,134 | 1,008 | 955 | 944 | 1,174 | 1,087 | 1,142 | 1,123 | 1,267 | 1,146 |
| Foreign | 139,044 | 143,269 | 142,925 | 143,946 | 144,142 | 140,746 | 144,296 | 145,550 | 145,595 | 144,619 | 143,887 | 143,982 |
| Less developed | 94,443 | 98,442 | 97,934 | 100,092 | 100,345 | 97,140 | 100,722 | 101,165 | 100,700 | 100,034 | 99,821 | 100,792 |
| Centrally planned | 40,111 | 40,289 | 40,424 | 39,286 | 39,296 | 39,261 | 39,298 | 40,120 | 40,661 | 40,403 | 39,922 | 39,045 |
| Newly industrializing | 1,847 | 1,873 | 1,818 | 1,801 | 1,768 | 1,763 | 1,731 | 1,732 | 1,698 | 1,638 | 1,554 | 1,538 |
| Latin America | 7,294 | 7,458 | 6,963 | 7,798 | 7,996 | 8,030 | 7,410 | 6,219 | 6,197 | 6,677 | 6,529 | 6,376 |
| Mexico | 170 | 170 | 120 | 192 | 125 | 150 | 120 | 140 | 75 | 70 | 70 | 50 |
| Central America | 269 | 286 | 262 | 246 | 220 | 196 | 189 | 247 | 247 | 251 | 242 | 243 |
| Nicaragua | 41 | 38 | 45 | 41 | 37 | 28 | 25 | 48 | 41 | 57 | 65 | 65 |
| Costa Rica | 76 | 85 | 70 | 72 | 60 | 40 | 43 | 62 | 52 | 48 | 52 | 40 |
| Panama | 95 | 106 | 99 | 91 | 87 | 83 | 73 | 90 | 109 | 93 | 80 | 95 |
| Caribbean | 313 | 336 | 345 | 329 | 339 | 325 | 326 | 322 | 293 | 285 | 285 | 288 |
| Cuba | 151 | 149 | 161 | 159 | 171 | 169 | 172 | 167 | 140 | 135 | 135 | 135 |
| Haiti | 50 | 50 | 55 | 55 | 45 | 45 | 45 | 45 | 45 | 45 | 38 | 38 |
| Domincan Republic | 101 | 125 | 117 | 102 | 110 | 100 | 98 | 98 | 98 | 95 | 102 | 105 |
| South America Ex., Braz., | 1,361 | 1,187 | 1,299 | 1,316 | 1,242 | 1,298 | 1,317 | 1,230 | 1,242 | 1,317 | 1,418 | 1,475 |
| Colombia | 481 | 396 | 364 | 386 | 384 | 389 | 460 | 410 | 435 | 420 | 400 | 390 |
| Venezuela | 227 | 164 | 151 | 181 | 135 | 136 | 114 | 116 | 121 | 152 | 142 | 155 |
| Guyana | 93 | 90 | 97 | 78 | 92 | 92 | 74 | 67 | 51 | 79 | 90 | 100 |
| Surinam | 70 | 70 | 75 | 75 | 75 | 71 | 75 | 31 | 31 | 31 | 50 | 50 |
| Ecuador | 129 | 93 | 136 | 134 | 172 | 139 | 126 | 135 | 151 | 190 | 200 | 220 |
| Peru | 170 | 180 | 200 | 190 | 144 | 215 | 209 | 218 | 185 | 158 | 167 | 180 |
| Bolivia | 53 | 43 | 120 | 119 | 87 | 94 | 85 | 90 | 90 | 90 | 100 | 100 |
| Chile | 37 | 40 | 39 | 32 | 37 | 39 | 39 | 43 | 33 | 32 | 29 | 30 |
| Brazil | 5,100 | 5,350 | 4,820 | 5,585 | 5,980 | 5,961 | 5,350 | 4,180 | 4,230 | 4,614 | 4,384 | 4,200 |
| Paraguay | 31 | 32 | 32 | 35 | 35 | 42 | 35 | 35 | 35 | 35 | 90 | 90 |
| Uruguay | 70 | 79 | 85 | 86 | 81 | 81 | 100 | 85 | 110 | 130 | 150 | 160 |
| Argentina | 81 | 129 | 117 | 130 | 90 | 100 | 108 | 100 | 110 | 140 | 130 | 120 |

*Refer to footnotes at end of table.*

*--continued*

Appendix table 48—World rice area harvested, 1960–93—continued

| Country or region 1/ Calendar year | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1,000 hectares | | | | | | |
| EC-12 | 301 | 273 | 308 | 318 | 334 | 329 | 347 | 331 | 373 | 367 | 359 | 342 |
| France | 5 | 7 | 9 | 11 | 12 | 12 | 14 | 17 | 19 | 20 | 20 | 22 |
| Spain | 68 | 41 | 73 | 74 | 79 | 76 | 80 | 59 | 90 | 94 | 83 | 50 |
| Portugal | 34 | 27 | 30 | 30 | 32 | 32 | 33 | 33 | 33 | 32 | 25 | 25 |
| Italy | 178 | 184 | 180 | 187 | 193 | 191 | 199 | 206 | 215 | 206 | 216 | 230 |
| Greece | 16 | 14 | 16 | 16 | 18 | 18 | 21 | 16 | 16 | 15 | 15 | 15 |
| Eastern Europe | 59 | 66 | 71 | 75 | 85 | 88 | 86 | 81 | 72 | 48 | 40 | 39 |
| Hungary | 13 | 13 | 13 | 15 | 15 | 15 | 13 | 12 | 12 | 9 | 7 | 7 |
| Romania | 21 | 28 | 33 | 38 | 45 | 47 | 48 | 49 | 40 | 22 | 17 | 17 |
| FSU-15 | 0 | 0 | 0 | 0 | 0 | 657 | 671 | 656 | 612 | 599 | 622 | 661 |
| USSR | 648 | 700 | 688 | 671 | 621 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| USSR+FSU15 | 648 | 700 | 688 | 671 | 621 | 657 | 671 | 656 | 612 | 599 | 622 | 661 |
| Turkmenistan | 0 | 0 | 0 | 0 | 0 | 18 | 19 | 17 | 16 | 19 | 40 | 50 |
| Ukraine | 0 | 0 | 0 | 0 | 0 | 35 | 35 | 33 | 28 | 23 | 24 | 25 |
| Uzbekistan | 0 | 0 | 0 | 0 | 0 | 155 | 166 | 161 | 147 | 160 | 160 | 160 |
| Kazakhstan | 0 | 0 | 0 | 0 | 0 | 133 | 135 | 133 | 124 | 118 | 121 | 115 |
| Russia | 0 | 0 | 0 | 0 | 0 | 306 | 306 | 301 | 286 | 267 | 265 | 300 |
| Middle East | 621 | 558 | 546 | 601 | 592 | 662 | 589 | 668 | 650 | 665 | 755 | 765 |
| Turkey | 77 | 70 | 64 | 68 | 70 | 65 | 70 | 75 | 75 | 50 | 65 | 75 |
| Iraq | 60 | 58 | 39 | 53 | 50 | 70 | 51 | 73 | 85 | 40 | 40 | 40 |
| Iran | 483 | 429 | 442 | 479 | 471 | 526 | 467 | 519 | 490 | 575 | 650 | 650 |
| Asia | 125,223 | 129,279 | 129,162 | 129,276 | 129,017 | 125,507 | 129,561 | 131,950 | 132,247 | 130,658 | 130,049 | 130,137 |
| South Asia | 53,070 | 56,131 | 55,774 | 55,872 | 55,833 | 53,375 | 56,482 | 57,089 | 57,709 | 56,995 | 55,704 | 55,746 |
| Afghanistan | 231 | 232 | 214 | 214 | 214 | 181 | 214 | 214 | 214 | 210 | 210 | 210 |
| India | 38,262 | 41,244 | 41,159 | 41,137 | 40,774 | 38,806 | 41,736 | 42,167 | 42,687 | 42,307 | 41,400 | 41,200 |
| Pakistan | 1,978 | 1,998 | 1,998 | 1,863 | 2,066 | 1,963 | 2,042 | 2,107 | 2,114 | 2,097 | 1,974 | 2,206 |
| Nepal | 1,265 | 1,334 | 1,377 | 1,391 | 1,333 | 1,423 | 1,450 | 1,433 | 1,431 | 1,350 | 1,300 | 1,350 |
| Bangladesh | 10,587 | 10,546 | 10,140 | 10,403 | 10,609 | 10,322 | 10,220 | 10,478 | 10,435 | 10,240 | 10,080 | 10,000 |
| Sri Lanka | 747 | 777 | 886 | 864 | 837 | 680 | 820 | 690 | 828 | 791 | 740 | 780 |
| Southeast Asia | 34,353 | 35,221 | 35,432 | 36,546 | 36,202 | 35,439 | 36,689 | 37,702 | 37,057 | 36,741 | 37,950 | 38,778 |
| Burma | 4,560 | 4,661 | 4,603 | 4,660 | 4,666 | 4,483 | 4,527 | 4,733 | 4,797 | 4,524 | 4,855 | 5,260 |
| Vietnam | 5,708 | 5,742 | 5,842 | 5,825 | 5,679 | 5,732 | 5,982 | 6,053 | 6,268 | 6,521 | 6,525 | 6,400 |
| Thailand | 8,940 | 9,606 | 9,629 | 9,833 | 9,659 | 9,237 | 9,917 | 9,986 | 8,792 | 9,053 | 9,400 | 9,600 |
| Laos | 664 | 647 | 680 | 730 | 730 | 675 | 650 | 700 | 860 | 750 | 800 | 800 |
| Khmer Rep | 1,615 | 1,611 | 1,063 | 1,541 | 1,532 | 1,600 | 1,670 | 1,640 | 1,740 | 1,670 | 1,600 | 1,600 |
| Malaysia | 635 | 648 | 626 | 649 | 635 | 629 | 655 | 612 | 662 | 650 | 660 | 665 |
| Indonesia | 8,988 | 9,162 | 9,764 | 9,902 | 9,896 | 9,800 | 9,800 | 10,530 | 10,502 | 10,282 | 10,870 | 11,250 |
| Philippines | 3,240 | 3,141 | 3,222 | 3,403 | 3,402 | 3,280 | 3,485 | 3,445 | 3,433 | 3,288 | 3,237 | 3,200 |
| China, Peoples Rep. | 33,056 | 33,136 | 33,178 | 32,070 | 32,266 | 32,139 | 31,914 | 32,700 | 33,064 | 32,590 | 32,090 | 31,300 |

*Refer to footnotes at end of table.*

*continued—*

Appendix table 48—World rice area harvested, 1960–93—continued

| Country or region 1/ Calendar year | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 hectares | | | | | | | |
| EC-12 | 301 | 273 | 308 | 318 | 334 | 329 | 347 | 331 | 373 | 367 | 359 | 342 |
| France | 5 | 7 | 9 | 11 | 12 | 12 | 14 | 17 | 19 | 20 | 20 | 22 |
| Spain | 68 | 41 | 73 | 74 | 79 | 76 | 80 | 59 | 90 | 94 | 83 | 50 |
| Portugal | 34 | 27 | 30 | 30 | 32 | 32 | 33 | 33 | 33 | 32 | 25 | 25 |
| Italy | 178 | 184 | 180 | 187 | 193 | 191 | 199 | 206 | 215 | 206 | 216 | 230 |
| Greece | 16 | 14 | 16 | 16 | 18 | 18 | 21 | 16 | 16 | 15 | 15 | 15 |
| Eastern Europe | 59 | 66 | 71 | 75 | 85 | 88 | 86 | 81 | 72 | 48 | 40 | 39 |
| Hungary | 13 | 13 | 13 | 15 | 15 | 15 | 13 | 12 | 12 | 9 | 7 | 7 |
| Romania | 21 | 28 | 33 | 38 | 45 | 47 | 48 | 49 | 40 | 22 | 17 | 17 |
| FSU-15 | 0 | 0 | 0 | 0 | 0 | 657 | 671 | 656 | 612 | 599 | 622 | 661 |
| USSR | 648 | 700 | 688 | 671 | 621 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| USSR+FSU15 | 648 | 700 | 688 | 671 | 621 | 657 | 671 | 656 | 612 | 599 | 622 | 661 |
| Turkmenistan | 0 | 0 | 0 | 0 | 0 | 18 | 19 | 17 | 16 | 19 | 40 | 50 |
| Ukraine | 0 | 0 | 0 | 0 | 0 | 35 | 35 | 33 | 28 | 23 | 24 | 25 |
| Uzbekistan | 0 | 0 | 0 | 0 | 0 | 155 | 166 | 161 | 147 | 160 | 160 | 160 |
| Kazakhstan | 0 | 0 | 0 | 0 | 0 | 133 | 135 | 133 | 124 | 118 | 121 | 115 |
| Russia | 0 | 0 | 0 | 0 | 0 | 306 | 306 | 301 | 286 | 267 | 265 | 300 |
| Middle East | 621 | 558 | 546 | 601 | 592 | 662 | 589 | 668 | 650 | 665 | 755 | 765 |
| Turkey | 77 | 70 | 64 | 68 | 70 | 65 | 70 | 75 | 75 | 50 | 65 | 75 |
| Iraq | 60 | 58 | 39 | 53 | 50 | 70 | 51 | 73 | 85 | 40 | 40 | 40 |
| Iran | 483 | 429 | 442 | 479 | 471 | 526 | 467 | 519 | 490 | 575 | 650 | 650 |
| Asia | 125,223 | 129,279 | 129,162 | 129,276 | 129,017 | 125,507 | 129,561 | 131,950 | 132,247 | 130,658 | 130,049 | 130,137 |
| South Asia | 53,070 | 56,131 | 55,774 | 55,872 | 55,833 | 53,375 | 56,482 | 57,089 | 57,709 | 56,995 | 55,704 | 55,746 |
| Afghanistan | 231 | 232 | 214 | 214 | 214 | 181 | 214 | 214 | 214 | 210 | 210 | 210 |
| India | 38,262 | 41,244 | 41,159 | 41,137 | 40,774 | 38,806 | 41,736 | 42,167 | 42,687 | 42,307 | 41,400 | 41,200 |
| Pakistan | 1,978 | 1,998 | 1,998 | 1,863 | 2,066 | 1,963 | 2,042 | 2,107 | 2,114 | 2,097 | 1,974 | 2,206 |
| Nepal | 1,265 | 1,334 | 1,377 | 1,391 | 1,333 | 1,423 | 1,450 | 1,433 | 1,431 | 1,350 | 1,300 | 1,350 |
| Bangladesh | 10,587 | 10,546 | 10,140 | 10,403 | 10,609 | 10,322 | 10,220 | 10,478 | 10,435 | 10,240 | 10,080 | 10,000 |
| Sri Lanka | 747 | 777 | 886 | 864 | 837 | 680 | 820 | 690 | 828 | 791 | 740 | 780 |
| Southeast Asia | 34,353 | 35,221 | 35,432 | 36,546 | 36,202 | 35,439 | 36,689 | 37,702 | 37,057 | 36,741 | 37,950 | 38,778 |
| Burma | 4,560 | 4,661 | 4,603 | 4,660 | 4,666 | 4,483 | 4,527 | 4,733 | 4,797 | 4,524 | 4,855 | 5,260 |
| Vietnam | 5,708 | 5,742 | 5,842 | 5,825 | 5,679 | 5,732 | 5,982 | 6,053 | 6,268 | 6,521 | 6,525 | 6,400 |
| Thailand | 8,940 | 9,606 | 9,629 | 9,833 | 9,659 | 9,237 | 9,917 | 9,986 | 8,792 | 9,053 | 9,400 | 9,600 |
| Laos | 664 | 647 | 680 | 730 | 730 | 675 | 650 | 700 | 860 | 750 | 800 | 800 |
| Khmer Rep | 1,615 | 1,611 | 1,063 | 1,541 | 1,532 | 1,600 | 1,670 | 1,640 | 1,740 | 1,670 | 1,600 | 1,600 |
| Malaysia | 635 | 648 | 626 | 649 | 635 | 629 | 655 | 612 | 662 | 650 | 660 | 665 |
| Indonesia | 8,988 | 9,162 | 9,764 | 9,902 | 9,896 | 9,800 | 9,800 | 10,530 | 10,502 | 10,282 | 10,870 | 11,250 |
| Philippines | 3,240 | 3,141 | 3,222 | 3,403 | 3,402 | 3,280 | 3,485 | 3,445 | 3,433 | 3,288 | 3,237 | 3,200 |
| China, Peoples Rep. | 33,056 | 33,136 | 33,178 | 32,070 | 32,266 | 32,139 | 31,914 | 32,700 | 33,064 | 32,590 | 32,090 | 31,300 |

*Refer to footnotes at end of table.*

*continued—*

Appendix table 48—World rice area harvested, 1960–93—continued

| Country or region 1/ Calendar year | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 hectares | | | | | | | |
| East Asia | 4,744 | 4,791 | 4,778 | 4,788 | 4,716 | 4,554 | 4,476 | 4,459 | 4,417 | 4,332 | 4,305 | 4,313 |
| Japan | 2,257 | 2,273 | 2,315 | 2,342 | 2,303 | 2,146 | 2,100 | 2,097 | 2,074 | 2,049 | 2,106 | 2,130 |
| Taiwan | 659 | 645 | 587 | 564 | 532 | 501 | 471 | 475 | 454 | 429 | 397 | 403 |
| Korea, South | 1,188 | 1,228 | 1,231 | 1,237 | 1,236 | 1,262 | 1,260 | 1,257 | 1,244 | 1,209 | 1,157 | 1,135 |
| Korea, North | 640 | 645 | 645 | 645 | 645 | 645 | 645 | 630 | 645 | 645 | 645 | 645 |
| Australia | 85 | 119 | 126 | 107 | 96 | 107 | 98 | 105 | 89 | 128 | 125 | 135 |
| Africa | 4,813 | 4,816 | 5,061 | 5,100 | 5,401 | 5,366 | 5,534 | 5,540 | 5,355 | 5,477 | 5,408 | 5,527 |
| North Africa | 432 | 424 | 415 | 391 | 465 | 432 | 361 | 354 | 437 | 469 | 519 | 506 |
| Egypt | 430 | 421 | 412 | 389 | 459 | 423 | 352 | 352 | 435 | 462 | 510 | 500 |
| Subsaharan Africa | 4,381 | 4,392 | 4,646 | 4,709 | 4,936 | 4,934 | 5,173 | 5,186 | 4,918 | 5,008 | 4,889 | 5,021 |
| West Africa | 2,545 | 2,594 | 2,854 | 2,884 | 3,014 | 2,995 | 3,117 | 3,122 | 2,906 | 3,050 | 2,973 | 3,034 |
| Guinea-Bissau | 143 | 90 | 140 | 97 | 105 | 120 | 123 | 120 | 120 | 170 | 120 | 120 |
| Senegal | 68 | 52 | 66 | 71 | 72 | 74 | 81 | 73 | 73 | 73 | 74 | 75 |
| Mali | 110 | 188 | 165 | 165 | 250 | 200 | 245 | 235 | 240 | 240 | 235 | 235 |
| Guinea | 410 | 400 | 556 | 561 | 567 | 573 | 561 | 575 | 490 | 650 | 600 | 600 |
| Sierra Leone | 425 | 425 | 400 | 380 | 380 | 385 | 360 | 370 | 310 | 255 | 265 | 270 |
| Ivory Coast | 350 | 380 | 411 | 420 | 509 | 540 | 595 | 620 | 625 | 630 | 615 | 640 |
| Ghana | 61 | 40 | 57 | 87 | 70 | 81 | 95 | 72 | 50 | 95 | 70 | 75 |
| Gambia | 28 | 16 | 20 | 20 | 27 | 20 | 25 | 25 | 22 | 22 | 23 | 23 |
| Togo | 17 | 17 | 20 | 20 | 21 | 23 | 33 | 22 | 22 | 22 | 23 | 23 |
| Nigeria | 600 | 630 | 670 | 710 | 660 | 630 | 635 | 640 | 650 | 600 | 655 | 680 |
| Burkina | 25 | 22 | 21 | 28 | 23 | 19 | 22 | 20 | 20 | 25 | 25 | 25 |
| Liberia | 210 | 236 | 232 | 231 | 233 | 236 | 233 | 235 | 175 | 165 | 165 | 165 |
| Central Africa | 314 | 288 | 285 | 282 | 278 | 276 | 325 | 300 | 290 | 285 | 290 | 290 |
| Cameroon | 25 | 30 | 35 | 40 | 35 | 35 | 35 | 36 | 35 | 35 | 35 | 35 |
| Chad | 40 | 35 | 31 | 22 | 20 | 15 | 25 | 25 | 25 | 21 | 21 | 21 |
| Zaire | 314 | 288 | 285 | 282 | 278 | 276 | 325 | 300 | 290 | 285 | 290 | 290 |
| East Africa | 197 | 198 | 200 | 241 | 338 | 363 | 426 | 435 | 370 | 385 | 325 | 395 |
| Tanzania | 180 | 180 | 182 | 220 | 315 | 340 | 402 | 410 | 345 | 360 | 300 | 370 |
| Southern Africa, Ex. S. A | 1,325 | 1,312 | 1,307 | 1,302 | 1,306 | 1,300 | 1,305 | 1,329 | 1,352 | 1,288 | 1,301 | 1,302 |
| Mozambique | 70 | 55 | 45 | 70 | 70 | 55 | 50 | 50 | 70 | 60 | 60 | 60 |
| Madagascar | 1,188 | 1,189 | 1,190 | 1,180 | 1,180 | 1,195 | 1,200 | 1,220 | 1,240 | 1,200 | 1,200 | 1,200 |
| Malawi | 42 | 42 | 43 | 21 | 23 | 19 | 23 | 26 | 25 | 10 | 24 | 25 |

1/ Region total include countries with less than 25,000 hectares harvested.

Appendix table 49—World rough rice production, 1960–93

| Country or region/ Local marketing year | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| World | 220,613 | 215,642 | 228,104 | 248,337 | 265,490 | 253,530 | 262,057 | 276,881 | 285,806 | 295,226 | 312,496 |
| United States | 2,477 | 2,459 | 2,996 | 3,188 | 3,318 | 3,460 | 3,856 | 4,054 | 4,723 | 4,168 | 3,801 |
| Foreign | 218,136 | 213,183 | 225,108 | 245,149 | 262,172 | 250,070 | 258,201 | 272,827 | 281,083 | 291,058 | 308,695 |
| Less developed | 123,158 | 123,644 | 125,448 | 133,873 | 141,140 | 125,833 | 125,454 | 139,594 | 147,989 | 155,275 | 158,739 |
| Centrally planned | 70,732 | 64,914 | 74,845 | 85,802 | 95,273 | 99,369 | 106,586 | 105,190 | 105,572 | 107,541 | 123,410 |
| Newly industrializing | 6,769 | 7,481 | 6,991 | 7,994 | 8,444 | 7,975 | 8,686 | 8,289 | 7,870 | 8,847 | 8,824 |
| Latin America | 8,134 | 8,298 | 8,670 | 9,040 | 10,686 | 8,880 | 10,136 | 10,188 | 9,974 | 10,557 | 9,480 |
| Mexico | 328 | 333 | 289 | 296 | 274 | 378 | 372 | 417 | 346 | 394 | 405 |
| Central America | 248 | 256 | 273 | 285 | 319 | 333 | 350 | 406 | 443 | 403 | 355 |
| Guatemala | 14 | 13 | 16 | 18 | 20 | 13 | 15 | 21 | 25 | 27 | 20 |
| Nicaragua | 34 | 38 | 37 | 46 | 48 | 53 | 63 | 67 | 85 | 65 | 75 |
| Costa Rica | 56 | 57 | 60 | 65 | 67 | 72 | 77 | 81 | 83 | 104 | 79 |
| Panama | 96 | 109 | 110 | 111 | 128 | 151 | 140 | 151 | 163 | 165 | 131 |
| Caribbean | 518 | 399 | 419 | 340 | 349 | 308 | 336 | 330 | 372 | 499 | 634 |
| Cuba | 338 | 212 | 231 | 140 | 123 | 55 | 68 | 92 | 100 | 205 | 326 |
| Haiti | 50 | 55 | 60 | 64 | 68 | 72 | 76 | 77 | 77 | 83 | 80 |
| Dominican Republic | 115 | 117 | 112 | 120 | 145 | 169 | 180 | 149 | 183 | 198 | 214 |
| South America Ex., Braz., | 1,499 | 1,571 | 1,771 | 1,584 | 1,896 | 1,894 | 2,069 | 2,100 | 2,074 | 2,206 | 2,404 |
| Colombia | 450 | 474 | 585 | 550 | 600 | 672 | 680 | 662 | 786 | 694 | 752 |
| Venezuela | 72 | 81 | 103 | 131 | 166 | 200 | 195 | 223 | 245 | 244 | 226 |
| Guyana | 203 | 226 | 227 | 172 | 280 | 242 | 254 | 188 | 189 | 174 | 211 |
| Surinam | 72 | 72 | 79 | 75 | 88 | 101 | 112 | 120 | 116 | 113 | 144 |
| Ecuador | 136 | 169 | 193 | 198 | 172 | 162 | 191 | 179 | 131 | 241 | 190 |
| Peru | 358 | 332 | 374 | 270 | 351 | 291 | 374 | 461 | 286 | 444 | 587 |
| Bolivia | 33 | 34 | 39 | 43 | 47 | 51 | 52 | 57 | 66 | 83 | 64 |
| Chile | 105 | 105 | 78 | 78 | 80 | 80 | 77 | 85 | 94 | 37 | 75 |
| Brazil | 5,392 | 5,557 | 5,740 | 6,345 | 7,580 | 5,802 | 6,792 | 6,652 | 6,394 | 6,648 | 5,394 |
| Paraguay | 16 | 17 | 16 | 20 | 22 | 11 | 18 | 21 | 27 | 37 | 33 |
| Uruguay | 54 | 61 | 77 | 47 | 90 | 84 | 116 | 104 | 134 | 139 | 122 |
| Argentina | 149 | 182 | 178 | 190 | 268 | 165 | 217 | 283 | 345 | 407 | 288 |

—continued

Appendix table 49—World rough rice production, 1960–93—continued

| Country or region/ Local marketing year | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| EU (EC–12) | 1,291 | 1,486 | 1,427 | 1,323 | 1,432 | 1,200 | 1,330 | 1,467 | 1,335 | 1,644 | 1,562 |
| France | 103 | 134 | 130 | 117 | 122 | 98 | 100 | 117 | 83 | 93 | 88 |
| Spain | 361 | 394 | 392 | 399 | 398 | 350 | 375 | 366 | 362 | 410 | 382 |
| Portugal | 151 | 177 | 174 | 166 | 181 | 139 | 154 | 146 | 149 | 176 | 195 |
| Italy | 622 | 700 | 663 | 564 | 624 | 509 | 621 | 745 | 639 | 862 | 819 |
| Greece | 54 | 81 | 68 | 77 | 107 | 104 | 80 | 93 | 102 | 103 | 78 |
| Eastern Europe | 148 | 125 | 118 | 164 | 146 | 125 | 158 | 189 | 158 | 204 | 209 |
| Hungary | 45 | 38 | 36 | 48 | 35 | 21 | 31 | 43 | 41 | 50 | 45 |
| Romania | 49 | 31 | 20 | 51 | 54 | 46 | 56 | 68 | 60 | 68 | 65 |
| FSU–15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| USSR | 149 | 222 | 245 | 337 | 423 | 434 | 640 | 803 | 954 | 994 | 1,149 |
| USSR+FSU15 | 149 | 222 | 245 | 337 | 423 | 434 | 640 | 803 | 954 | 994 | 1,149 |
| Turkmenistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ukraine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Uzbekistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kazakhstan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Russia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Middle East | 999 | 884 | 1,185 | 1,214 | 1,243 | 1,406 | 1,492 | 1,494 | 1,534 | 1,544 | 1,486 |
| Turkey | 169 | 215 | 254 | 200 | 154 | 200 | 231 | 215 | 189 | 200 | 246 |
| Iraq | 118 | 65 | 78 | 151 | 162 | 177 | 158 | 315 | 354 | 318 | 180 |
| Iran | 709 | 600 | 850 | 860 | 923 | 1,023 | 1,098 | 959 | 980 | 1,020 | 1,056 |
| Asia | 203,614 | 198,907 | 207,438 | 227,080 | 241,930 | 232,181 | 238,336 | 251,604 | 259,804 | 268,697 | 287,171 |
| South Asia | 71,330 | 73,007 | 68,267 | 76,749 | 80,454 | 67,017 | 65,427 | 79,158 | 83,713 | 86,360 | 87,723 |
| Afghanistan | 313 | 319 | 319 | 319 | 380 | 380 | 337 | 396 | 402 | 407 | 366 |
| India | 52,011 | 53,548 | 49,875 | 55,553 | 59,021 | 45,929 | 45,703 | 56,474 | 59,701 | 60,706 | 63,401 |
| Pakistan | 1,547 | 1,692 | 1,645 | 1,790 | 2,028 | 1,977 | 2,049 | 2,250 | 3,051 | 3,605 | 3,303 |
| Nepal | 2,040 | 2,108 | 2,108 | 2,109 | 2,201 | 2,207 | 2,007 | 2,119 | 2,178 | 2,241 | 2,305 |
| Bangladesh | 14,522 | 14,441 | 13,318 | 15,952 | 15,770 | 15,767 | 14,377 | 16,774 | 17,033 | 18,026 | 16,731 |
| Sri Lanka | 897 | 899 | 1,002 | 1,026 | 1,054 | 757 | 954 | 1,145 | 1,348 | 1,375 | 1,617 |
| Southeast Asia | 48,176 | 47,586 | 51,183 | 50,644 | 52,295 | 52,200 | 50,939 | 50,581 | 53,866 | 58,758 | 62,626 |
| Burma | 6,850 | 6,486 | 7,666 | 7,790 | 8,509 | 8,258 | 6,285 | 7,942 | 8,200 | 7,986 | 8,179 |
| Vietnam | 9,168 | 9,258 | 9,746 | 9,623 | 9,697 | 9,332 | 8,435 | 8,688 | 8,166 | 9,115 | 9,915 |
| Thailand | 9,508 | 9,886 | 10,992 | 11,585 | 11,362 | 10,977 | 11,947 | 9,626 | 10,439 | 13,411 | 13,570 |
| Laos | 500 | 540 | 510 | 520 | 735 | 740 | 754 | 811 | 771 | 895 | 905 |
| Khmer Rep. | 2,335 | 2,383 | 2,038 | 2,622 | 2,760 | 2,500 | 2,375 | 2,457 | 3,251 | 2,503 | 3,814 |
| Malaysia | 1,152 | 1,022 | 1,135 | 1,188 | 1,103 | 1,255 | 1,234 | 1,194 | 1,432 | 1,597 | 1,678 |
| Indonesia | 14,953 | 14,096 | 15,124 | 13,468 | 14,134 | 15,063 | 15,812 | 15,297 | 17,156 | 18,013 | 19,324 |
| Philippines | 3,705 | 3,910 | 3,967 | 3,843 | 3,992 | 4,072 | 4,094 | 4,560 | 4,445 | 5,232 | 5,235 |
| China, Peoples Rep. | 59,730 | 53,640 | 62,986 | 73,766 | 83,000 | 87,721 | 95,390 | 93,686 | 94,529 | 95,066 | 109,990 |

*continued—*

Appendix table 49—World rough rice production, 1960–93—continued

| Country or region/ Local marketing year | 1960 | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1,000 metric tons | | | | | |
| East Asia | 24,378 | 24,674 | 25,002 | 25,921 | 26,181 | 25,243 | 26,580 | 28,179 | 27,696 | 28,513 | 26,832 |
| Japan | 16,072 | 15,524 | 16,261 | 16,015 | 15,730 | 15,511 | 15,931 | 18,066 | 18,061 | 17,504 | 15,861 |
| Taiwan | 2,592 | 2,733 | 2,864 | 2,859 | 3,045 | 3,184 | 3,226 | 3,273 | 3,414 | 3,147 | 3,340 |
| Korea, South | 4,151 | 4,718 | 4,108 | 5,120 | 5,387 | 4,770 | 5,443 | 5,004 | 4,438 | 5,681 | 5,471 |
| Korea, North | 1,537 | 1,669 | 1,750 | 1,912 | 2,007 | 1,757 | 1,963 | 1,824 | 1,765 | 2,162 | 2,147 |
| Australia | 114 | 134 | 136 | 142 | 153 | 182 | 214 | 221 | 256 | 247 | 299 |
| Africa | 3,687 | 3,127 | 5,889 | 5,849 | 6,159 | 5,662 | 5,895 | 6,861 | 7,068 | 7,171 | 7,339 |
| North Africa | 1,514 | 1,165 | 2,063 | 2,246 | 2,067 | 1,815 | 1,711 | 2,310 | 2,633 | 2,613 | 2,645 |
| Egypt | 1,486 | 1,142 | 2,038 | 2,219 | 2,036 | 1,790 | 1,679 | 2,279 | 2,586 | 2,556 | 2,605 |
| Subsaharan Africa | 2,173 | 1,962 | 3,826 | 3,603 | 4,092 | 3,847 | 4,184 | 4,551 | 4,435 | 4,558 | 4,694 |
| West Africa | 1,844 | 1,627 | 1,922 | 1,792 | 2,078 | 1,927 | 2,050 | 2,286 | 2,149 | 2,277 | 2,286 |
| Guinea-Bissau | 118 | 120 | 120 | 120 | 120 | 80 | 60 | 45 | 45 | 28 | 35 |
| Senegal | 82 | 83 | 90 | 106 | 109 | 125 | 125 | 135 | 59 | 142 | 98 |
| Mali | 185 | 185 | 190 | 160 | 158 | 158 | 129 | 172 | 94 | 120 | 138 |
| Guinea | 323 | 219 | 319 | 249 | 329 | 272 | 275 | 351 | 375 | 368 | 351 |
| Sierra Leone | 369 | 263 | 315 | 331 | 373 | 399 | 433 | 469 | 427 | 507 | 458 |
| Ivory Coast | 160 | 156 | 229 | 219 | 248 | 240 | 274 | 347 | 365 | 303 | 316 |
| Ghana | 32 | 34 | 32 | 42 | 42 | 32 | 38 | 52 | 65 | 67 | 80 |
| Gambia | 29 | 29 | 30 | 31 | 37 | 37 | 37 | 20 | 40 | 37 | 41 |
| Togo | 12 | 9 | 18 | 23 | 27 | 17 | 27 | 27 | 17 | 21 | 23 |
| Nigeria | 360 | 344 | 370 | 304 | 405 | 355 | 406 | 391 | 375 | 386 | 427 |
| Burkina Faso | 31 | 30 | 45 | 25 | 34 | 25 | 31 | 45 | 42 | 38 | 35 |
| Liberia | 111 | 115 | 119 | 125 | 130 | 134 | 140 | 142 | 152 | 163 | 190 |
| Central Africa | 70 | 71 | 74 | 60 | 55 | 49 | 91 | 100 | 129 | 129 | 158 |
| Cameroon | 0 | 5 | 9 | 11 | 14 | 14 | 17 | 23 | 17 | 18 | 12 |
| Chad | 23 | 23 | 24 | 34 | 38 | 25 | 37 | 32 | 35 | 37 | 39 |
| Zaire | 70 | 71 | 74 | 60 | 55 | 49 | 91 | 100 | 129 | 129 | 158 |
| East Africa | 107 | 109 | 119 | 197 | 134 | 99 | 157 | 131 | 156 | 169 | 216 |
| Tanzania | 95 | 94 | 104 | 183 | 120 | 84 | 140 | 114 | 136 | 144 | 182 |
| Southern Africa, Ex. S.A. | 152 | 155 | 1,711 | 1,554 | 1,825 | 1,772 | 1,886 | 2,034 | 2,001 | 1,983 | 2,034 |
| Mozambique | 116 | 120 | 130 | 135 | 145 | 145 | 150 | 165 | 90 | 102 | 118 |
| Madagascar | 0 | 0 | 1,552 | 1,388 | 1,648 | 1,589 | 1,700 | 1,830 | 1,872 | 1,858 | 1,869 |
| Malawi | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

*continued—*

Appendix table 49—World rough rice production, 1960–93—continued

| Country or region/ Local marketing year | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| World | 316,593 | 306,229 | 333,800 | 331,074 | 357,425 | 346,755 | 368,745 | 385,423 | 376,568 | 393,805 | 407,562 |
| United States | 3,890 | 3,875 | 4,208 | 5,098 | 5,824 | 5,243 | 4,500 | 6,039 | 5,986 | 6,629 | 8,289 |
| Foreign | 312,703 | 302,354 | 329,592 | 325,976 | 351,601 | 341,512 | 364,245 | 379,384 | 370,582 | 387,176 | 399,273 |
| Less developed | 159,410 | 149,085 | 166,276 | 159,690 | 182,463 | 171,485 | 189,648 | 198,122 | 183,136 | 206,763 | 211,388 |
| Centrally planned | 129,170 | 127,896 | 137,055 | 139,343 | 140,740 | 142,441 | 144,454 | 151,766 | 159,685 | 156,866 | 162,439 |
| Newly industrializing | 8,701 | 8,812 | 8,914 | 9,501 | 9,866 | 10,818 | 11,971 | 11,444 | 10,373 | 8,962 | 10,153 |
| Latin America | 10,336 | 10,971 | 11,303 | 12,389 | 14,725 | 13,651 | 13,446 | 13,751 | 16,378 | 15,390 | 16,536 |
| Mexico | 367 | 420 | 435 | 487 | 720 | 450 | 525 | 412 | 480 | 390 | 585 |
| Central America | 435 | 401 | 503 | 509 | 619 | 484 | 503 | 587 | 601 | 568 | 668 |
| Guatemala | 58 | 61 | 67 | 52 | 73 | 21 | 26 | 26 | 50 | 48 | 42 |
| Nicaragua | 83 | 75 | 84 | 90 | 116 | 60 | 69 | 86 | 62 | 69 | 120 |
| Costa Rica | 90 | 89 | 104 | 128 | 158 | 166 | 149 | 197 | 210 | 171 | 202 |
| Panama | 136 | 125 | 162 | 178 | 185 | 145 | 186 | 186 | 170 | 163 | 196 |
| Caribbean | 658 | 686 | 747 | 760 | 857 | 857 | 899 | 921 | 930 | 994 | 1,002 |
| Cuba | 329 | 351 | 375 | 400 | 417 | 451 | 458 | 458 | 425 | 478 | 462 |
| Haiti | 80 | 71 | 85 | 88 | 92 | 55 | 105 | 95 | 85 | 95 | 109 |
| Dominican Republic | 234 | 249 | 272 | 258 | 325 | 325 | 309 | 351 | 397 | 391 | 398 |
| South America Ex., Braz., | 2,450 | 2,572 | 2,820 | 3,282 | 3,720 | 3,540 | 3,729 | 3,926 | 4,463 | 4,514 | 4,773 |
| Colombia | 905 | 1,043 | 1,175 | 1,540 | 1,614 | 1,549 | 1,400 | 1,715 | 1,932 | 1,892 | 1,798 |
| Venezuela | 142 | 165 | 302 | 297 | 363 | 277 | 495 | 545 | 652 | 712 | 682 |
| Guyana | 185 | 158 | 170 | 256 | 297 | 173 | 358 | 308 | 238 | 257 | 252 |
| Surinam | 137 | 122 | 163 | 162 | 175 | 173 | 203 | 227 | 237 | 259 | 267 |
| Ecuador | 181 | 195 | 236 | 241 | 321 | 300 | 217 | 193 | 241 | 347 | 432 |
| Peru | 591 | 552 | 450 | 426 | 474 | 560 | 547 | 424 | 560 | 421 | 652 |
| Bolivia | 77 | 76 | 69 | 83 | 127 | 113 | 120 | 89 | 76 | 94 | 101 |
| Chile | 68 | 86 | 55 | 34 | 75 | 98 | 120 | 105 | 182 | 95 | 100 |
| Brazil | 6,132 | 6,632 | 6,483 | 7,000 | 8,500 | 8,000 | 7,481 | 7,593 | 9,638 | 8,638 | 9,154 |
| Paraguay | 36 | 38 | 42 | 55 | 57 | 69 | 38 | 58 | 57 | 75 | 71 |
| Uruguay | 128 | 137 | 158 | 188 | 217 | 228 | 231 | 262 | 288 | 362 | 418 |
| Argentina | 294 | 260 | 315 | 351 | 309 | 320 | 309 | 312 | 266 | 286 | 354 |

—continued

Appendix table 49—World rough rice production, 1960–93—continued

| Country or region/ Local marketing year | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| EU (EC-12) | 1,565 | 1,391 | 1,750 | 1,690 | 1,659 | 1,522 | 1,313 | 1,624 | 1,827 | 1,668 | 1,612 |
| France | 77 | 52 | 62 | 44 | 38 | 28 | 18 | 37 | 31 | 25 | 17 |
| Spain | 361 | 346 | 386 | 367 | 378 | 406 | 380 | 401 | 428 | 433 | 444 |
| Portugal | 162 | 164 | 168 | 129 | 132 | 97 | 102 | 135 | 146 | 155 | 112 |
| Italy | 892 | 751 | 1,044 | 1,047 | 1,009 | 907 | 719 | 956 | 1,127 | 969 | 960 |
| Greece | 73 | 78 | 90 | 103 | 102 | 84 | 94 | 95 | 95 | 86 | 79 |
| Eastern Europe | 237 | 184 | 212 | 198 | 241 | 133 | 188 | 174 | 207 | 171 | 203 |
| Hungary | 67 | 60 | 68 | 56 | 68 | 32 | 35 | 22 | 41 | 24 | 38 |
| Romania | 66 | 45 | 50 | 52 | 68 | 37 | 48 | 58 | 60 | 38 | 49 |
| FSU-15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| USSR | 1,283 | 1,478 | 1,585 | 1,718 | 1,805 | 1,797 | 1,991 | 1,895 | 2,146 | 2,506 | 2,235 |
| USSR+FSU15 | 1,283 | 1,478 | 1,585 | 1,718 | 1,805 | 1,797 | 1,991 | 1,895 | 2,146 | 2,506 | 2,235 |
| Turkmenistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ukraine | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Uzbekistan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kazakhstan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Russia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Middle East | 1,626 | 1,659 | 1,738 | 1,618 | 1,501 | 1,688 | 1,843 | 1,725 | 1,766 | 1,894 | 2,132 |
| Turkey | 269 | 188 | 245 | 231 | 231 | 243 | 254 | 292 | 346 | 262 | 305 |
| Iraq | 307 | 268 | 157 | 69 | 61 | 164 | 176 | 150 | 158 | 167 | 162 |
| Iran | 1,047 | 1,200 | 1,333 | 1,312 | 1,201 | 1,276 | 1,408 | 1,280 | 1,259 | 1,462 | 1,662 |
| Asia | 289,782 | 279,190 | 305,676 | 300,736 | 323,377 | 314,199 | 336,790 | 351,582 | 339,464 | 356,798 | 367,670 |
| South Asia | 87,349 | 81,175 | 91,858 | 84,317 | 100,484 | 88,791 | 107,325 | 109,610 | 91,933 | 111,118 | 110,832 |
| Afghanistan | 350 | 340 | 420 | 420 | 451 | 457 | 460 | 460 | 438 | 462 | 475 |
| India | 64,667 | 58,926 | 66,143 | 59,428 | 73,183 | 62,938 | 79,005 | 80,740 | 63,559 | 80,527 | 79,952 |
| Pakistan | 3,343 | 3,436 | 3,686 | 3,468 | 3,929 | 4,110 | 4,429 | 4,913 | 4,829 | 4,689 | 5,150 |
| Nepal | 2,680 | 2,011 | 2,416 | 2,453 | 2,605 | 2,386 | 2,282 | 2,339 | 2,060 | 2,464 | 2,562 |
| Bangladesh | 14,913 | 15,150 | 17,881 | 16,947 | 19,162 | 17,647 | 19,473 | 19,293 | 19,129 | 20,844 | 20,467 |
| Sri Lanka | 1,396 | 1,312 | 1,312 | 1,601 | 1,154 | 1,253 | 1,676 | 1,865 | 1,918 | 2,132 | 2,226 |
| Southeast Asia | 62,698 | 58,856 | 65,584 | 65,149 | 68,415 | 71,438 | 69,736 | 75,135 | 75,636 | 82,183 | 87,096 |
| Burma | 8,192 | 7,373 | 8,600 | 8,584 | 9,210 | 9,320 | 9,461 | 10,530 | 10,450 | 10,680 | 10,760 |
| Vietnam | 10,225 | 10,748 | 11,125 | 11,023 | 10,538 | 12,075 | 10,885 | 10,040 | 10,758 | 11,842 | 13,238 |
| Thailand | 13,744 | 12,412 | 14,900 | 13,386 | 15,300 | 15,067 | 13,921 | 17,470 | 15,758 | 17,368 | 17,776 |
| Laos | 812 | 817 | 883 | 905 | 885 | 858 | 851 | 795 | 868 | 1,140 | 1,250 |
| Khmer Rep. | 2,732 | 1,926 | 1,051 | 635 | 1,500 | 1,800 | 1,800 | 1,500 | 1,568 | 1,714 | 1,490 |
| Malaysia | 1,809 | 1,826 | 1,968 | 2,092 | 1,998 | 1,995 | 1,913 | 1,509 | 2,111 | 2,059 | 1,688 |
| Indonesia | 20,182 | 19,387 | 21,481 | 22,463 | 22,331 | 23,301 | 23,347 | 25,772 | 26,282 | 29,651 | 32,774 |
| Philippines | 4,997 | 4,362 | 5,571 | 6,056 | 6,643 | 7,016 | 7,552 | 7,513 | 7,835 | 7,723 | 8,110 |
| China, Peoples Rep. | 115,204 | 113,354 | 121,736 | 123,904 | 125,560 | 125,804 | 128,566 | 136,929 | 143,750 | 139,906 | 143,954 |

--continued

Appendix table 49—World rough rice production, 1960–93—continued

| Country or region/ Local marketing year | 1971 | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| East Asia | 24,531 | 25,805 | 26,498 | 27,366 | 28,918 | 28,166 | 31,163 | 29,908 | 28,145 | 23,591 | 25,788 |
| Japan | 13,609 | 14,861 | 15,187 | 15,365 | 16,456 | 14,716 | 16,368 | 15,736 | 14,948 | 12,188 | 12,826 |
| Taiwan | 3,137 | 3,309 | 3,057 | 3,324 | 3,380 | 3,284 | 3,475 | 3,092 | 3,099 | 2,978 | 3,004 |
| Korea, South | 5,553 | 5,496 | 5,850 | 6,174 | 6,485 | 7,533 | 8,495 | 8,352 | 7,274 | 5,984 | 7,149 |
| Korea, North | 2,221 | 2,132 | 2,397 | 2,500 | 2,596 | 2,632 | 2,824 | 2,728 | 2,824 | 2,441 | 2,809 |
| Australia | 248 | 309 | 410 | 387 | 417 | 530 | 491 | 692 | 613 | 729 | 855 |
| Africa | 7,626 | 7,172 | 6,918 | 7,240 | 7,876 | 7,992 | 8,183 | 7,941 | 8,181 | 8,020 | 8,030 |
| North Africa | 2,687 | 2,524 | 2,290 | 2,274 | 2,452 | 2,319 | 2,297 | 2,384 | 2,533 | 2,412 | 2,254 |
| Egypt | 2,681 | 2,507 | 2,275 | 2,242 | 2,424 | 2,300 | 2,272 | 2,351 | 2,510 | 2,384 | 2,236 |
| Subsaharan Africa | 4,939 | 4,648 | 4,628 | 4,966 | 5,424 | 5,673 | 5,886 | 5,557 | 5,648 | 5,608 | 5,776 |
| West Africa | 2,500 | 2,309 | 2,315 | 2,473 | 2,864 | 2,926 | 2,934 | 2,971 | 2,889 | 2,863 | 3,027 |
| Guinea-Bissau | 35 | 37 | 28 | 30 | 68 | 80 | 34 | 35 | 40 | 31 | 51 |
| Senegal | 108 | 45 | 65 | 117 | 132 | 63 | 146 | 148 | 97 | 65 | 120 |
| Mali | 170 | 130 | 100 | 89 | 218 | 236 | 182 | 252 | 165 | 165 | 176 |
| Guinea | 375 | 375 | 300 | 300 | 385 | 415 | 391 | 366 | 348 | 351 | 331 |
| Sierra Leone | 500 | 478 | 478 | 490 | 500 | 528 | 587 | 500 | 527 | 513 | 500 |
| Ivory Coast | 385 | 319 | 335 | 403 | 476 | 426 | 477 | 505 | 533 | 419 | 390 |
| Ghana | 67 | 72 | 75 | 73 | 70 | 70 | 58 | 108 | 93 | 78 | 97 |
| Gambia | 41 | 52 | 55 | 55 | 31 | 35 | 12 | 26 | 60 | 34 | 38 |
| Togo | 24 | 15 | 11 | 14 | 14 | 23 | 17 | 23 | 17 | 24 | 21 |
| Nigeria | 462 | 466 | 514 | 523 | 586 | 611 | 620 | 592 | 559 | 786 | 871 |
| Burkina Faso | 37 | 34 | 32 | 35 | 40 | 45 | 38 | 40 | 48 | 40 | 45 |
| Liberia | 200 | 210 | 225 | 248 | 228 | 245 | 257 | 243 | 249 | 218 | 240 |
| Central Africa | 180 | 191 | 182 | 191 | 192 | 195 | 218 | 226 | 231 | 246 | 251 |
| Cameroon | 12 | 11 | 12 | 18 | 29 | 48 | 42 | 45 | 38 | 47 | 63 |
| Chad | 51 | 28 | 33 | 35 | 36 | 50 | 20 | 39 | 69 | 42 | 25 |
| Zaire | 180 | 191 | 182 | 191 | 192 | 195 | 218 | 226 | 231 | 246 | 251 |
| East Africa | 231 | 205 | 246 | 194 | 389 | 369 | 436 | 315 | 332 | 252 | 364 |
| Tanzania | 193 | 171 | 204 | 154 | 346 | 314 | 386 | 263 | 284 | 195 | 313 |
| Southern Africa, Ex. S.A. | 2,028 | 1,943 | 1,885 | 2,108 | 1,979 | 2,183 | 2,298 | 2,045 | 2,196 | 2,247 | 2,134 |
| Mozambique | 120 | 120 | 120 | 102 | 79 | 68 | 70 | 48 | 70 | 70 | 61 |
| Madagascar | 1,872 | 1,795 | 1,730 | 1,972 | 1,841 | 2,042 | 2,155 | 1,914 | 2,045 | 2,109 | 2,011 |
| Malawi | 0 | 0 | 0 | 0 | 33 | 42 | 42 | 50 | 50 | 38 | 33 |

—continued

Appendix table 49—World rough rice production, 1960–93—continued

| Country or region/ Local marketing year | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1,000 metric tons | | | | | | |
| World | 416,122 | 448,476 | 463,591 | 466,617 | 465,530 | 463,793 | 487,500 | 506,614 | 518,008 | 514,969 | 519,445 | 513,734 |
| United States | 6,969 | 4,523 | 6,296 | 6,122 | 6,049 | 5,879 | 7,253 | 7,007 | 7,081 | 7,142 | 8,149 | 7,081 |
| Foreign | 409,153 | 443,953 | 457,295 | 460,495 | 459,481 | 457,914 | 480,247 | 499,607 | 510,927 | 507,827 | 511,296 | 506,653 |
| Less developed | 201,499 | 228,042 | 228,530 | 242,440 | 238,777 | 234,682 | 261,002 | 268,258 | 271,324 | 272,233 | 272,739 | 276,561 |
| Centrally planned | 182,214 | 190,091 | 200,536 | 190,218 | 193,302 | 197,279 | 193,364 | 205,007 | 213,280 | 210,459 | 212,845 | 208,791 |
| Newly industrializing | 10,447 | 10,751 | 10,809 | 10,605 | 10,368 | 9,998 | 10,704 | 10,494 | 10,017 | 9,728 | 9,317 | 8,544 |
| Latin America | 15,159 | 16,085 | 16,444 | 17,544 | 18,017 | 19,318 | 18,963 | 15,341 | 17,197 | 18,007 | 17,968 | 18,000 |
| Mexico | 510 | 435 | 436 | 747 | 526 | 570 | 399 | 540 | 300 | 285 | 300 | 210 |
| Central America | 577 | 719 | 689 | 741 | 635 | 559 | 571 | 676 | 692 | 723 | 693 | 685 |
| Guatemala | 48 | 44 | 42 | 44 | 39 | 53 | 61 | 41 | 39 | 45 | 41 | 41 |
| Nicaragua | 131 | 135 | 125 | 155 | 145 | 105 | 95 | 98 | 114 | 157 | 169 | 169 |
| Costa Rica | 143 | 246 | 200 | 243 | 183 | 137 | 171 | 226 | 194 | 188 | 191 | 168 |
| Panama | 176 | 200 | 175 | 187 | 179 | 166 | 139 | 175 | 215 | 186 | 165 | 200 |
| Caribbean | 1,080 | 1,181 | 1,256 | 1,126 | 1,212 | 1,037 | 1,112 | 1,159 | 1,024 | 1,035 | 1,084 | 1,070 |
| Cuba | 520 | 518 | 555 | 525 | 571 | 466 | 489 | 535 | 451 | 431 | 438 | 438 |
| Haiti | 133 | 133 | 167 | 133 | 117 | 117 | 117 | 117 | 117 | 117 | 100 | 100 |
| Dominican Republic | 394 | 495 | 498 | 431 | 486 | 422 | 474 | 474 | 426 | 457 | 514 | 500 |
| South America Ex., Braz., | 4,915 | 4,275 | 4,898 | 4,679 | 4,714 | 4,972 | 5,345 | 4,664 | 4,721 | 5,210 | 5,421 | 5,852 |
| Colombia | 2,071 | 1,780 | 1,695 | 1,798 | 1,865 | 1,775 | 2,102 | 1,817 | 1,738 | 1,692 | 1,646 | 1,692 |
| Venezuela | 609 | 449 | 409 | 472 | 369 | 400 | 332 | 312 | 400 | 660 | 595 | 646 |
| Guyana | 277 | 250 | 312 | 265 | 357 | 350 | 262 | 220 | 155 | 252 | 280 | 433 |
| Surinam | 279 | 279 | 290 | 298 | 300 | 279 | 300 | 119 | 119 | 121 | 130 | 159 |
| Ecuador | 378 | 270 | 430 | 382 | 535 | 423 | 433 | 490 | 576 | 720 | 752 | 819 |
| Peru | 706 | 632 | 918 | 710 | 597 | 1,000 | 960 | 891 | 867 | 814 | 829 | 839 |
| Bolivia | 86 | 61 | 194 | 181 | 139 | 180 | 194 | 143 | 143 | 154 | 185 | 185 |
| Chile | 131 | 162 | 154 | 115 | 146 | 160 | 162 | 138 | 151 | 132 | 120 | 123 |
| Brazil | 7,800 | 9,000 | 8,765 | 9,816 | 10,578 | 11,800 | 11,088 | 7,971 | 10,000 | 10,100 | 9,901 | 9,706 |
| Paraguay | 65 | 52 | 66 | 52 | 70 | 24 | 70 | 70 | 55 | 55 | 170 | 170 |
| Uruguay | 313 | 340 | 430 | 406 | 336 | 381 | 530 | 464 | 517 | 610 | 714 | 786 |
| Argentina | 277 | 475 | 400 | 435 | 352 | 380 | 448 | 331 | 460 | 654 | 569 | 477 |

—continued

Appendix table 49—World rough rice production, 1960–93—continued

| Country or region/ Local marketing year | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1,000 metric tons | | | | | | |
| EU (EC–12) | 1,607 | 1,480 | 1,708 | 1,968 | 1,925 | 1,916 | 1,952 | 2,068 | 2,394 | 2,274 | 2,223 | 1,947 |
| France | 26 | 35 | 35 | 62 | 60 | 59 | 74 | 97 | 125 | 118 | 117 | 117 |
| Spain | 401 | 224 | 437 | 459 | 494 | 483 | 499 | 340 | 571 | 586 | 557 | 326 |
| Portugal | 143 | 109 | 134 | 148 | 149 | 145 | 146 | 148 | 152 | 152 | 112 | 112 |
| Italy | 954 | 1,029 | 1,012 | 1,193 | 1,103 | 1,113 | 1,119 | 1,375 | 1,451 | 1,328 | 1,342 | 1,297 |
| Greece | 83 | 83 | 90 | 106 | 119 | 116 | 114 | 108 | 95 | 90 | 95 | 95 |
| Eastern Europe | 212 | 247 | 254 | 278 | 349 | 326 | 321 | 168 | 164 | 112 | 86 | 85 |
| Hungary | 48 | 48 | 33 | 48 | 48 | 48 | 48 | 28 | 38 | 25 | 15 | 15 |
| Romania | 46 | 85 | 111 | 138 | 177 | 154 | 160 | 68 | 68 | 31 | 25 | 25 |
| FSU–15 | 0 | 0 | 0 | 0 | 0 | 2,430 | 2,599 | 2,253 | 2,163 | 1,995 | 1,966 | 2,297 |
| USSR | 2,218 | 2,335 | 2,443 | 2,308 | 2,365 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| USSR+FSU15 | 2,218 | 2,335 | 2,443 | 2,308 | 2,365 | 2,430 | 2,599 | 2,253 | 2,163 | 1,995 | 1,966 | 2,297 |
| Turkmenistan | 0 | 0 | 0 | 0 | 0 | 45 | 49 | 45 | 42 | 54 | 82 | 154 |
| Ukraine | 0 | 0 | 0 | 0 | 0 | 171 | 163 | 152 | 117 | 102 | 92 | 115 |
| Uzbekistan | 0 | 0 | 0 | 0 | 0 | 506 | 582 | 485 | 503 | 515 | 540 | 538 |
| Kazakhstan | 0 | 0 | 0 | 0 | 0 | 606 | 626 | 555 | 578 | 522 | 468 | 538 |
| Russia | 0 | 0 | 0 | 0 | 0 | 1,072 | 1,146 | 986 | 895 | 772 | 755 | 923 |
| Middle East | 2,110 | 1,632 | 1,868 | 2,193 | 2,203 | 2,249 | 1,830 | 2,320 | 2,465 | 2,406 | 2,550 | 2,542 |
| Turkey | 323 | 291 | 258 | 249 | 254 | 246 | 254 | 231 | 246 | 154 | 223 | 215 |
| Iraq | 164 | 111 | 110 | 149 | 146 | 197 | 141 | 233 | 249 | 75 | 75 | 75 |
| Iran | 1,620 | 1,227 | 1,497 | 1,792 | 1,800 | 1,803 | 1,432 | 1,853 | 1,970 | 2,177 | 2,252 | 2,252 |
| Asia | 378,762 | 412,980 | 425,211 | 426,544 | 424,343 | 421,585 | 444,330 | 467,089 | 475,265 | 471,331 | 474,713 | 469,307 |
| South Asia | 101,665 | 122,643 | 120,020 | 128,631 | 124,850 | 118,738 | 140,122 | 147,898 | 149,596 | 148,781 | 145,679 | 148,572 |
| Afghanistan | 478 | 480 | 480 | 480 | 480 | 345 | 491 | 451 | 431 | 431 | 431 | 431 |
| India | 70,681 | 90,155 | 87,514 | 95,747 | 90,633 | 85,302 | 105,744 | 110,371 | 111,448 | 110,501 | 108,761 | 110,261 |
| Pakistan | 5,173 | 5,014 | 4,973 | 4,379 | 5,230 | 4,862 | 4,800 | 4,830 | 4,898 | 4,865 | 4,674 | 5,371 |
| Nepal | 1,832 | 2,760 | 2,709 | 2,803 | 2,800 | 2,982 | 3,282 | 3,390 | 3,500 | 3,221 | 2,721 | 3,153 |
| Bangladesh | 21,345 | 21,752 | 21,932 | 22,562 | 23,111 | 23,122 | 23,327 | 26,793 | 26,781 | 27,378 | 27,033 | 27,003 |
| Sri Lanka | 2,156 | 2,482 | 2,412 | 2,660 | 2,596 | 2,125 | 2,478 | 2,063 | 2,538 | 2,385 | 2,059 | 2,353 |
| Southeast Asia | 89,260 | 94,728 | 98,053 | 101,054 | 98,883 | 102,469 | 108,889 | 112,529 | 110,393 | 114,398 | 117,238 | 117,967 |
| Burma | 10,960 | 11,520 | 11,320 | 11,500 | 11,800 | 11,400 | 12,500 | 13,500 | 13,695 | 12,800 | 13,400 | 14,655 |
| Vietnam | 15,232 | 15,608 | 16,358 | 15,955 | 14,905 | 17,427 | 18,248 | 19,352 | 18,818 | 21,933 | 21,530 | 21,800 |
| Thailand | 16,877 | 19,548 | 19,905 | 20,264 | 18,868 | 18,427 | 21,264 | 20,177 | 17,192 | 20,400 | 19,930 | 18,485 |
| Laos | 1,172 | 1,083 | 1,300 | 1,458 | 1,490 | 1,220 | 1,085 | 1,417 | 1,500 | 1,250 | 1,500 | 1,500 |
| Khmer Rep. | 2,048 | 2,040 | 1,259 | 1,789 | 2,086 | 2,075 | 2,470 | 2,670 | 2,100 | 2,397 | 2,200 | 2,200 |
| Malaysia | 1,650 | 1,778 | 1,568 | 1,953 | 1,786 | 1,696 | 1,783 | 1,781 | 2,019 | 1,800 | 1,860 | 1,890 |
| Indonesia | 33,584 | 35,303 | 38,137 | 39,032 | 38,971 | 41,538 | 42,308 | 44,726 | 45,178 | 44,680 | 47,300 | 48,200 |
| Philippines | 7,731 | 7,842 | 8,200 | 9,097 | 8,971 | 8,680 | 9,225 | 8,900 | 9,885 | 9,132 | 9,512 | 9,231 |
| China, Peoples Rep. | 161,596 | 168,866 | 178,256 | 168,570 | 172,224 | 173,880 | 169,110 | 180,130 | 189,331 | 183,810 | 186,220 | 182,000 |

*—continued*

Appendix table 49—World rough rice production, 1960–93—continued

| Country or region/ Local marketing year | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 1,000 metric tons | | | | | | |
| East Asia | 26,241 | 26,743 | 28,882 | 28,289 | 28,386 | 26,498 | 26,209 | 26,532 | 25,945 | 24,342 | 25,576 | 20,768 |
| Japan | 12,838 | 12,957 | 14,848 | 14,577 | 14,559 | 13,284 | 12,419 | 12,934 | 13,124 | 12,005 | 13,216 | 9,615 |
| Taiwan | 3,140 | 3,143 | 2,839 | 2,750 | 2,496 | 2,402 | 2,333 | 2,359 | 2,285 | 2,300 | 2,060 | 2,152 |
| Korea, South | 7,307 | 7,608 | 7,970 | 7,855 | 7,872 | 7,596 | 8,371 | 8,135 | 7,732 | 7,428 | 7,257 | 6,392 |
| Korea, North | 2,956 | 3,035 | 3,225 | 3,107 | 3,459 | 3,216 | 3,086 | 3,104 | 2,804 | 2,609 | 3,043 | 2,609 |
| Australia | 548 | 632 | 864 | 687 | 550 | 755 | 806 | 846 | 788 | 1,128 | 956 | 1,195 |
| Africa | 8,537 | 8,562 | 8,503 | 8,973 | 9,729 | 9,335 | 9,446 | 9,522 | 10,491 | 10,574 | 10,834 | 11,280 |
| North Africa | 2,443 | 2,448 | 2,336 | 2,315 | 2,750 | 2,366 | 2,163 | 2,136 | 3,173 | 3,476 | 3,957 | 3,939 |
| Egypt | 2,437 | 2,442 | 2,330 | 2,312 | 2,731 | 2,331 | 2,130 | 2,130 | 3,167 | 3,447 | 3,910 | 3,900 |
| Subsaharan Africa | 6,094 | 6,114 | 6,167 | 6,658 | 6,979 | 6,969 | 7,283 | 7,386 | 7,318 | 7,098 | 6,877 | 7,341 |
| West Africa | 3,211 | 3,179 | 3,232 | 3,605 | 3,757 | 3,738 | 3,984 | 3,894 | 3,768 | 3,878 | 3,822 | 4,017 |
| Guinea–Bissau | 95 | 78 | 105 | 115 | 125 | 142 | 145 | 160 | 160 | 165 | 162 | 162 |
| Senegal | 105 | 109 | 135 | 146 | 148 | 135 | 146 | 182 | 182 | 194 | 177 | 192 |
| Mali | 129 | 217 | 109 | 142 | 245 | 236 | 288 | 273 | 276 | 276 | 273 | 273 |
| Guinea | 400 | 395 | 403 | 437 | 511 | 515 | 522 | 426 | 500 | 648 | 600 | 600 |
| Sierra Leone | 484 | 524 | 460 | 505 | 525 | 543 | 517 | 517 | 400 | 400 | 383 | 425 |
| Ivory Coast | 451 | 359 | 514 | 541 | 561 | 598 | 691 | 711 | 716 | 723 | 691 | 750 |
| Ghana | 36 | 40 | 66 | 72 | 63 | 135 | 158 | 67 | 82 | 152 | 105 | 117 |
| Gambia | 37 | 19 | 27 | 40 | 41 | 24 | 40 | 41 | 35 | 35 | 40 | 40 |
| Togo | 17 | 17 | 17 | 17 | 18 | 21 | 30 | 20 | 20 | 20 | 23 | 23 |
| Nigeria | 974 | 913 | 871 | 1,023 | 947 | 827 | 833 | 900 | 900 | 800 | 900 | 967 |
| Burkina Faso | 43 | 40 | 42 | 51 | 38 | 22 | 38 | 42 | 42 | 31 | 31 | 31 |
| Liberia | 283 | 290 | 298 | 288 | 288 | 298 | 298 | 280 | 210 | 200 | 200 | 200 |
| Central Africa | 254 | 274 | 270 | 262 | 253 | 257 | 288 | 275 | 262 | 258 | 275 | 275 |
| Cameroon | 68 | 97 | 110 | 123 | 113 | 120 | 115 | 117 | 110 | 110 | 108 | 108 |
| Chad | 23 | 18 | 1 | 26 | 25 | 15 | 35 | 22 | 22 | 23 | 22 | 22 |
| Zaire | 254 | 274 | 270 | 262 | 253 | 257 | 288 | 275 | 262 | 258 | 275 | 275 |
| East Africa | 398 | 391 | 410 | 487 | 600 | 702 | 683 | 774 | 754 | 683 | 455 | 705 |
| Tanzania | 343 | 340 | 362 | 430 | 534 | 639 | 624 | 714 | 692 | 620 | 390 | 640 |
| Southern Africa, Ex. S.A. | 2,231 | 2,270 | 2,255 | 2,304 | 2,369 | 2,272 | 2,328 | 2,443 | 2,534 | 2,279 | 2,325 | 2,344 |
| Mozambique | 61 | 55 | 55 | 55 | 61 | 55 | 55 | 55 | 64 | 33 | 61 | 61 |
| Madagascar | 2,105 | 2,147 | 2,131 | 2,178 | 2,230 | 2,150 | 2,200 | 2,305 | 2,406 | 2,208 | 2,203 | 2,219 |
| Malawi | 33 | 33 | 35 | 33 | 36 | 27 | 32 | 45 | 44 | 15 | 42 | 42 |

Appendix table 50—Major world rice exporters, 1961–94

| Country | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| World | 6,512 | 6,349 | 7,342 | 7,731 | 8,245 | 7,880 | 7,779 | 7,166 | 7,494 | 8,197 | 8,553 |
| United States | 835 | 1,050 | 1,197 | 1,317 | 1,549 | 1,347 | 1,795 | 1,834 | 1,837 | 1,738 | 1,409 |
| Foreign | 5,677 | 5,299 | 6,145 | 6,414 | 6,696 | 6,533 | 5,984 | 5,332 | 5,657 | 6,459 | 7,144 |
| Brazil | 151 | 44 | 0 | 12 | 237 | 289 | 32 | 158 | 70 | 95 | 149 |
| Italy | 259 | 209 | 176 | 80 | 119 | 108 | 222 | 279 | 280 | 594 | 473 |
| Pakistan | 124 | 128 | 102 | 164 | 135 | 213 | 140 | 81 | 135 | 130 | 196 |
| Nepal | 159 | 179 | 182 | 273 | 234 | 266 | 247 | 292 | 260 | 247 | 228 |
| Burma | 1,591 | 1,744 | 1,712 | 1,413 | 1,335 | 1,128 | 546 | 331 | 562 | 677 | 844 |
| Vietnam | 182 | 90 | 330 | 60 | 6 | 13 | 3 | 2 | 20 | 18 | 3 |
| Thailand | 1,576 | 1,271 | 1,418 | 1,896 | 1,895 | 1,508 | 1,483 | 1,068 | 1,023 | 1,064 | 1,576 |
| China, Peoples Rep. | 428 | 458 | 684 | 762 | 985 | 1,487 | 1,577 | 1,299 | 1,179 | 1,280 | 1,292 |
| Korea, North | 22 | 0 | 0 | 0 | 44 | 72 | 125 | 60 | 96 | 89 | 103 |
| Australia | 62 | 38 | 58 | 57 | 65 | 64 | 99 | 97 | 124 | 111 | 165 |
| Less developed | 4,277 | 3,988 | 4,412 | 4,975 | 4,908 | 4,284 | 3,535 | 3,140 | 3,299 | 3,472 | 3,897 |
| Centrally planned | 663 | 575 | 1,037 | 876 | 1,051 | 1,595 | 1,714 | 1,366 | 1,325 | 1,453 | 1,478 |
| Newly industrializing | 261 | 359 | 370 | 304 | 401 | 347 | 202 | 204 | 131 | 62 | 94 |

*--continued*

Appendix table 50—Major world rice exporters, 1961–94—continued

| Country | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| World | 8,719 | 8,383 | 7,661 | 7,321 | 8,399 | 10,605 | 9,596 | 11,865 | 12,541 | 12,658 | 11,490 |
| United States | 1,949 | 1,581 | 1,697 | 2,057 | 2,032 | 2,264 | 2,264 | 2,267 | 2,977 | 3,008 | 2,486 |
| Foreign | 6,770 | 6,802 | 5,964 | 5,264 | 6,367 | 8,341 | 7,332 | 9,598 | 9,564 | 9,650 | 9,004 |
| Brazil | 2 | 33 | 57 | 3 | 76 | 410 | 180 | 0 | 1 | 46 | 11 |
| Italy | 372 | 247 | 461 | 451 | 396 | 275 | 409 | 475 | 519 | 389 | 455 |
| Pakistan | 300 | 771 | 478 | 498 | 861 | 860 | 703 | 1,366 | 971 | 1,127 | 794 |
| Nepal | 325 | 300 | 21 | 115 | 181 | 105 | 85 | 100 | 10 | 43 | 50 |
| Burma | 570 | 157 | 214 | 307 | 657 | 690 | 375 | 590 | 675 | 674 | 701 |
| Vietnam | 3 | 0 | 0 | 1 | 2 | 6 | 5 | 0 | 33 | 5 | 15 |
| Thailand | 2,112 | 849 | 1,046 | 933 | 1,870 | 2,915 | 1,573 | 2,696 | 2,681 | 3,049 | 3,620 |
| China, Peoples Rep. | 1,426 | 2,631 | 2,060 | 1,630 | 876 | 1,033 | 1,435 | 1,053 | 1,116 | 509 | 446 |
| Korea, North | 88 | 96 | 286 | 328 | 89 | 269 | 412 | 234 | 284 | 262 | 204 |
| Australia | 143 | 158 | 145 | 185 | 218 | 260 | 337 | 400 | 321 | 335 | 530 |
| Less developed | 4,058 | 2,739 | 2,304 | 2,404 | 4,397 | 5,860 | 3,880 | 5,846 | 5,770 | 6,753 | 6,253 |
| Centrally planned | 1,675 | 2,846 | 2,581 | 2,030 | 1,094 | 1,402 | 1,972 | 1,561 | 1,646 | 907 | 765 |
| Newly industrializing | 174 | 143 | 38 | 23 | 8 | 167 | 343 | 428 | 334 | 93 | 307 |

—continued

Appendix table 50—Major world rice exporters, 1961–94—continued

| Country | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | | |
| World | 11,507 | 12,138 | 11,511 | 12,435 | 13,350 | 11,848 | 14,649 | 12,367 | 12,768 | 14,833 | 15,423 | 16,163 |
| United States | 2,330 | 2,128 | 1,902 | 2,397 | 2,444 | 2,241 | 2,967 | 2,420 | 2,197 | 2,106 | 2,500 | 2,700 |
| Foreign | 9,177 | 10,010 | 9,609 | 10,038 | 10,906 | 9,607 | 11,682 | 9,947 | 10,571 | 12,727 | 12,923 | 13,463 |
| Brazil | 7 | 0 | 0 | 0 | 0 | 20 | 5 | 0 | 0 | 0 | 0 | 0 |
| Italy | 532 | 435 | 531 | 551 | 555 | 443 | 464 | 554 | 617 | 711 | 625 | 500 |
| Pakistan | 1,298 | 1,057 | 962 | 1,146 | 1,226 | 923 | 789 | 904 | 1,297 | 1,358 | 900 | 1,300 |
| Nepal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Burma | 750 | 727 | 450 | 660 | 493 | 368 | 456 | 186 | 176 | 185 | 275 | 400 |
| Vietnam | 140 | 83 | 60 | 125 | 153 | 97 | 1,383 | 1,670 | 1,048 | 1,914 | 1,900 | 2,000 |
| Thailand | 3,694 | 4,528 | 3,993 | 4,334 | 4,344 | 4,791 | 6,036 | 3,938 | 3,988 | 4,776 | 4,700 | 4,000 |
| China, Peoples Rep. | 328 | 1,125 | 1,019 | 957 | 1,301 | 698 | 315 | 326 | 689 | 933 | 1,300 | 1,400 |
| Korea, North | 102 | 31 | 77 | 20 | 179 | 236 | 68 | 43 | 9 | 0 | 0 | 0 |
| Australia | 280 | 241 | 450 | 400 | 338 | 417 | 450 | 470 | 400 | 500 | 500 | 775 |
| Less developed | 6,471 | 7,147 | 6,966 | 7,261 | 7,387 | 7,054 | 8,337 | 6,230 | 6,877 | 7,993 | 7,900 | 8,075 |
| Centrally planned | 670 | 1,339 | 1,239 | 1,171 | 1,874 | 1,197 | 1,916 | 2,189 | 1,896 | 2,872 | 3,231 | 3,425 |
| Newly industrializing | 530 | 345 | 37 | 175 | 241 | 104 | 68 | 81 | 248 | 190 | 202 | 225 |

Appendix table 51—Major rice importers, 1961–94

| Country or region/ calendar year | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| World | 5,854 | 6,014 | 6,718 | 7,422 | 7,336 | 7,392 | 6,917 | 6,560 | 6,938 | 7,571 | 7,782 |
| United States | 6 | 10 | 0 | 1 | 30 | 6 | 0 | 0 | 1 | 20 | 62 |
| Foreign | 5,848 | 6,004 | 6,718 | 7,421 | 7,306 | 7,386 | 6,917 | 6,560 | 6,937 | 7,551 | 7,720 |
| Less developed | 4,040 | 3,775 | 4,343 | 4,965 | 4,270 | 4,074 | 3,478 | 3,394 | 3,386 | 4,298 | 4,113 |
| Centrally planned | 240 | 577 | 517 | 656 | 658 | 1,000 | 1,380 | 1,196 | 1,497 | 1,621 | 1,205 |
| Newly industrializing | 785 | 790 | 971 | 708 | 671 | 649 | 822 | 849 | 1,217 | 836 | 1,492 |
| Canada | 39 | 39 | 47 | 46 | 54 | 39 | 41 | 42 | 42 | 48 | 71 |
| Mexico | 0 | 0 | 2 | 0 | 17 | 12 | 0 | 0 | 5 | 16 | 1 |
| Cuba | 187 | 195 | 190 | 286 | 282 | 146 | 157 | 177 | 186 | 199 | 280 |
| Haiti | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Colombia | 39 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 3 | 0 |
| Peru | 12 | 1 | 1 | 48 | 92 | 79 | 59 | 48 | 37 | 0 | 0 |
| Brazil | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 |
| United Kingdom | 100 | 114 | 107 | 105 | 111 | 107 | 102 | 116 | 109 | 126 | 147 |
| Netherlands | 61 | 72 | 55 | 70 | 50 | 63 | 60 | 70 | 66 | 69 | 69 |
| Belgium-Luxembourg | 54 | 56 | 42 | 49 | 30 | 44 | 37 | 41 | 46 | 45 | 56 |
| France | 63 | 70 | 54 | 58 | 87 | 117 | 105 | 136 | 115 | 92 | 103 |
| Germany | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spain | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Russia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turkey | 10 | 0 | 0 | 0 | 0 | 9 | 0 | 0 | 13 | 9 | 2 |
| Syria | 26 | 35 | 21 | 35 | 29 | 32 | 36 | 39 | 30 | 40 | 49 |
| Iraq | 70 | 69 | 14 | 95 | 1 | 0 | 11 | 0 | 0 | 2 | 97 |
| Iran | 19 | 7 | 3 | 41 | 29 | 10 | 24 | 2 | 1 | 1 | 60 |
| Jordan | 24 | 18 | 23 | 21 | 26 | 25 | 23 | 18 | 19 | 15 | 24 |
| Kuwait | 18 | 18 | 20 | 25 | 50 | 47 | 19 | 42 | 27 | 38 | 55 |
| Saudi Arabia | 85 | 142 | 120 | 99 | 141 | 142 | 125 | 124 | 151 | 202 | 200 |
| Yeman, United | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| United Arab Emirates | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 21 |
| Sri Lanka | 469 | 411 | 403 | 658 | 642 | 693 | 355 | 370 | 309 | 534 | 339 |
| Khmer Rep. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 10 | 1 | 20 |

—continued

Appendix table 51—Major rice importers, 1961–94—continued

| Country or region/ calendar year | 1961 | 1962 | 1963 | 1964 | 1965 | 1966 | 1967 | 1968 | 1969 | 1970 | 1971 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| Malaysia | 423 | 374 | 493 | 499 | 387 | 329 | 321 | 311 | 289 | 356 | 235 |
| Singapore | 335 | 350 | 440 | 270 | 291 | 262 | 256 | 288 | 237 | 275 | 272 |
| Indonesia | 1,064 | 1,025 | 1,043 | 1,010 | 203 | 308 | 354 | 628 | 604 | 956 | 516 |
| Brunei | 6 | 6 | 7 | 9 | 7 | 9 | 10 | 11 | 11 | 11 | 9 |
| Philippines | 9 | 31 | 256 | 300 | 570 | 108 | 290 | 0 | 0 | 0 | 369 |
| China, Peoples Rep. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 8 |
| Japan | 136 | 178 | 222 | 415 | 967 | 812 | 509 | 271 | 56 | 19 | 13 |
| Hong Kong | 394 | 427 | 412 | 410 | 370 | 367 | 421 | 314 | 347 | 307 | 330 |
| Korea, North | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Papua New Guinea | 0 | 0 | 0 | 24 | 28 | 34 | 33 | 39 | 38 | 44 | 46 |
| North Africa | 17 | 10 | 9 | 13 | 16 | 19 | 17 | 13 | 25 | 21 | 33 |
| Libya | 10 | 7 | 8 | 10 | 12 | 18 | 16 | 12 | 23 | 18 | 23 |
| Subsaharan Africa | 424 | 517 | 503 | 599 | 691 | 690 | 553 | 578 | 559 | 671 | 791 |
| Senegal | 110 | 118 | 101 | 184 | 179 | 159 | 153 | 185 | 146 | 119 | 188 |
| Guinea | 21 | 25 | 42 | 40 | 37 | 40 | 19 | 25 | 10 | 30 | 15 |
| Sierra Leone | 4 | 27 | 21 | 1 | 19 | 35 | 24 | 17 | 12 | 50 | 27 |
| Ivory Coast | 34 | 43 | 26 | 51 | 78 | 83 | 24 | 47 | 56 | 79 | 97 |
| Ghana | 30 | 47 | 27 | 39 | 30 | 49 | 40 | 31 | 28 | 53 | 35 |
| Nigeria | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 6 |
| Liberia | 23 | 28 | 36 | 44 | 33 | 46 | 33 | 46 | 28 | 49 | 54 |
| Somali Rep. | 16 | 17 | 23 | 37 | 29 | 22 | 17 | 15 | 16 | 23 | 38 |
| Angola | 1 | 1 | 2 | 1 | 2 | 3 | 2 | 2 | 2 | 5 | 1 |
| Mozambique | 1 | 3 | 6 | 0 | 1 | 4 | 5 | 4 | 0 | 1 | 1 |
| Madagascar | 0 | 0 | 2 | 5 | 78 | 13 | 0 | 0 | 43 | 20 | 61 |
| South Africa | 52 | 44 | 60 | 59 | 67 | 74 | 78 | 79 | 81 | 68 | 82 |

—continued

Appendix table 51—Major rice importers, 1961-94—continued

| Country or region/ calendar year | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| World | 8,318 | 8,095 | 8,184 | 7,896 | 8,907 | 9,836 | 9,373 | 11,793 | 11,945 | 12,626 | 10,688 |
| United States | 15 | 15 | 3 | 1 | 0 | 3 | 3 | 3 | 3 | 22 | 27 |
| Foreign | 8,303 | 8,080 | 8,181 | 7,895 | 8,907 | 9,833 | 9,370 | 11,790 | 11,942 | 12,604 | 10,661 |
| Less developed | 4,601 | 5,044 | 4,910 | 4,879 | 5,312 | 6,972 | 6,594 | 8,223 | 8,101 | 6,459 | 6,740 |
| Centrally planned | 1,397 | 1,131 | 1,403 | 1,180 | 1,540 | 970 | 739 | 1,222 | 1,173 | 1,767 | 1,461 |
| Newly industrializing | 1,377 | 914 | 905 | 884 | 715 | 596 | 539 | 930 | 1,290 | 2,783 | 710 |
| Canada | 66 | 66 | 56 | 60 | 66 | 89 | 89 | 90 | 99 | 99 | 108 |
| Mexico | 1 | 38 | 71 | 1 | 1 | 1 | 1 | 34 | 128 | 66 | 16 |
| Cuba | 256 | 201 | 276 | 200 | 179 | 144 | 171 | 161 | 137 | 70 | 175 |
| Haiti | 0 | 5 | 1 | 4 | 11 | 24 | 9 | 18 | 20 | 16 | 5 |
| Colombia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| Peru | 0 | 0 | 0 | 78 | 71 | 0 | 10 | 150 | 250 | 103 | 58 |
| Brazil | 9 | 11 | 0 | 63 | 17 | 0 | 29 | 711 | 239 | 142 | 124 |
| United Kingdom | 128 | 141 | 126 | 116 | 145 | 211 | 203 | 175 | 151 | 155 | 168 |
| Netherlands | 69 | 94 | 85 | 112 | 219 | 126 | 128 | 164 | 175 | 226 | 146 |
| Belgium-Luxembourg | 54 | 73 | 85 | 58 | 130 | 93 | 90 | 120 | 160 | 171 | 223 |
| France | 132 | 160 | 150 | 147 | 187 | 244 | 182 | 167 | 246 | 241 | 264 |
| Germany | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Spain | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 48 |
| Russia | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Turkey | 2 | 63 | 11 | 77 | 20 | 50 | 37 | 10 | 10 | 26 | 20 |
| Syria | 56 | 51 | 88 | 72 | 61 | 40 | 115 | 128 | 39 | 72 | 121 |
| Iraq | 33 | 16 | 210 | 218 | 198 | 237 | 290 | 382 | 379 | 350 | 369 |
| Iran | 92 | 145 | 268 | 367 | 276 | 578 | 320 | 371 | 507 | 583 | 587 |
| Jordan | 25 | 16 | 23 | 11 | 33 | 24 | 24 | 35 | 47 | 37 | 46 |
| Kuwait | 54 | 29 | 42 | 73 | 58 | 76 | 67 | 95 | 85 | 59 | 53 |
| Saudi Arabia | 151 | 142 | 203 | 189 | 300 | 161 | 404 | 341 | 356 | 427 | 471 |
| Yeman, United | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| United Arab Emirates | 14 | 5 | 34 | 39 | 79 | 87 | 83 | 135 | 159 | 103 | 54 |
| Sri Lanka | 266 | 343 | 302 | 434 | 425 | 542 | 161 | 211 | 189 | 168 | 214 |
| Khmer Rep. | 92 | 157 | 225 | 350 | 0 | 0 | 0 | 200 | 317 | 132 | 36 |

—continued

Appendix table 51—Major rice importers, 1961–94—continued

| Country or region/ calendar year | 1972 | 1973 | 1974 | 1975 | 1976 | 1977 | 1978 | 1979 | 1980 | 1981 | 1982 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | |
| Malaysia | 213 | 298 | 334 | 145 | 210 | 283 | 405 | 239 | 167 | 317 | 393 |
| Singapore | 358 | 234 | 163 | 147 | 226 | 225 | 194 | 214 | 187 | 178 | 185 |
| Indonesia | 762 | 1,638 | 1,056 | 671 | 1,309 | 1,989 | 1,824 | 1,934 | 2,040 | 543 | 364 |
| Brunei | 10 | 11 | 12 | 11 | 11 | 16 | 16 | 13 | 16 | 21 | 13 |
| Philippines | 458 | 306 | 168 | 152 | 55 | 30 | 0 | 0 | 0 | 0 | 0 |
| China, Peoples Rep. | 19 | 0 | 102 | 30 | 114 | 0 | 0 | 71 | 18 | 162 | 263 |
| Japan | 3 | 24 | 63 | 36 | 20 | 21 | 64 | 20 | 20 | 80 | 66 |
| Hong Kong | 409 | 380 | 281 | 307 | 323 | 304 | 343 | 361 | 315 | 301 | 300 |
| Korea, North | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Papua New Guinea | 49 | 62 | 42 | 55 | 59 | 60 | 60 | 84 | 97 | 87 | 88 |
| North Africa | 31 | 63 | 51 | 63 | 57 | 80 | 63 | 77 | 61 | 78 | 50 |
| Libya | 16 | 46 | 33 | 40 | 39 | 56 | 34 | 55 | 44 | 44 | 21 |
| Subsaharan Africa | 754 | 929 | 954 | 546 | 910 | 1,646 | 2,117 | 1,844 | 2,196 | 2,461 | 2,814 |
| Senegal | 170 | 192 | 207 | 102 | 236 | 248 | 228 | 259 | 280 | 322 | 370 |
| Guinea | 17 | 30 | 30 | 36 | 20 | 36 | 50 | 71 | 128 | 78 | 53 |
| Sierra Leone | 5 | 37 | 45 | 0 | 4 | 16 | 19 | 100 | 80 | 56 | 87 |
| Ivory Coast | 88 | 148 | 73 | 2 | 5 | 148 | 142 | 218 | 257 | 281 | 349 |
| Ghana | 24 | 54 | 39 | 0 | 0 | 73 | 95 | 36 | 30 | 39 | 40 |
| Nigeria | 11 | 2 | 4 | 6 | 94 | 446 | 789 | 242 | 394 | 686 | 666 |
| Liberia | 42 | 46 | 34 | 31 | 37 | 60 | 61 | 73 | 86 | 95 | 90 |
| Somali Rep. | 36 | 40 | 13 | 19 | 17 | 43 | 20 | 79 | 87 | 77 | 86 |
| Angola | 1 | 1 | 3 | 11 | 18 | 37 | 36 | 57 | 55 | 49 | 32 |
| Mozambique | 0 | 0 | 0 | 0 | 53 | 37 | 84 | 80 | 74 | 68 | 87 |
| Madagascar | 49 | 69 | 99 | 57 | 71 | 105 | 154 | 158 | 177 | 192 | 357 |
| South Africa | 75 | 92 | 65 | 79 | 81 | 99 | 92 | 121 | 126 | 134 | 146 |

*--continued*

Appendix table 51—Major rice importers, 1961-94—continued

| Country or region/ calendar year | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | | |
| World | 10,677 | 11,357 | 10,278 | 11,394 | 12,001 | 10,637 | 14,009 | 11,197 | 11,374 | 13,414 | 14,065 | 15,115 |
| United States | 39 | 41 | 81 | 96 | 110 | 129 | 124 | 151 | 163 | 175 | 190 | 200 |
| Foreign | 10,638 | 11,316 | 10,197 | 11,298 | 11,891 | 10,508 | 13,885 | 11,046 | 11,211 | 13,239 | 13,875 | 14,915 |
| Less developed | 7,618 | 7,950 | 7,050 | 7,576 | 7,843 | 6,934 | 9,545 | 7,972 | 7,813 | 9,638 | 9,992 | 9,372 |
| Centrally planned | 589 | 800 | 888 | 1,407 | 1,667 | 1,220 | 1,869 | 609 | 805 | 1,104 | 1,004 | 827 |
| Newly industrializing | 800 | 609 | 527 | 575 | 681 | 651 | 674 | 603 | 631 | 635 | 634 | 633 |
| Canada | 99 | 105 | 108 | 87 | 85 | 113 | 111 | 154 | 185 | 173 | 180 | 190 |
| Mexico | 0 | 103 | 39 | 1 | 1 | 1 | 189 | 148 | 173 | 385 | 350 | 400 |
| Cuba | 180 | 53 | 131 | 101 | 168 | 162 | 164 | 238 | 264 | 138 | 375 | 300 |
| Haiti | 4 | 4 | 7 | 25 | 98 | 53 | 79 | 112 | 103 | 136 | 140 | 140 |
| Colombia | 1 | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 45 | 118 | 85 | 100 |
| Peru | 126 | 43 | 1 | 203 | 115 | 19 | 237 | 233 | 340 | 325 | 220 | 250 |
| Brazil | 247 | 56 | 497 | 1,202 | 85 | 110 | 147 | 493 | 776 | 450 | 480 | 650 |
| United Kingdom | 177 | 190 | 201 | 294 | 214 | 237 | 248 | 245 | 248 | 264 | 300 | 275 |
| Netherlands | 153 | 167 | 203 | 175 | 196 | 137 | 133 | 199 | 177 | 196 | 200 | 200 |
| Belgium-Luxembourg | 241 | 256 | 280 | 194 | 192 | 185 | 254 | 180 | 184 | 149 | 170 | 180 |
| France | 327 | 324 | 278 | 294 | 268 | 286 | 286 | 257 | 289 | 200 | 215 | 220 |
| Germany | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 241 | 245 | 250 |
| Spain | 37 | 92 | 14 | 34 | 36 | 17 | 53 | 68 | 25 | 17 | 100 | 130 |
| Russia | 0 | 0 | 0 | 0 | 0 | 175 | 185 | 100 | 100 | 500 | 200 | 200 |
| Turkey | 85 | 81 | 50 | 99 | 175 | 67 | 221 | 203 | 146 | 292 | 250 | 250 |
| Syria | 96 | 131 | 94 | 92 | 90 | 125 | 74 | 101 | 123 | 48 | 140 | 150 |
| Iraq | 280 | 448 | 405 | 373 | 515 | 547 | 448 | 388 | 252 | 434 | 700 | 550 |
| Iran | 681 | 566 | 614 | 380 | 895 | 400 | 1,000 | 850 | 565 | 950 | 1,050 | 750 |
| Jordan | 93 | 65 | 37 | 119 | 87 | 146 | 81 | 106 | 111 | 84 | 100 | 120 |
| Kuwait | 106 | 98 | 111 | 40 | 90 | 67 | 85 | 68 | 18 | 47 | 100 | 100 |
| Saudi Arabia | 543 | 525 | 492 | 504 | 510 | 510 | 525 | 547 | 533 | 625 | 750 | 750 |
| Yeman, United | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 169 | 175 | 175 |
| United Arab Emirates | 82 | 232 | 163 | 202 | 289 | 224 | 333 | 317 | 248 | 376 | 250 | 250 |
| Sri Lanka | 150 | 81 | 197 | 259 | 108 | 184 | 338 | 139 | 208 | 330 | 300 | 300 |
| Khmer Rep. | 0 | 7 | 4 | 15 | 0 | 0 | 11 | 0 | 54 | 60 | 100 | 100 |

*--continued*

Appendix table 51—Major rice importers, 1961–94—continued

| Country or region/ calendar year | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 1,000 metric tons | | | | | | | |
| Malaysia | 388 | 424 | 420 | 212 | 196 | 289 | 378 | 298 | 367 | 444 | 400 | 400 |
| Singapore | 221 | 223 | 201 | 263 | 267 | 274 | 284 | 227 | 207 | 230 | 230 | 230 |
| Indonesia | 1,068 | 419 | 53 | 24 | 131 | 50 | 385 | 77 | 192 | 650 | 50 | 50 |
| Brunei | 18 | 14 | 18 | 22 | 20 | 16 | 14 | 31 | 22 | 27 | 30 | 30 |
| Philippines | 0 | 212 | 528 | 5 | 1 | 152 | 228 | 538 | 91 | 0 | 250 | 200 |
| China, Peoples Rep. | 61 | 131 | 201 | 352 | 429 | 421 | 1,042 | 57 | 67 | 93 | 150 | 50 |
| Japan | 14 | 169 | 18 | 20 | 17 | 16 | 23 | 11 | 34 | 17 | 220 | 2,000 |
| Hong Kong | 361 | 376 | 323 | 305 | 409 | 372 | 384 | 363 | 418 | 400 | 400 | 400 |
| Korea, North | 11 | 0 | 0 | 28 | 76 | 0 | 21 | 27 | 194 | 10 | 150 | 200 |
| Papua New Guinea | 88 | 103 | 110 | 115 | 115 | 125 | 130 | 135 | 140 | 160 | 160 | 160 |
| North Africa | 92 | 59 | 90 | 161 | 80 | 94 | 141 | 106 | 133 | 186 | 186 | 190 |
| Libya | 43 | 28 | 31 | 55 | 47 | 33 | 89 | 53 | 87 | 160 | 160 | 160 |
| Subsaharan Africa | 2,519 | 2,764 | 2,391 | 2,914 | 2,901 | 2,103 | 2,668 | 2,148 | 2,330 | 2,651 | 2,791 | 2,591 |
| Senegal | 322 | 344 | 300 | 363 | 263 | 209 | 432 | 332 | 433 | 360 | 385 | 375 |
| Guinea | 76 | 37 | 43 | 113 | 84 | 108 | 177 | 88 | 47 | 130 | 200 | 150 |
| Sierra Leone | 64 | 8 | 82 | 103 | 52 | 16 | 103 | 111 | 57 | 50 | 100 | 75 |
| Ivory Coast | 308 | 291 | 23 | 217 | 401 | 160 | 386 | 263 | 169 | 290 | 295 | 310 |
| Ghana | 16 | 29 | 44 | 21 | 37 | 36 | 100 | 69 | 95 | 110 | 130 | 120 |
| Nigeria | 903 | 629 | 569 | 462 | 642 | 344 | 164 | 224 | 296 | 440 | 300 | 300 |
| Liberia | 83 | 85 | 71 | 102 | 106 | 65 | 92 | 73 | 129 | 43 | 130 | 100 |
| Somali Rep. | 53 | 85 | 35 | 109 | 105 | 50 | 75 | 82 | 62 | 109 | 100 | 75 |
| Angola | 47 | 53 | 62 | 88 | 96 | 107 | 121 | 96 | 128 | 120 | 130 | 130 |
| Mozambique | 74 | 104 | 177 | 190 | 263 | 216 | 252 | 217 | 199 | 118 | 125 | 130 |
| Madagascar | 187 | 340 | 188 | 262 | 123 | 218 | 104 | 79 | 70 | 100 | 100 | 100 |
| South Africa | 158 | 186 | 178 | 190 | 268 | 242 | 292 | 295 | 360 | 375 | 385 | 400 |

☆ U.S. GOVERNMENT PRINTING OFFICE: 1994 300-125/00299