THE RICE MARKETS OF THE UNITED STATES AND MEXICO

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TAMRC International Research
Report No. IM-01-04
February 2004

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Texas Agribusiness Market Research Center (TAMRC) International Research Report No. IM-01-04, February 2004 by Dr. Wesley P. Welch and Dr. Gary W. Williams.

ABSTRACT:
This report provides a qualitative analysis of both the U.S. and Mexican rice markets along with a description of the provisions of NAFTA pertaining to rice trade between the two countries. Although U.S. rice exports to Mexico make up less than 15% of total U.S. rice exports, Mexico has become the largest single export destination for U.S. rice. Under NAFTA, Mexico completed the phase out of its *ad valorem* tariffs for rough and milled rice in January of 2003. As a result, many believe that U.S. rice exports to Mexico will increase and that the composition will shift back to milled from rough form.

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EXECUTIVE SUMMARY

This report provides a qualitative analysis of the rice industries of U.S. and Mexico as well as a description of the provisions of the North American Free Trade Agreement (NAFTA) pertaining to rice trade between the two countries. While rice production in both countries was highly influenced by domestic agricultural policy in past decades, domestic government policies in both countries have recently become more market-oriented while still providing income support for producers. U.S. rice production has grown steadily over time due to increases in long grain rice acreage and yield increases. Mexican rice production has been highly variable due to production practices relying heavily on sporadic rainfall.

Although the demand for rice has increased in both countries, the increase has been more rapid in the U.S. than in Mexico along with a dramatic rise in processed food utilization and health-consciousness among consumers in the U.S. In Mexico, much of the increase in rice demand is the result of population growth although per capita demand has increased to some extent as well. Increases in consumer education and wealth are expected to further increase the demand for rice in Mexico over time.

Although not among the world's 5 largest rice producing countries, the U.S. is the fifth largest world rice exporter. U.S. rice exports account for about 40% of the total use of U.S. rice, down from almost 60% in 1980. The United States exports rough rice, parboiled rice, brown rice, and fully milled rice. Milled rice, including brown rice, accounts for the bulk of U.S. rice exports. However, rough rice exports, mostly southern long grain to Latin America, have grown substantially in recent years. Even so, total U.S. rice exports have remained relatively stable as increases in long grain rough rice exports have offset decreases in U.S. exports of other classes of rice.

The U.S. also regularly imports rice, which currently account for nearly 12% of the U.S. food use of rice. Nearly all U.S. rice imports are aromatic varieties that cannot currently be grown domestically. Thailand supplies about 75% of U.S. rice imports. India and Pakistan supply most of the remainder.

Although exporting small quantities of rice, Mexico is primarily a rice importer, currently importing over 50% of total rice supply. Although U.S. rice exports to Mexico make up less than 15% of total U.S. rice exports, Mexico is the largest export destination for U.S. rice. All of Mexico's rough rice imports and the majority of its milled rice imports are supplied by the U.S., 98% of which are of the long grain variety.

Total Mexican rice imports skyrocketed between 1979 and 1998 while at the same time the composition of imports shifted dramatically from milled to rough rice. Between 1979 through 1993, milled rice accounted for an average 86% of total Mexican rice imports. Currently however, only 14% of Mexican rice imports are in milled form. Mexican rough rice imports, which were sporadic until 1992, have increased tremendously, currently accounting for 86% of total Mexican rice imports.

The rapid growth in Mexican rice imports in the 1980, and 1990s are primarily the result of Mexico's unilateral elimination of rice import controls. Imports currently account for nearly 50% of Mexican rice consumption. In 1990, the milled rice tariff was increased from 10% to 20% *ad valorem* while the rough rice tariff was left at 10% to protect the Mexican milling industry. The tariff differential has been primarily responsible for the dramatic shift in the composition of Mexican rice imports from milled to rough form.

Mexico began phasing out its rice import tariffs with the implementation of NAFTA in January of 1994. The 10% and 20% *ad valorem* tariffs for rough and milled rice, respectively, were reduced proportionately in each year until they were eliminated completely in January of 2003. Most analysts believe that the Mexican rice import tariff reductions will increase U.S. rice exports to Mexico by making U.S. rice more competitive in Mexican markets relative to foreign rice exports. The expectation is that the composition of Mexican rice imports from the U.S. will also shift back to milled form. At the same time, some expect that freer trade under NAFTA will contribute to an increase in Mexican per capita income which could lead to increased rice demand and imports from the U.S. However, the Mexican economic crisis beginning in December 1994 had a major impact on the Mexican economy. A sharp devaluation in the peso and the associated negative impact on Mexican GDP decreased Mexican purchasing power and may be responsible for the large recent drop in Mexican rice imports.

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Rice, the staple diet for two-thirds of the world's population, is the single most important foodstuff in the world (USA Rice Federation). Rice is cultivated on every continent, save Antarctica, but less than 5% of world production is traded, the overwhelming majority being consumed domestically. For the United States (U.S.), however, rice is an important export commodity. Up to 90% of U.S. rice production has been exported since its introduction in 1685 (Roche). The U.S. is currently the world's fifth largest rice exporter, sending rice to over 100 countries worldwide (USA Rice Federation).

Mexico has become the single largest export destination for U.S. rice, averaging 421,000 tons (rough basis) for marketing years 1994 though 1998. Mexican preference for U.S. rice stems from a variety of reasons including geographic proximity and a ban on Asian rice. Mexico banned Asian rice imports in September of 1993, citing phytosanitary concerns. In compliance with the World Trade Organization (WTO) requirements, the ban was lifted in 1996 under the stipulation that Asian rice be produced in certified pest-free areas and is subjected to a period of quarantine prior to entering the country. While these measures currently prohibit imports of Asian rice, some analysts believe Thailand will eventually meet the qualifications, reenter the Mexican market, and become a major competitor with the U.S. for market share.

Some researchers expect total Mexican rice imports to increase for two major reasons (Cramer, Young, and Wailes). First, Mexican rice production declined rapidly from the mid-1980s to the mid-1990s, reportedly due to declining government support, increased input costs, and competition for irrigated land, especially in Sinaloa, a major rice-growing region. Because Mexico has become increasingly dependent upon imports of food grains, the Mexican government has encouraged production of corn and dry beans on irrigated land formerly used for rice production (FAOb). High value export crops such as fresh vegetables, which compete with rice for irrigated land, have been encouraged as well. Second, increasing per capita rice consumption and income coupled with an average annual population growth rate of approximately 2% will likely impact total Mexican rice demand in the future.

The Mexican agricultural sector, including the rice industry, has been significantly affected by changing foreign and domestic government policies. For example, a change in foreign policy led Mexico to begin unilaterally reducing barriers to trade in 1982. Domestic policy changed beginning in the early 1980s with the elimination of extensive government production subsidies. In addition, the recent trend of commercialization and consolidation of ejidos, small communal farms, is changing the structure of production agriculture in Mexico (Rindermann and Gómez Cruz). Such structural changes affect the competitive situation of both domestic and foreign participants in the Mexican rice market.

This report provides a qualitative analysis of the rice markets of the U.S. and Mexico with emphasis on the characteristics and structure of the respective rice markets as well as trade aspects. A description of the North American Free Trade Agreement (NAFTA) and its provisions pertaining to the U.S. and Mexican rice industries is presented as well.

U.S. Rice Markets

Rice has been produced in the U.S. since the early 1600s (Dethloff). Early production was focused along the eastern seaboard with South Carolina becoming an exporter in 1685. By the 1800s, the majority of rice production had shifted to the Gulf Coast, Arkansas, and the Mississippi River Delta. A prime example of the law of comparative advantage, the shift occurred due to a number of factors including: (1) decreasing yields and relatively high labor costs in the older production areas of the Southeast, (2) technological advancements in rice production better suited to the relatively larger, flatter fields of the South, and (3) westward population migration (Efferson, Setia et al.). Rice production in California began in response to the gold rush of 1849. Included in the influx of people from all nations were an estimated 40,000 Chinese, whose staple food was rice (USA Rice Federation). Rice production became necessary to feed the immigrants. Today, rice production is concentrated in six states: Arkansas, California, Louisiana, Mississippi, Missouri, and Texas.

U.S. Rice Supply

Rice, scientifically known as *Oryza sativa*, has two major varieties: indica and japonica. Indica rice, typically grown in tropical and subtropical climates, is the most widely produced variety of rice (IRRI). Japonica rice is produced mainly in temperate and subtropical climates and annually accounts for 10%-15% of world rice production. Differences include grain shape and amylose content. Indica rice grains range from long to short and tend to be slender, while japonica grains are short and roundish. Amylose content ranges from 23%-31% for indica and 0%-20% for japonica. Amylose content directly affects the cooking quality of rice. The higher the amylose content, the drier and fluffier the rice cooks. In addition to indica and japonica, several minor varieties of rice are produced. Such varieties include sweet or waxy rice used in commercial product formulations, aromatic rice, which has a nutty flavor and aroma, and arborio rice, commonly used in *risotto*, an Italian dish (USA Rice Federation).

Most rice produced in the southern U.S. (Arkansas, Louisiana, Mississippi, Missouri, and Texas) is genetically a subset of japonica rice known as temperate japonica or javonica but exhibit a grain shape and cooking qualities similar to indica rice (Pinson). California produces true japonica varieties. Nevertheless, the U.S. primarily differentiates rice into long, medium, and short grain, irrespective of variety. Long grain rice generally has a length to width ratio (LTR) of four to five, medium grain has an LTR of two to three, and short grain rice is nearly round. Long grain rice is produced in Arkansas, Louisiana, Mississippi, Missouri, and Texas. Both medium and short grain rice are produced primarily in California with small quantities produced

in Arkansas and Louisiana as well. While the U.S. produces long, medium, and short grain rice, long grain rice makes up the majority of U.S. rice production (Table1). Over the period of 1979 to 1998, long grain rice averaged 68% of total U.S. production while medium and short grain rice averaged 29% and 3%, respectively.

Total U.S. rice production grew 40% from 132 million hundredweight (cwt) in 1979 to 184 million cwt in 1998, representing an average annual growth rate of just over 3% (Table 1). Interestingly, growth varied greatly between different grain types. Long grain rice production showed the greatest increase at 73%, followed by medium grain with a modest growth of 7%. In contrast, short grain rice production decreased 84%. These trends were in response to changing conditions in both domestic and export rice markets. Domestic rice demand has increased over all grain types. However, while long grain rice exports have increased, there has been a significant decline in exports of medium grain rice. Short grain rice exports have remained relatively constant.

Rice production is a function of both harvested acreage and yield per harvested acre. Trends in harvested acreage and yields differ greatly between grain types. Both long grain harvested acreage and yield showed significant growth (32% and 30%, respectively) between 1979 and 1998, which led to the notable increase in production. The growth of medium grain production was the result of a 23% yield increase, which more than offset the 12% decrease in harvested area. The large decline in short grain production was the result of decreases in both harvested area (82%) and yield (14%).

U.S. Rice Production Practices

In the majority of the world, rice production is a highly labor-intensive process. Seeds are germinated and then hand transplanted into flooded fields at a specific maturity level. Field operations such as weeding, fertilizing, and harvesting are done by hand as well. Harvested rice is then bundled or thrashed and air-dried prior to milling (Vegas). Rice production in the U.S., on the other hand, is the most technically advanced in the world. The production of rice within the U.S. requires a relatively flat surface area with poor internal drainage in order to control flood irrigation. Many regions utilize highly advanced laser leveling systems to prepare the fields for planting. Rice is planted between March and May, and harvested between July and late October, depending upon the region (Dismukes). Methods of planting include both aerial and traditional ground-based methods. Aerial seeding is used primarily in California, southwest Louisiana, and the upper coast of Texas in order to control red rice, a weed. Fields that are aerial seeded are flooded prior to planting, as red rice cannot sprout through standing water (Setia et al.). In areas where red rice is not a problem, ground-based planting methods (drill and broadcast seeding) are prevalent. Likewise, fertilizer and pesticide applications are done via airplane or tractor depending upon planting method.

All rice in the U.S. is irrigated. Fields are flooded either at or shortly after planting and remain so throughout maturity. Sources of irrigation water, depending on region, include canals, surface water, and wells. Producers in California and Texas rely mainly on water from canals. Louisiana

producers utilize surface water. Those in Arkansas, Mississippi, and Missouri employ irrigation wells (Setia et al.).

Prior to harvest, fields are drained to facilitate grain drying and combine operations. Fields are harvested when grain moisture content is between 18% and 23%. The rough, or paddy, rice is then transported to a drying facility where it is further dried to a moisture content of 12% to 13% prior to milling.

Rice milling consists of a number of procedures that yield differing byproducts for various end uses (USA Rice Federation). The goal of rice milling is to preserve as many whole kernels as possible after the removal of the hull and bran layers. Approximate milling yields are as follows: hulls, 20%; rice bran and polish, 10%; broken kernels, 15%; and whole kernels, 55%.

U.S. Farm Prices of Rough Rice

Although U.S. farm prices for rough rice are relatively stable throughout the marketing year, they do tend to follow a seasonal pattern similar to that of other grains. Prices are lowest in the months following harvest, peak around February and March, and then decline through July as forecasts for the coming rice harvest become more accurate. Rough rice prices exhibit relatively low seasonal variation due to the storability of the crop and government programs that have heavily influenced prices. There was speculation that as government programs, specifically the marketing loan program that began in 1986, became more market-oriented, rice price variability would increase. However, the coefficients of variation for rice prices before and after 1986 indicate that price variation actually decreased for all rice types after the advent of the marketing loan program (Table 2). Because of its greater domestic and export demand, long grain rough rice has sold at a premium to medium and short grain rice for the majority of the period.

U.S. Marketing and Policy

This section describes the methods of marketing harvested rice in the U.S. as well as the government policies that affect not only marketing but also rice production, supply, and trade.

U.S. Rice Marketing

Compared to most other grains, rice passes through many fewer handlers, processors, and other middlemen on its way from producers to consumers. The majority of rice is consumed in whole-grain form whereas wheat, for example, is mostly consumed as flour. As a result, rice generally moves directly from producer to miller and from miller to wholesale, retail, or export markets. While this marketing system reduces rice marketing and handling costs, one consequence is that much of the speculative risk must be borne by the producer (Efferson). Nevertheless, rice producers have many marketing options including bid/acceptance, direct sales, cooperative pooling, Commodity Credit Corporation (CCC) loans, and the rice futures market (Setia et al.).

The bid/acceptance method utilizes marketing agencies that obtain a rice sample from rice producers, which is graded for sale. Buyers bid on the rice and sellers decide whether or not to accept the bids. Upon acceptance, the buyer arranges to obtain the rice from the storage facility. Direct sales involve both private contracts and auctions. Rice is sold while still in the field and delivered directly to the buyer after harvest. Under the pooling method, rice is delivered to a cooperative following harvest where the rice is sampled, graded, and commingled with rice of like type and quality. Member producers pay a base rate plus any premiums or discounts (depending upon grain quality) per unit of rice for drying and storage operations. Producers receive a partial payment at delivery and further payments as the rice is sold.

As is the case with production practices, marketing decisions vary by geographic region. In Louisiana, Mississippi, and Texas, the majority of rice is marketed either by bid/acceptance or direct sales (Setia et al.). The bid/acceptance method is utilized for between 20%-25% of the rice crop in Louisiana, 40%-50% in Mississippi, and greater than 33% in Texas. About 25% of the 1984 U.S. rice crop was marketed through direct sales (Dismukes). Producers in Arkansas and California, location of the only rice cooperatives in the U.S., rely primarily on the cooperative pooling method. About 70% of rice production in these states enters a cooperative marketing pool (Smith, Wailes, and Cramer).

The final two options, while less utilized, serve the function of reducing the speculative risk placed on the producer. The CCC offers non-recourse loans that, in effect, set a price floor for the producer. Once widely utilized, changes in government programs have dramatically reduced the amount of rice forfeited to the CCC. The trading of rice futures contracts, which began in the early 1980s, shifts price risk from producers to speculators. Producers mainly use rice futures as a risk management tool (Setia et al.). However, the contracts also serve a marketing function by allowing the delivery of certain rice grade/quality combinations to select locations in Arkansas.

U.S. Rice Policy

Government intervention in the U.S. rice market has a long history. Following WWI, a period of consistently poor farm returns coupled with a marked decrease in exports spurred proposals for Government assistance in improving farm receipts. The first successful program was the Agricultural Adjustment Act of 1938. The precursor of many current programs, the 1938 Act initiated non-recourse loans, marketing quotas, acreage allotments, and direct payments for many commodities, including rice (Holder and Grant). While the non-recourse loan program has been continually in effect, quotas, allotments, direct payments, and repayment conditions have been periodically adjusted or eliminated according to prevailing market and/or political conditions.

Non-recourse loans set a price floor by allowing producers to pledge their crop as collateral with the CCC in exchange for a predetermined amount per unit, i.e., the loan rate. At any time during the marketing year, the producer may sell the crop and repay the loan plus interest or forfeit it to the CCC with no penalty. Marketing quotas limit the amount of a crop that may be marketed. Acreage allotments restrict the amount of acres producers may plant. In order to be eligible for program assistance, producers must comply with provisions of the program.

The Rice Production Act of 1975 sought to establish a more market-oriented rice industry not unlike that of other grains. A target pricing system was initiated, with deficiency payments based on both the loan rate and the average farm price for the first five months of the marketing year (August to December). Acreage allotments were used only as a payment base as opposed to a supply control mechanism. Only producers planting within their allotments were eligible for program benefits.

Continuing the trend of increased domestic market orientation, the Agricultural and Food Act of 1981 completely eliminated acreage allotments and marketing quotas. An acreage reduction program which required producers to idle an annually determined percentage of their base acreage to be eligible for program benefits was introduced as a replacement. In 1983, to combat excessive stocks, a payment-in-kind (PIK) program was introduced. Producers received certificates for CCC rice stocks equal to 80% of their government program yield on additional acreage diverted under the program. In addition, a paid land diversion (PLD) program was made available in 1983 and 1985 whereby producers could receive a PLD payment in exchange for diverting additional acreage.

In the early and mid-1980s, U.S. rice exports fell, causing both a dramatic increase in rice stocks and a decrease in rice prices. As a result, the cost of farm programs soared ($18 billion in fiscal year 1985). These problems were addressed by the Food Security Act (FSA) of 1985 in a two-pronged approach. First, support levels were based on market clearing prices rather than on either the index of producer prices paid or production costs as under previous programs. Second, the PIK program was modified such that producers received generic certificates redeemable for CCC commodities in lieu of direct payments. A marketing loan program was authorized that allowed CCC loans to be repaid at the lower of the loan rate or the world price. Also, a 50/92 program allowed producers to devote an additional 50% of their base acreage (above required ARP reduction) to conservation practices and receive deficiency payments on 92% of base acreage.

The Food, Agriculture, Conservation, and Trade Act of 1990 continued the major provisions of the 1985 Act and introduced a planting flexibility component consisting of both normal flex and optional flex acres. Normal flex acres allowed producers to forego payments on 15% of their acreage base and plant any crop other than fruits or vegetables. An optional 10% could be planted to other crops. Loan eligibility was available for program crops planted on flex acres.

The 1996 Federal Agricultural Improvement and Reform (FAIR) Act further accelerated the process of making commodity supplies dependent upon market conditions rather than on government programs. The FAIR act effectively severed the linkage between income support payments and market prices but continued the marketing loan program provision initiated by the FSA of 1985 (Kohls and Uhl). This was accomplished by eliminating price-sensitive deficiency payments, based on target prices, and providing decoupled income support payments, or production flexibility contracts (PFC), for seven years to farmers who entered the program. PFC payments ($/cwt) were made on 85% of a producer's base acreage and were based on the program yield. Since PFC payments were unrelated to market prices, producers were able to make cropping decisions based on market conditions. As with previous programs, producers had to comply with certain provisions of government programs in order to receive program benefits.

Rice producer participation rates have been among the highest of eligible crops. From 1982-1998 participation averaged 94%, increasing from 78% in 1982 to nearly 100% in 1998 (USDAg).

U.S. Rice Trade Policy

Foreign exchange policy in the U.S. has run the gamut from being highly-protectionist to being pro-trade. Prior to the 1930s, U.S. trade policy was characterized by limiting market-access to foreign competitors through the use of both tariff and non-tariff trade barriers. This policy changed in the period leading up to and after the Second World War (WW II). According to Eckes, in the years leading up to WW II, the U.S. sought to obtain alliances with countries in Europe and the Western Hemisphere. After the war, U.S. foreign policy objectives included assisting in the economic recovery and viability of war-torn countries as well as promoting global stability and peace. Under a "trade, not aid" philosophy, the U.S. entered into a number of reciprocal agreements in which far more was conceded than was received in return (Eckes). National average *ad valorem* equivalent tariff rates dropped from 45% in 1934 to 3.5% in 1995.

By the late 1960s, the U.S. agricultural and manufacturing industries, among others, were vehemently opposing U.S. trade policies that allowed foreign producers relatively free access to the U.S. market without requiring equal access in return. For the first time, there was large public support for the protection of domestic markets (Eckes). However, the U.S. government, concerned with the spread of communism, responded by saying: "To sell, we must buy. We therefore must resist the temptation to accept remedies that deny American producers and consumers access to world markets and destroy the prosperity of our friends in the non-Communist world" (Johnson and Porter, p. 577).

Global agricultural trade liberalization was not addressed until the Uruguay Round (UR) of GATT that began in 1986 and was completed in 1993. The UR was expected to greatly benefit U.S. agriculture through increased market access to boost U.S. exports, farm income, and agricultural employment (USDAd). The major benefit to the U.S. rice industry from the UR was potential access to the previously highly protected Japanese and Korean rice markets. Access to the European Union was expected to increase as well.

U.S. Rice Demand

Once harvested, paddy rice is utilized in either the domestic or export market. Rice consumed domestically is milled and utilized in whole kernel form or further processed and consumed in the form of cereal, baby food, or other processed food products. Rice entering the export market is shipped rough or milled depending upon export demand.

U.S. Domestic Demand for Rice

Rice demand in the U.S. has increased 110% from 31 million cwt in 1980 to 65 million cwt (milled basis) in 1998. Reasons for the increase include changes in demographics and eating habits and the use of rice by the processed foods industry (Setia et al.). The Asian population in the U.S., who consider rice a dietary staple, has significantly increased over the last two decades. Increases in the Hispanic population have boosted domestic rice consumption as well. Also, in addition to the increases in the Asian and Hispanic populations, the younger segment of the U.S. population (ages 19-34) consumes more rice than other segments (Gao, Wailes, and Cramer). Because rice contains no fat, cholesterol, or sodium, health-conscious Americans have increasingly added rice to their diets (Setia et al.). Rice utilization by the processed foods industry has skyrocketed from 4.5 million cwt in 1980 to 16.1 million cwt in 1998.

According to a survey of U.S. rice millers performed by Food Research Associates (FRA), domestic rice is utilized in three primary outlets: (1) direct food use, (2) processed food use, and (3) beer. While all three outlets have shown increases since 1980, processed food use has shown the most growth, 260% from 1980 to 1998 (Table 3). Furthermore, the processed food outlet has increased its share of total rice distribution from 15% in 1980 to 25% in 1998. The food processing industry uses rice in a number of products including pet food, cereal, and package mixes. These three products made up nearly 85% of total rice utilized in the processing industry in 1998. Prior to 1998, cereal had been the largest user of rice. However, pet food usage has increased just over 1,300% since it began being included as a separate outlet in 1986, and surpassed cereal utilization in 1998.

The FRA survey results also provide insight as to the geographical distribution of rice for direct food use. According to the survey, regions with large Asian and Hispanic populations account for the largest percentages of the distribution. Specifically, the Pacific (California, Oregon, Washington, Hawaii, and Alaska), South Atlantic (Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, and Florida), Middle Atlantic (New York, Pennsylvania, and New Jersey), and West South Central (Texas, Oklahoma, Arkansas, and Louisiana) regions represented 76% of the total rice distribution in the 1998 survey.

Rice distribution by grain length differs by use. Long grain rice made up 70% of direct food usage in 1998 followed by medium grain (28%) and short grain (2%). Processed food was distributed as follows: long grain (9%), medium grain (27%), and short grain (1%). Broken rice, which is not differentiated by type, was the largest contributor (41%) to the food-processing outlet with the remainder being made up of rice flour and specialty rice. Brewers have traditionally used broken rice, also called second heads. Whole grain use by the beer outlet has primarily been in the form of medium grain rice.

U.S. Rice Export Demand

For the majority of the world, rice is a staple food crop. Most rice is consumed within a few miles from where it was produced. Between calendar years 1979 and 1998, annual world rice exports averaged a mere 4.5% of annual world rice production. The opposite is true for the U.S.,

however. At one time, almost 90% of annual U.S. rice production entered export markets (Roche). The U.S. is one of the world's fifth largest rice exporter, exporting rice to over 100 countries. Exports from the U.S. averaged 50% of domestic production and 17% of global exports for calendar years 1979-1998. During the 1990s, the U.S. exported an average of 46% of domestic production, 14% of global rice exports. The decline in the U.S. export/production ratio is mainly a result of continued increases in domestic consumption. In addition, U.S. government programs, which have kept domestic prices above world trading prices, negatively affect U.S. export demand as well (Setia et al.). The declining U.S. share of global rice exports can be attributed to the large increase in rice exports by other countries. Between calendar years 1979 and 1998, non-U.S. rice exports increased 101% while U.S. rice exports increased only 40%.

The majority of U.S. rice exports are in the form of milled, long grain rice, averaging 71% of total U.S. rice exports between marketing years 1979 and 1998 (Table 4). However, rough rice exports have grown 1,442% since marketing year 1979 and currently make up 30% of total rice exports. Since 1994, rough rice exports have dramatically increased. The majority of rough rice exports are destined for Latin America, a region of rapidly increasing rice demand. Latin American production, especially in Brazil, decreased significantly in 1994 and again in the region as a whole in 1997 and 1998 reportedly due to the *El Niño* weather pattern.

U.S. rough rice exports are primarily long grain (97%). The U.S. is the only major rice exporting country that exports rough rice (Childs and Burdett). U.S. exports of long grain rice increased by 32% between 1979 and 1998 and now account for an average 79% of total (rough and milled) U.S. rice exports. Over the same period, U.S. medium grain rice exports dropped in half and now account for an average of only 20% of total U.S. rice exports. Short grain exports increased by only about 2% over that period and account for only 1% of total U.S. rice exports.

Mexican Rice Markets

Rice has been produced in Mexico since the early 1830s. Rice production began in the south-central region of the country, spread to the Northwest, and finally to the Southeast, following a path of competitive advantage and government influence (Cramer, Young, and Wailes). Since 1979, rice has been produced in eighteen Mexican states. However, five states, Sinaloa, Veracruz, Campeche, Michoacan, Morelos, and Tabasco have dominated production, averaging 77% of the national total over the last two decades.

Mexican Rice Supply

There are two types of rice produced in Mexico: Morelos, and Sinaloa. Both are long grain varieties. The Morelos type is shorter and thicker than the Sinaloa type which is comparable to U.S. long grain rice (Salin et al.).

Mexican Rice Production

In terms of quantity produced, rice is the fourth ranked crop in Mexico, trailing only corn, wheat, and beans. From 1979 to 1998, total Mexican rice production decreased 7% from 10.9 million cwt in 1979 to 10.1 million cwt in 1998 (Table 5). Mexican rice production is highly variable, ranging from a high of 17.8 million cwt in 1985 to a low of 6.3 million cwt in 1993. Sources of variability have included abrupt changes in rice production profitability from year to year, irregular precipitation, and changes in government farm policy (Rindermann and Gómez Cruz).

Unlike the U.S. where all rice is irrigated, an average of 63% of Mexican rice has been irrigated; the remaining 37% has been rainfed. However, Mexican irrigated production has steadily declined from 81% of total production in 1979 to 50% in 1998. Due to an increasing dependence upon foreign feed grains, the Mexican government has encouraged the production of corn and beans, traditional staples, on irrigated land once devoted to rice production. In addition, the production of high-value export crops, such as fresh vegetables, has been encouraged as well. The Mexican government has facilitated rainfed rice production by supplying infrastructure in the form of machinery, roads, and, rice mills in the Southeast, a major rainfed production region (Cramer, Young, and Wailes). These changes are evident in the top producing states as well as the nation as a whole. In Sinaloa in the northwest part of Mexico which has traditionally been the leading producer of rice and where all rice is irrigated, production has decreased 83% since 1979. At the same time, in Veracruz on the east coast of Mexico where an average of 71% of rice acreage is rainfed, production has increased 145% since 1979. Veracruz replaced Sinaloa as the leading rice producing state in the 1990s. Nationwide, irrigated rice production has decreased 43% since 1979 while rainfed production has increased 141%.

Mexican Production Practices

Rice production practices in Mexico differ by region. In the central region, which includes Michoacan and Morelos, rice is produced by the traditional transplant method. Rice seeds are germinated in nurseries and subsequently transplanted to irrigated paddies. While this is a highly labor intensive practice, there are advantages. Seeding rates are 60%-65% lower than direct seeding, pests are easier to control, and the stand is healthier and more uniform (SAGARPAa). As a result, the central region is consistently among the highest yielding areas in Mexico. The remaining two regions, the Northwest (Sinaloa) and the Southeast (Campeche, Tabasco, and Veracruz) are both direct seeded and rice production is similar to that in the U.S. The major difference between the two regions is water. In the Northwest, rice production is irrigated whereas that in the Southeast is rainfed.

Mexican Farm Prices of Rough Rice

Mexican farm prices have skyrocketed over the years mainly due to inflation (Table 6). Nominal national average rice prices increased 40,000% from 1979-1998. However, because the prices for all agricultural products increased almost 98,000%, the real national average rice price actually decreased 59%. Until 1989, Mexican rice prices were highly influenced by government

programs, especially the guaranteed price program administered by the National Basic Foods Company (CONASUPO). Mexican rice policy has since become more market-oriented.

Mexican Marketing and Policy

The following section describes the marketing of harvested rice in Mexico as well as government policies affecting Mexican rice markets.

Mexican Rice Marketing

Rough rice in Mexico is marketed directly to rice mills that are concentrated in areas of production. Due to production shortfalls, the number of Mexican rice mills has declined steadily over time. There were an estimated seventy rice mills in 1989 but only forty-seven in 1999 (Cramer, Young, and Wailes; Salin et. al.). The Government guaranteed and concerted price programs heavily influenced Mexican rough rice marketing in past years. Prior to 1989, the Mexican government set minimum prices for both rough and milled rice. The government purchased 90% of the Sinaloa's rice crop in 1987 (Cramer, Young, and Wailes). From 1989 through 1996, the government allowed millers and producers to negotiate concerted prices, which were a transition between guaranteed prices and direct payments.

Mexican Rice Policy

Government intervention in the Mexican rice market, like that in the U.S., has a long history, and has evolved over time. Whereas U.S. agricultural policy is determined through the periodic farm bill process, Mexican agricultural policy is determined during the first year of every presidential term and is a part of the six-year National Development Plan.

The main goal of agricultural policy in Mexico from the mid-1960s to 1980 was to provide consumers with an abundant, cheap food supply (OECD). Faced with increasing demand and stagnant supplies, the government agricultural policy objective from 1980-1988 targeted food self-sufficiency through increased agricultural productivity. The main tool for achieving these objectives was a guaranteed producer price program similar to the U.S. loan rate program along with a retail price ceiling program administered by CONASUPO. Prior to planting, CONASUPO announced the guaranteed prices which were usually above world price levels, acted as the buyer of last resort, and then sold accumulated inventories in government retail stores at prices below the guaranteed producer price. In addition, the Mexican government routinely subsidized the purchase of production inputs and agricultural credit. To protect the integrity of the price support program, the government established import licensing requirements for most agricultural commodities that effectively controlled imports.

In 1989, the Mexican government instituted a major reform of agricultural policy. Numerous state enterprises were downsized, restructured, or privatized to deregulate the agro-food sector

(OECD). Guaranteed support prices were discontinued and replaced by concerted prices and direct payments. The Agricultural Marketing Support and Services (ASERCA) agency of SAGARPA was created in 1991 to provide direct payments to producers. Producers receive a direct payment through ASERCA per ton of harvested rice. At the same time, the practice of subsidizing the purchase of production inputs and credit was discontinued (Williams).

Continuing the trend toward market-oriented policies, the Program of Direct Payments to the Countryside (PROCAMPO) was created in 1994 to decouple the linkage between production and price support. Similar to the production flexibility contracts in the 1996 U.S farm bill, PROCAMPO payments are provided on a per hectare basis to eligible producers. Producers may plant any program crop on eligible area and receive program payments over the fifteen-year horizon of the program. PROCAMPO was intended to promote the shift of production to commodities with a comparative advantage, guarantee certain income support to producers over a long-term horizon, and allow consumers to purchase commodities at free market levels (OECD). Payments to producers under PROCAMPO have been so low, however, that the program has had little effect on decision-making by Mexican agricultural producers (Williams).

Mexican Rice Trade Policy

Mexican foreign policy has undergone drastic changes over the last twenty years. Prior to the unilateral opening of Mexican markets in the early-1980s, foreign policy was characterized by an import substitution strategy. In theory, import substitution is designed to allow the development of domestic industry by protecting the industry from foreign competition through high trade barriers in the form of tariffs, import licenses, etc. In practice, Mexican import substitution led to inefficient markets, declining productivity, corruption, and decapitalization of the Mexican economy and directly contributed to the debt crisis of 1982 (Selby). In an effort to achieve economic recovery by attracting foreign investment and motivating economic growth through increased exports, Mexico began reducing trade barriers and the role of government in the economy in the mid-1980s (Williams). Mexico acceded to GATT in 1986. In 1989, Mexico removed import permit requirements for most agricultural commodities (OECD). Beginning in the early 1990s, Mexico began negotiating both bilateral and multilateral trade agreements with several Central and South American countries, the European Union, Canada and the U.S. (OAS).

Mexican trade policy with respect to rice has evolved over time as well. Although never subject to import permits, rice imports were subject to a 10% *ad valorem* tariff until 1990. The tariff was small compared to other goods, whose rates were as high as 100% primarily because Mexico rarely imported rice prior to 1989. In 1990, the tariff on milled rice imports was increased to 20% *ad valorem.* The rough rice tariff was maintained at 10%, however, with the objective of protecting the Mexican rice milling industry with increasing excess capacity as domestic production continued to decline.

In addition to tariff barriers, Mexico prohibited the importation of Asian rice in 1993 citing phytosanitary concerns. To comply with the WTO, the ban was lifted in 1996. However, Asian rice imports must originate from certified pest-free areas and are subject to quarantine prior to entering the country, which continues to limit imports of rice from Asia.

Unlike the U.S., which exports a large percentage of production, Mexico has come to rely heavily on rice imports to satisfy domestic demand.

Mexican Domestic Rice Demand

The demand for rice in Mexico increased substantially in the 1980s and 1990s from 7.6 million cwt in 1979 to 13.1 million cwt in 1998, an increase of 72% (Table 7). Although much of the increase in demand was due to an increase in population, Mexican per capita demand also increased by 18% over the same period from 11.5 lb to 13.6 lb. Nevertheless, Mexico's per capita consumption rate remains among the lowest in Latin America. Factors contributing to the low rate of consumption include little use of rice in processed foods and limited menu variety (Romero). Mexican consumers use rice primarily in a side dish called *sopa seca* ("dry soup"). As consumers and processors become more educated on different uses for rice, consumption is expected to expand (Romero).

Mexican Import Demand for Rice

In all but a few years prior to 1990, Mexico was self-sufficient in rice. However, increases in demand coupled with decreases in production have made Mexico increasingly dependent upon rice imports (Table 8). The import share of total Mexican rice supply has risen steadily since 1990 to currently around 50% (Rindermann and Gómez Cruz). Of the four basic grains in Mexico (corn, wheat, beans, and rice), rice is the most dependent upon imports.

While total Mexican rice imports have steadily risen, the composition of imports has shifted dramatically as well. From 1979 through 1993, milled rice averaged 86% of total imports. Currently however, only 14% of imports are in milled form. Mexican rough rice imports, which were sporadic until 1992, have increased tremendously and currently account for 86% of total rice imports by volume primarily as a result of the import tariff differential implemented in 1990. All of Mexico's rough rice and the majority of its milled rice imports are supplied by the U.S., 98% of which are of the long grain variety.

NAFTA and U.S.-Mexico Rice Trade

Canada, Mexico, and the U.S. implemented the NAFTA on January 1, 1994. Once fully implemented, NAFTA will create barrier-free trade among member states while allowing trade barriers for non-members to be set by the individual member states. The process of freeing trade within NAFTA has consisted of removing tariff and most non-tariff barriers over time. Tariffs on rice trade were to be phased out in equal increments over a period of ten years ending on January 1, 2003 (Table 9).

Most analysts have concluded that NAFTA would facilitate increased rice exports to Mexico and that exports would shift to milled versus rough form (Cramer, Young, and Wailes; Fellin, Fuller, and Salin). Actual rice trade behavior between the U.S. and Mexico since NAFTA was implemented, however, has been seemingly inconsistent with these early analyses. Between 1989 to 1998, U.S. rice exports to Mexico increased 20% (Table 10). In the five years prior to NAFTA, rough rice averaged 33% of total U.S. rice exports to Mexico and milled rice exports averaged 67%. Since the implementation of NAFTA in 1994, rough rice exports to Mexico have increased 28% while milled rice exports have actually decreased by 61%. In 1998, the shares of total exports for rough and milled rice were still 86% and 14%, respectively. Total U.S. rice exports to Mexico have remained relatively stable under NAFTA with a change in the composition from milled to rough rather than the other way around as expected by the U.S. rice industry and by rice market analysts.

One explanation of this phenomenon suggested by the USA Rice Federation is that the U.S. rice industry has not promoted the consumption of U.S. milled rice in Mexico (Lehrer). Consistent with Salin et al., Lehrer suggests the use of joint ventures with Mexican packers and retailers as well as branding to promote U.S. milled rice imports. Furthermore, Lehrer suggests that political pressure is being placed on the Mexican rice industry to continue importing rough rice.

Another possibility is suggested in recent research by Welch and Williams. They conclude that the primary reason for the decline in U.S. milled rice exports to Mexico has been the devaluation of the Mexican peso and the accompanying economic crisis in Mexico. They find NAFTA has actually had a large positive effect on U.S. rice exports to Mexico but those effects have been swamped by the peso devaluation and the on-going economic crisis in Mexico.

Summary

This report has provided a qualitative analysis of the rice industries of the U.S. and Mexico as well as a description of the provisions of NAFTA pertaining to rice trade between the two countries. While rice production in both countries was highly influenced by domestic agricultural policy in the past, domestic government policies in both countries have recently become more market-oriented while still providing income support for producers. U.S. rice production has grown steadily over time due to increases in long grain rice acreage and yield increases. Mexican rice production has been highly variable due to production practices relying heavily on sporadic rainfall.

Although rice demand has increased in both countries, the U.S. has experienced much more growth than Mexico. U.S. demand increases can be attributed to the dramatic rise in processed food utilization as well as to the increasing health-consciousness of U.S. consumers. Much of the increase in Mexican rice demand can be attributed to population growth although per capita demand has increased as well. Increases in consumer education and wealth are expected to further increase Mexican demand for rice.

While importing small quantities of rice, the U.S. is the world's fifth largest rice exporter, currently exporting 50% of production. Total U.S. rice exports have remained relatively stable because increases in long grain rough rice exports have largely been offset by declines in exports of other classes of rice. Although Mexico exports small quantities of rice, Mexico is primarily a rice importer, currently importing over 50% of total rice supply. Mexican rice imports have increased dramatically since the late 1980s due to the unilateral opening of Mexican markets.

Mexico is phasing out its rice import tariffs consistent with the provisions of NAFTA. The tariffs have declined steadily from 10% and 20% *ad valorem* for rough and milled rice, respectively, when NAFTA was implemented to be completely eliminated in January of 2003. Most analysts forecast that the Mexican rice import tariff reductions would both increase U.S. rice exports to Mexico by making U.S. rice more competitive and shift the composition of those import from rough to milled rice. Actual rice trade behavior between the U.S. and Mexico since NAFTA was implemented, however, has been seemingly inconsistent with these early analyses. Total rice trade has stayed relatively stable and rough rice continues to dominate in U.S. rice exports to Mexico. While various hypotheses have been forwarded to explain the unexpected behavior of Mexican rice imports, recent research suggests that the negative effects of the Mexican peso devaluation and accompanying economic crisis on Mexican rice imports have more than swamped the positive effects of NAFTA.

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APPENDIX: TABLES

Table 1: U.S. Rice Production, 1979-1998

Year	Area Harvested				Average Yield				Production			
	Long	Medium	Short	Total	Long	Medium	Short	Total	Long	Medium	Short	Total
	1000 acres				cwt/acre				1000 cwt			
1979	1,940	749	180	2,869	41.59	53.97	60.19	45.99	80,692	40,421	10,834	131,947
1980	2,170	1,004	138	3,312	40.02	51.22	57.02	44.13	86,851	51,407	7,892	146,150
1981	2,482	1,150	160	3,792	44.49	53.47	67.70	48.19	110,426	61,497	10,819	182,742
1982	2,175	951	137	3,262	42.95	54.02	64.99	47.10	93,424	51,342	8,871	153,637
1983	1,543	511	115	2,169	41.68	53.60	69.69	45.98	64,318	27,388	8,014	99,720
1984	2,095	604	103	2,802	45.84	58.45	72.59	49.54	96,029	35,304	7,477	138,810
1985	1,942	471	80	2,492	51.68	60.50	76.50	54.14	100,367	28,464	6,082	134,913
1986	1,806	498	56	2,360	53.58	64.74	77.57	56.51	96,773	32,239	4,344	133,356
1987	1,698	594	41	2,333	52.41	63.39	72.12	55.55	88,995	37,651	2,957	129,603
1988	2,233	616	51	2,900	53.45	59.89	71.41	55.14	119,364	36,891	3,642	159,897
1989	1,998	638	51	2,687	54.64	64.95	76.18	57.49	109,161	41,441	3,885	154,487
1990	2,065	745	13	2,823	52.21	63.53	73.38	55.29	107,806	47,328	954	156,088
1991	2,023	748	10	2,781	53.95	66.15	75.30	57.31	109,137	49,477	753	159,367
1992	2,372	747	13	3,132	53.97	67.78	77.69	57.36	128,015	50,633	1,010	179,658
1993	2,028	789	16	2,833	50.82	65.75	73.31	55.10	103,064	51,873	1,173	156,110
1994	2,379	925	12	3,316	56.09	68.53	78.67	59.64	133,445	63,390	944	197,779
1995	2,312	769	12	3,093	52.65	66.63	75.00	56.21	121,730	51,241	900	173,871
1996	1,967	822	15	2,804	57.77	69.22	71.27	61.20	113,629	56,901	1,069	171,599
1997	2,309	776	18	3,103	53.91	73.57	78.67	58.97	124,485	57,091	1,416	182,992
1998	2,568	656	33	3,257	54.26	66.16	51.84	56.63	139,328	43,404	1,711	184,443
Growth 98/79 (%)	32	-12	-82	14	30	23	-14	23	73	7	-84	40
Average Percent of Total									68	29	3	

Source: USDAc.

Table 2: U.S. Marketing Year Average Farm Prices, 1979-1998

	Nominal			Real[1]		
Year	U.S. [2]	Long	Medium/Short	U.S. [2]	Long	Medium/Short
	$/cwt					
1979	10.50	10.90	10.60	10.66	11.06	10.76
1980	12.80	12.50	13.30	11.80	11.52	12.26
1981	9.05	9.70	8.06	8.89	9.53	7.92
1982	7.91	8.56	6.91	8.01	8.67	7.00
1983	8.57	9.36	7.13	8.04	8.78	6.69
1984	8.04	8.66	6.66	8.11	8.73	6.72
1985	6.53	6.75	5.87	7.10	7.34	6.38
1986	3.75	3.82	3.55	3.97	4.04	3.75
1987	7.27	7.77	6.36	7.35	7.85	6.43
1988	6.83	6.96	6.47	6.16	6.27	5.83
1989	7.35	7.59	6.71	6.56	6.78	5.99
1990	6.70	6.94	6.19	6.18	6.40	5.71
1991	7.58	7.83	7.00	7.34	7.59	6.78
1992	5.89	5.87	5.91	5.63	5.61	5.65
1993	7.98	7.93	8.09	7.34	7.29	7.44
1994	6.78	6.87	6.70	6.58	6.66	6.50
1995	9.15	9.37	8.82	7.75	7.93	7.47
1996	9.96	10.60	8.37	8.51	9.06	7.15
1997	9.70	10.20	8.52	8.98	9.45	7.89
1998	8.89	10.20	8.52	8.89	10.20	8.52
Coefficient of Variation						
1979-85	22.57%	19.32%	31.72%			
1987-98	16.62%	18.88%	14.65%			

[1] Nominal prices deflated by U.S. Farm Price Index.

[2] Weighted average of long and medium/short grain prices.

Source: USDAc, USDOL.

Table 3: U.S. Rice Distribution Patterns, 1980-1998

Year	Direct Food Use	Processed Foods	Beer	Total [1]
	---------- 1000 cwt ----------			
1980	18,790	4,491	7,667	30,948
	(61)	(15)	(25)	
1982	19,170	3,342	9,610	32,122
	(60)	(10)	(30)	
1984	21,200	5,438	9,670	36,308
	(58)	(15)	(27)	
1986	22,870	7,630	10,680	41,180
	(56)	(19)	(26)	
1988	25,050	8,621	11,150	44,821
	(56)	(19)	(25)	
1990	27,970	12,180	11,000	51,150
	(55)	(24)	(22)	
1994	31,506	16,134	10,707	58,347
	(54)	(28)	(18)	
1995	36,282	14,900	11,177	62,359
	(58)	(24)	(18)	
1996	35,780	14,133	10,820	60,733
	(59)	(23)	(18)	
1997	37,556	15,565	11,088	64,209
	(58)	(24)	(17)	
1998	38,104	16,146	10,699	64,949
	(59)	(25)	(16)	
Growth 98/80 (%)	103	260	40	110
Average Percent of Total	58	20	22	

[1] Does not include imports.

Numbers in parenthesis represent percent of total.

Source: Food Research Associates.

Table 4: U.S. Marketing Year Rice Exports, 1979-1998

	Rough			Milled				Total			
Year	Long	Medium	Total	Long	Medium	Short	Total	Long	Medium	Short	Total
	---------- 1000 cwt - Rough Equivalent ----------										
1979	1,670	0	1,670	52,536	27,340	1,791	81,667	54,206	27,340	1,791	83,337
1980	414	0	414	53,739	23,416	2,546	79,701	54,153	23,416	2,546	80,115
1981	5,785	0	5,785	59,685	15,500	1,367	76,552	65,470	15,500	1,367	82,337
1982	574	0	574	49,642	18,342	268	68,252	50,216	18,342	268	68,826
1983	3,239	0	3,239	48,101	18,943	229	67,273	51,339	18,943	229	70,511
1984	3,203	0	3,203	44,996	13,503	264	58,763	48,200	13,503	264	61,966
1985	1,765	0	1,765	47,783	8,916	215	56,914	49,547	8,916	215	58,679
1986	8,199	0	8,199	63,924	10,953	731	75,607	72,123	10,953	731	83,806
1987	1,160	0	1,160	56,361	14,510	134	71,005	57,521	14,510	134	72,165
1988	3,837	116	3,953	70,230	12,005	240	82,475	74,067	12,121	240	86,428
1989	1,293	301	1,594	65,881	9,853	206	75,940	67,174	10,154	206	77,534
1990	4,648	168	4,816	56,878	9,426	218	66,522	61,527	9,594	218	71,338
1991	6,331	0	6,331	49,110	10,607	317	60,034	55,442	10,607	317	66,366
1992	4,945	202	5,146	62,478	9,037	212	71,727	67,423	9,239	212	76,873
1993	3,554	92	3,646	52,853	18,973	247	72,072	56,407	19,065	247	75,718
1994	18,399	107	18,506	63,246	18,015	372	81,632	81,644	18,122	372	100,138
1995	10,475	209	10,684	55,028	17,134	391	72,553	65,503	17,342	391	83,237
1996	11,297	1,434	12,731	46,086	18,897	569	65,552	57,383	20,332	569	78,284
1997	25,564	548	26,112	46,685	13,513	1,418	61,616	72,249	14,061	1,418	87,727
1998	24,026	1,726	25,753	47,404	11,828	1,830	61,063	71,430	13,555	1,830	86,816
Growth 98/79 (%)			1,442				-25	32	-50	2	4
Average Percent:											
by Class	97	3		78	21	1					
by Total	9	0.3	9	71	19	0.8	91	79	20	1	

Source: USDOCc, USITC.

Table 5: Mexican Rice Production, 1979-1998

	Area Harvested			Average Yield			Production		
Year	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total	Irrigated	Rainfed	Total
	1000 acres			cwt/acre			1000 cwt		
1979	266	107	374	32.98	19.59	29.19	8,784	2,102	10,886
1980	186	129	315	38.41	20.68	31.17	7,158	2,660	9,818
1981	270	162	432	39.89	30.12	36.22	10,761	4,884	15,644
1982	220	167	387	34.84	22.11	29.34	7,672	3,698	11,370
1983	139	191	329	39.88	19.66	28.18	5,531	3,752	9,282
1984	180	131	311	42.81	23.20	34.52	7,691	3,049	10,739
1985	328	207	535	39.93	22.72	33.28	13,103	4,699	17,803
1986	209	180	389	36.91	23.86	30.87	7,708	4,298	12,007
1987	196	186	383	40.53	27.23	34.06	7,963	5,067	13,029
1988	98	215	313	42.87	27.31	32.16	4,181	5,884	10,065
1989	210	164	374	39.12	20.69	31.05	8,228	3,392	11,621
1990	130	130	260	40.45	26.29	33.38	5,276	3,419	8,695
1991	110	100	210	43.18	29.25	36.54	4,733	2,922	7,655
1992	140	83	223	43.72	30.76	38.88	6,120	2,566	8,687
1993	66	80	146	49.62	38.38	43.47	3,273	3,058	6,331
1994	98	119	217	49.85	28.15	37.97	4,892	3,345	8,237
1995	104	90	194	49.13	33.29	41.75	5,085	3,006	8,092
1996	95	120	214	51.25	32.04	40.52	4,850	3,838	8,688
1997	129	151	280	45.14	29.89	36.91	5,834	4,516	10,350
1998	95	156	251	53.09	32.48	40.24	5,024	5,076	10,100
Growth 98/79 (%)	-64	46	-33	61	66	38	-43	141	-7
Average Percent of Total							63	37	

Source: SAGARPAb.

Table 6: Mexican Marketing Year Average Farm Prices, 1979-1998

	Nominal			Real[1]		
Year	MX [2]	Spring/Summer	Fall/Winter	MX [2]	Spring/Summer	Fall/Winter
	$MX/cwt					
1979	0.19	0.19	0.16	181.71	183.31	161.09
1980	0.27	0.27	0.20	205.22	207.45	156.81
1981	0.28	0.29	0.27	149.50	150.03	139.79
1982	0.44	0.45	0.35	172.35	176.00	135.69
1983	1.00	1.00	0.77	195.93	197.31	152.24
1984	1.70	1.72	1.24	192.09	194.84	139.97
1985	2.66	2.68	1.82	191.49	193.17	130.85
1986	4.62	4.68	2.49	173.35	175.65	93.46
1987	11.15	11.27	7.77	174.60	176.53	121.71
1988	17.97	18.09	12.94	132.24	133.16	95.20
1989	22.76	22.87	21.10	120.11	120.71	111.36
1990	24.75	25.75	19.33	94.77	98.60	74.01
1991	27.69	28.00	23.49	86.54	87.50	73.40
1992	25.73	25.76	25.44	67.56	67.64	66.80
1993	24.69	24.74	24.30	61.06	61.20	60.09
1994	31.20	31.50	28.81	72.63	73.32	67.07
1995	48.36	50.01	38.73	91.30	94.42	73.13
1996	73.33	73.55	71.20	98.89	99.18	96.02
1997	68.77	67.71	79.36	80.02	78.79	92.35
1998	74.41	73.84	78.91	74.41	73.84	78.91
Growth 98/79 (%)	40,009	39,352	47,877	-59	-60	-51

[1] Nominal prices deflated using Mexican Farm Price Index.

[2] Weighted average of the Spring/Summer and Fall/Winter seasons.

Source: SAGARPAb, Secretaría de Economía.

Table 7: Mexican Domestic Rice Demand, 1979-1998

Year	Population	Demand	
		Total	Per Capita
	millions	1000 cwt	pounds
1979	65.92	7,589	11.51
1980	67.57	8,596	12.72
1981	69.19	12,956	18.72
1982	70.79	8,062	11.39
1983	72.35	6,197	8.56
1984	73.91	11,679	15.80
1985	75.47	16,273	21.56
1986	77.02	8,031	10.43
1987	78.57	9,080	11.56
1988	80.12	6,724	8.39
1989	81.67	11,768	14.41
1990	83.23	9,118	10.96
1991	84.84	7,582	8.94
1992	86.43	14,306	16.55
1993	88.00	10,338	11.75
1994	89.57	11,816	13.19
1995	91.15	10,902	11.96
1996	92.72	13,051	14.08
1997	94.28	13,852	14.69
1998	95.85	13,062	13.63
Growth 98/79 (%)	45	72	18

Source: World Bank, SAGARPAb, INEGI, FAOa.

Table 8: Mexican Calendar Year Rice Imports, 1979-1998

Year	Rough	Milled	Total
	----- 1000 cwt - Rough Equivalent -----		
1979	1	1	3
1980	394	196	590
1981	141	2,791	2,932
1982	214	3,398	3,612
1983	1	682	683
1984	0	7	7
1985	0	6,451	6,451
1986	0	6,284	6,284
1987	0	31	31
1988	16	547	563
1989	0	27	27
1990	380	5,389	5,769
1991	399	4,361	4,760
1992	1,074	2,516	3,591
1993	2,422	9,855	12,277
1994	4,612	4,345	8,958
1995	4,083	5,145	9,229
1996	5,841	2,323	8,164
1997	9,011	1,836	10,847
1998	8,952	1,460	10,413
Growth 98/79 (%)	605,120	102,973	359,445
Average Percent of Total	27.0%	73.0%	

Source: INEGI, FAOa.

Table 9: Mexican Ad Valorem Rice Import Tariffs Under NAFTA

Year	Rough	Milled	Absolute Difference
	---------- Percent ----------		
1993	10	20	10
1994	9	18	9
1995	8	16	8
1996	7	14	7
1997	6	12	6
1998	5	10	5
1999	4	8	4
2000	3	6	3
2001	2	4	2
2002	1	2	1
2003	0	0	0

Source: USDAf.

Table 10: U.S. Marketing Year Long Grain Rice Exports to Mexico, 1979-1998

Year	Rough	Milled	Total
	---------- 1000 cwt - Rough Equivalent ----------		
1979	0	713	713
1980	34	930	964
1981	0	41	41
1982	0	1	1
1983	0	0	0
1984	0	0	0
1985	0	24	24
1986	0	5	5
1987	0	17	17
1988	9	1,675	1,683
1989	360	6,098	6,457
1990	737	1,872	2,609
1991	1,538	2,132	3,670
1992	2,757	3,414	6,171
1993	2,378	2,874	5,252
1994	5,202	2,762	7,964
1995	5,197	2,918	8,114
1996	6,691	1,592	8,284
1997	8,316	1,446	9,763
1998	6,660	1,077	7,737
Growth (%)			
98/89	1,753	-82	20
93/89	561	-53	-19
98/94	28	-61	-3
Average Percent of Total			
98/89	55	45	
93/89	33	67	
98/94	76	24	

Source: USDOCc, USITC.