

**STRUCTURE OF THE MEXICAN RICE INDUSTRY:
IMPLICATIONS FOR STRATEGIC PLANNING**

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ABSTRACT:

This is the first of two reports on the Mexican rice market prepared for the U.S. Rice Producers Association by the Texas Agricultural Market Research Center. The reports provide important insights on the opportunities and challenges for future growth of U.S. rice exports to Mexico, particularly with the potential for NAFTA-induced tariff reductions to alter the competitive position of U.S. rice in Mexico. This study explores and analyzes the current structure of the Mexican rice market and derives implications and provides recommendations to guide strategic planning. This report also serves as background to the second report, an in-depth statistical assessment of the logistics and transportation system for U.S.-Mexico rice trade and the impact that changes in Mexican tariffs will have on that trade.

The Texas Agricultural Market Research Center (TAMRC) has been providing timely, unique, and professional research on a wide range of issues relating to agricultural markets and commodities of importance to Texas and the nation for more than two decades. TAMRC is a market research service of the Texas Agricultural Experiment Station and the Texas Agricultural Extension Service. The main TAMRC objective is to conduct research leading to expanded and more efficient markets for Texas and U.S. agricultural products. Major TAMRC research divisions include International Market Research, Consumer and Product Market Research, Commodity Market Research, and Contemporary Market Issues Research.

STRUCTURE OF THE MEXICAN RICE INDUSTRY: IMPLICATIONS FOR STRATEGIC PLANNING

EXECUTIVE SUMMARY

This report is the first of two on the Mexican rice market prepared for the U.S. Rice Producers Association by the Texas Agricultural Market Research Center. This first report explores and analyzes the structure of the Mexican rice market and derives implications to guide strategic planning. This report also serves as background to the second report, an in-depth statistical assessment of the logistics and transportation system for U.S.-Mexico rice trade and the impact that changes in Mexican tariffs will have on that trade. Together, the two reports provide important insights on the opportunities and challenges for future growth of U.S. rice exports to Mexico, particularly with the potential for NAFTA-induced tariff reductions to alter the competitive position of U.S. rice in Mexico.

The analysis in this study relies on data from publicly available sources on Mexican rice production trends and practices, prices, consumption, and trade, including official Mexican and U.S. government data and reports. Data and information compiled by the Mexican Rice Council (COMEARROZ) was another key source. Information was obtained from telephone calls to knowledgeable sources in Mexico. The research staff of the Texas Agricultural Market Research Center (TAMRC) also conducted two surveys in Mexico to supplement the previously published information. The first primary data collection effort was a two-part survey of the major Mexican rice millers and packers to determine the specific attributes of rice and conditions of trade that are of interest to Mexican rice buyers. The second survey entailed market-intercept interviews of rice consumers in Mexico City and Monterrey.

Although Mexican producers supply the Mexican market with a number of rice varieties, about 60% of Mexico's rice consumption is imported. Rice moves from points of production and ports of entry to mills, packers, manufacturers, warehouses, and retail outlets of various types. Most domestically produced rice and imported rough rice is milled and packed by a small number of rice millers. Only a few firms in Mexico pack imported milled rice or rice milled by domestic millers. Some rice and rice by-products in Mexico go directly from mills to manufacturers of soups, cereals, and other food products and beverages. Most of the rice from mills and packers, however, enters the food distribution system, passing through central warehouses (*centrales de abasto*) or moves through government hands for distribution to supermarkets, *tiendas de abarrotes* (small retail grocery stores), and public markets. An increasing volume of rice in Mexico is beginning to flow directly from mills and packers to supermarkets, a phenomenon that is occurring throughout Latin America across a wide variety of food products like meat, fruits, and vegetables.

In Mexico, rice is consumed both as a highly-processed, high value-added product (such as parboiled rice in a prepared soup) and as a less processed product (such as bulk brown rice). Most

commonly, however, rice is commonly sold as processed, white rice and purchased in consumer-ready packages as plain, uncooked rice. Unfortunately, there is little or no information available on the share of rice that is purchased in various types of packaging and distributed through the various distribution outlets. Such information is critically needed for strategic decisions regarding retail marketing and promotion activities.

The surveys of Mexican rice millers provided insights on the rice milling industry in three areas: (1) the image of U.S. rice among Mexican millers, (2) factors with the potential to impact the access of U.S. rice into Mexican markets, and (3) suggestions to enhance the competitiveness of U.S. in Mexico. Salient points raised by Mexican rice millers included the following:

- The primary factors that determine their choice of foreign rice supplier included, in order of importance: (1) price and quality, (2) availability, (3) reliability, (4) tariffs, and (5) transportation. Sales promotion programs (by alternative suppliers) were considered only moderately important and the country of origin ranked as the least important factor.
- Asian suppliers are not currently competitive in the Mexican market due to: (1) phytosanitary restrictions imposed by the Mexican government on imports of Asian rice and (2) Asian rice can only be purchased by the ship load.
- Mexican rice millers believe that good quality rice can be imported from alternative international sources, even though American rice has some advantages. There is some preference for U.S. rice given comparable quality and price because of: (1) greater assurance of quality, (2) faster and more secure shipping, and (3) the possibility to import small volumes. Mexican millers are satisfied with the quality and uniformity of U.S. rice.
- The country of origin is not as important to Mexican millers as price and quality in their rice purchasing decisions.
- Mexican millers are concerned about the continuing reduction of the tariff differential between milled and rough rice and the potential effect on their business. Even so, the larger millers have been relatively successful in competing with imported white rice under NAFTA.
- The three most important factors for selecting a mode of transportation are (in order of importance): (1) the quantity to be transported; (2) the cost; and (3) reliability.
- The terms of credit offered by the supplier was the highest ranked among the factors listed as influencing rice purchases by the Mexican millers responding to the survey.
- Mexican millers do not routinely use futures markets to hedge their rice purchases and expressed little concern about the risk associated with fluctuations in rice prices and transportation rates.

- Only two of the millers interviewed claimed to be doing any type of sales promotion.
- Mexican rice millers have little or no knowledge of U.S. rice promotion programs.
- Suggestions by Mexican millers for how American rice suppliers might improve their competitiveness in the Mexican market, included:
 - Keep prices down
 - Speak Spanish and learn Mexican culture
 - Provide credit
 - Directly distribute and sell U.S. rice in Mexico
 - More direct contact with U.S. rice suppliers needed
 - Share the risk
 - Jointly promote rice

The surveys of Mexican consumers provided additional insight into the characteristics of the Mexican rice market. The surveys were strictly a preliminary effort to gather some information on rice consumption in Mexico. A total of only 20 consumers were interviewed (12 in Mexico City and 8 in Monterrey) in four different supermarkets (Aurrera, Bodega Gigante, and Wal-Mart in Mexico City and H.E.B. in Monterrey). Nevertheless, the main conclusions from the consumer survey are broadly consistent with rice miller's perceptions of Mexican rice consumers. Consumers provided insight in two areas: (1) consumption patterns and preferences and (2) brands of rice consumed. Salient points raised by consumers included the following:

- Mexican consumers purchase rice as frequently as one to three times per month on average and consume rice four to six times per week.
- Most Mexican consumers serve rice as "sopa seca," white rice prepared with some vegetables such as peas and/or beans and perhaps a little meat. Sopa seca is most commonly served in Mexico as a first course before the main meal. Many Mexican consumers also serve rice as an accompaniment to main courses. Few serve rice as a main dish or in other ways.
- Mexican consumers consider rice to be a high quality food product. The food characteristics consumers found most lacking in rice include: (1) uniformity of product, (2) good source of fiber, (3) nutritive, and (4) short preparation time required.
- Mexican consumers differentiate between two main rice types: (1) long grain or Sinaloa type rice and (2) "Morelos" type rice.
- Most Mexican consumers are unaware of the country of origin of the rice they purchase. Most would buy Mexican-grown rice if they knew the country of origin. Few have much interest in purchasing rice specifically of U.S. origin.

A plan for expanding the Mexican market for U.S. rice could incorporate either or both of two general strategies: (1) grow the market through generic rice promotion efforts or (2) target promotion efforts by providing services to millers and building consumer preference for U.S. rice. Generic promotion programs have been commonly used by other U.S. commodity associations (United Soybean Board, U.S. Meat Export Federation, etc.) but are quite costly. In addition, some of the benefits are also enjoyed by competing foreign suppliers. The USA Rice Federation has apparently conducted generic rice promotion programs in Mexico for many years. Unfortunately, rice millers and consumers appear to be largely unaware of those efforts.

Targeted promotion efforts essentially attempt to increase market share without necessarily increasing total consumption. Based on the results of this study, targeted promotion programs that might have some success include alliances with a Mexican milling/packing firm to develop new brands identified as U.S.-origin rice or couponing in Mexico to enhance sales of U.S.-origin rice. Designing and evaluating such promotion programs, however, will require more information on Mexican rice consumer behavior than currently available. The consumer level market research conducted for this study provides conflicting results on whether Mexican rice consumers are price-conscious or highly brand loyal when buying rice. Without question, the entry of new rice brands into the Mexican market would be a difficult challenge given the proliferation of rice brands and the strong position of a few long-established brands. The apparent differentiation of rice types by Mexican consumers must be considered in any brand promotion campaign.

For targeted promotion strategic considerations, this study identified at least two important characteristics of the Mexican rice market that might be used by U.S. rice suppliers to boost the U.S. share of Mexican rice consumption: (1) the problem of price and exchange rate risk faced by Mexican rice millers in purchasing rice from foreign suppliers and (2) transportation and logistics issues. Market share might be gained by U.S. rice suppliers by providing risk management services to Mexican rice buyers. The benefit of providing such services is illustrated by an analysis of actual Mexican import transactions for rice. Using futures contracts for rough rice and for U.S. dollar-peso foreign exchange can improve costs over an unhedged scenario by approximately 20%. The U.S. is in a more competitive position than other countries to offer risk management services because several relevant derivative contracts are available to importers of U.S. rice that may not be available to importers of rice from other regions of the world.

Regarding transportation and logistics issues, the geographic proximity of the U.S. to Mexico and the well-developed U.S. grain export logistics and handling systems should give U.S. suppliers a competitive edge in supplying high-quality, low-cost rice to Mexican buyers. U.S. suppliers, however, face a key tradeoff in competitively supplying rice to the Mexican market: the need to balance the requirements of many Mexican rice buyers for smaller rice shipments against the potential efficiencies from bulk handling of large quantities of rice. The costs of rice transportation and handling could be reduced if shippers were able to use bulk handling systems. Where possible, rough rice exported to Mexico is handled in bulk, utilizing the Mississippi River barge system. Rough rice in bulk, either ocean-going or in rail hoppers, is relatively less costly to ship than white rice in sacks. A supplier who can assemble a unit train (50 or more hoppers), for example, would pay substantially lower transportation rates and could pass on the cost advantage to Mexican buyers.

In a competitive market, consumers in Mexico would benefit from the cost savings and consume more rice, thus increasing U.S. - Mexico rice trade. However, Mexican rice importers often purchase relatively small quantities of rice, compared with the size of export shipments typical for other grains. Mexican rice millers limit the size of shipments due to high storage costs in Mexico and the limited storage capacity at their mills. Unfortunately, transactions costs on the smaller shipments desired by Mexican millers are high which results in higher costs of rice to Mexican consumers than would prevail if the most efficient handling system were used which restricts growth in Mexican rice consumption. Strategies that allow for larger shipments of rice using the most efficient modes of transportation could be highly successful in increasing not only the U.S. share but also the level of rice consumption in Mexico.

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STRUCTURE OF THE MEXICAN RICE INDUSTRY: IMPLICATIONS FOR STRATEGIC PLANNING

Over the next four years, changes in tariffs and in other trade practices and policies have the potential to alter the competitive position of U.S. rice in Mexico, an export market that has grown in importance for U.S. rice producers over the last decade. Not only are Mexican tariffs on imports of U.S. rice being reduced in stages under NAFTA, the differential between tariffs on rough and milled rice is being reduced as well. Both duties will be completely eliminated in 2003. Staying competitive in this dynamic environment will require detailed information on the structure and functioning of the Mexican rice market to support the necessary strategic decisions and adjustments. This study explores and analyzes the structure of the Mexican rice market and derives implications to guide strategic planning. This report also serves as background to the second report, an in-depth statistical assessment of the logistics and transportation system for U.S.-Mexico rice trade and the impact that changes in Mexican tariffs will have on that trade.

This report draws on several major sources of information. First, an in-depth review of the existing literature on the Mexican rice market in both Spanish and English uncovered a variety of publicly available sources of information and data related to Mexican rice production trends and practices, prices, consumption, and trade, including official Mexican and U.S. Department of Agriculture data and reports as well as data and information compiled by the Mexican Rice Council (COMEARROZ). The key studies relevant to the Mexican rice market are summarized in Appendix I. Also, information was obtained from personal interviews and telephone calls to knowledgeable sources in Mexico. These secondary sources of information are referenced in the appropriate sections of the report and in the list of references at the end of the report¹.

Unfortunately, the information available from the existing literature on many aspects of the Mexican rice industry is still quite incomplete, particularly with respect to the Mexican rice milling industry and Mexican rice consumers. Consequently, the research staff of the Texas Agricultural Market Research Center (TAMRC) conducted two surveys in Mexico to supplement the information needed for this study. The first was a two-part survey of the major Mexican rice millers and packers to determine the specific attributes of rice and conditions of trade that are of interest to Mexican rice buyers. The second survey entailed market-intercept interviews of rice consumers in Mexico City and Monterrey.

The overall objective of the Mexican rice miller and packer survey was to describe and analyze data and perspectives of Mexican rice millers and packers on the main factors determining the source of their supply of rice, including (1) price, (2) quality, (3) uniformity, (4) origin, (5) tariff rates, (6) cost

¹ Sources not cited in the text but which provide important information on the Mexican rice market are also listed in the references at the end.

and reliability of transportation modes, (7) packaging, (8) variety preferences, (9) financing and risk management, (10) dependability of supply, (11) sales and promotional support, (12) documentation requirements, and (13) by-product demand. The first part of the survey was mailed to Mexican rice millers and requested detailed statistics on prices, costs, capacities, and other aspects of their operations. The second part of the survey was conducted face-to-face with the rice millers and packers to: (1) identify their perceptions of Mexican consumer attitudes and preferences regarding rice from U.S., Asian, and other sources and (2) evaluate their perceptions of current and potential U.S. rice promotion programs to determine the value of current efforts and the need for additional programs. Because all the large Mexican millers also pack their own rice brands, the packing industry was covered by the interviews with millers. One interview was completed with a company that packs but does not mill rice.

The objectives of the market-intercept interviews of Mexican rice consumers were similar to those of the second part of the rice miller and packer survey. Indeed, the two surveys contained many of the same questions to allow for a comparison of responses.

Finally, the TAMRC staff also interviewed the leadership of COMEARROZ on possible activities to develop the Mexican rice market. In addition, COMEARROZ provided data for rice import transactions by company and product type from January 1, 1996 through June 30, 1999. The records include information on quantity and value of each shipment of imported rice.

Based on all this information, this report first discusses the structure of the Mexican rice market from production and imports through milling, packing, and consumption. The report then analyzes the results of the survey of millers and consumers. Finally, the report concludes with a discussion of the issues and opportunities relating to the competitiveness of U.S. rice in Mexico with particular focus on strategies to boost U.S. sales of rice in Mexico.

Structure of the Mexican Rice Market

Although Mexican producers supply the Mexican market with a number of rice varieties, about 60% of Mexico's rice consumption is imported. Rice moves from points of production and ports of entry to mills, packers, manufacturers, warehouses, and retail outlets of various types (Figure 1). Most domestically produced rice and imported rough rice is milled and packed by a small number of rice millers. Only few firms in Mexico pack imported milled rice or rice milled by domestic millers. Some rice and rice by-products in Mexico go directly from mills to manufacturers of soups, cereals, and other food products and beverages. Most of the rice from mills and packers, however, enters the food distribution system, passing through central warehouses (*centrales de abasto*) or moves through government hands for distribution to supermarkets, *tiendas de abarrotes* (small retail grocery stores), and public markets. An increasing volume of rice in Mexico is beginning to flow directly from mills and packers to supermarkets, a phenomenon that is occurring throughout Latin America across a wide variety of food products like meat, fruits, and vegetables.

In Mexico, rice is consumed both as a highly-processed, high value-added product (such as parboiled rice in a prepared soup) and as a less processed product (such as bulk brown rice). Most commonly, however, rice is commonly sold as processed, white rice and purchased in consumer-ready packages as plain, uncooked rice. Unfortunately, there is little or no information available on the share of rice that is purchased in various types of packaging and distributed through the various distribution outlets. Such information is critically needed for strategic decisions regarding retail marketing and promotion activities.

Mexican Rice Production

The main rice producing states in Mexico are located in the Northwest (Nayarit and Sinaloa), Southcentral (Michoacan and Morelos) and Southeast (Campeche, Tabasco, and Veracruz) regions of the country (Figure 2). The major Mexican rice producing states in 1996 included Veracruz (38%), Campeche (12%), Michoacan (10%), Morelos (8%), Nayarit (7%), together accounting for about three-fourths of production (Table 1). Although Sinaloa was the top rice producing state in past years, a continuous drought over several years has severely reduced rice production in that northern part of Mexico. In contrast, the vast water resources of Veracruz, Tabasco, and Campeche have boosted the production of those states substantially in recent years².

Mexico benefits from two rice production seasons: (1) the spring/summer (S/S) season and (2) the fall/winter (F/W) season. Most of the domestic rice is planted and reaches maturity during the S/S season. The rice is harvested and the mills receive the grain from domestic producers from November through January.

Although Mexico produces many varieties of rice in many areas of the country, production is insufficient to meet the domestic demand. Mexican rice production has changed little since 1990 despite sharp growth in consumption (Table 2). The future growth of Mexican rice production will face three important constraints: (1) the availability of water, (2) the availability of drying facilities, and (3) declining Mexican government support for crop producers.

The Water Constraint

Of the 483.6 million acres of Mexican landmass, only about 13% are arable, of which crop acreage accounts for about 25% and permanent pasture not currently suitable for cultivation for the remainder. The amount of land considered arable varies each year depending on precipitation and the availability of water for irrigation. Of the land area dedicated to crop production in Mexico, only about 20-25% is irrigated. The remainder is rainfed land but only about 14% is considered to be

² Because water is a key factor in the future rice production potential in Mexico, water as a constraint to the rice production in Mexico will be examined in detail in the next section.

good rainfed land. As a result, the availability of water and irrigation is one of the most limiting factors for increased rice production and yields in Mexico. Although rice yields are substantially higher on irrigated land than on rainfed land, the Mexican production of rice in irrigated areas has been more variable than that of dryland rice. For example, irrigated rice production in Mexico has varied from a high of 277,609 metric tons (mt) in 1992 to a low of 148,459 mt in 1993 (Tables 3, 4, and 5). Non-irrigated production has been less variable, growing slowly from a low of 116,413 mt in 1992 to a high of 174,078 mt in 1996.

The scarcity of irrigation water in many areas of Mexico is not a lack of irrigation infrastructure necessarily, but rather a lack of adequate precipitation for full utilization of the existing infrastructure. The lack of adequate irrigation in most agricultural areas of Mexico means that rice and other crop production in Mexico depends to a large degree on climatic conditions. Rains are concentrated in two periods in Mexico, the most important of which is July to October and the other is December to January. With the exception of the coasts and the high mountains, there is little or no rain the rest of the year. The Pacific South and Yucatan regions of the country have the highest rainfall ranging from 40 inches to 80 inches annually. Large expanses of the North, North Central and Central areas of Mexico suffer from extremely dry conditions. Average annual rainfall for the states in these regions range from 5.7 inches in Baja California to 26.1 inches in San Luis Potosí.

The distribution of water resources for irrigation in Mexico is not uniform. In some regions there are rivers with abundant water (e.g., Tabasco, Veracruz, southern Sonora, Sinaloa, the coasts of Oaxaca, Nayarit, and Chiapas). In other regions, there are few if any rivers (e.g., Baja California, the northeast part of the country, and the major part of the Yucatan Peninsula). Most rivers in Mexico are not long nor do they have large volumes of water. There are about 100 rivers that empty into the Pacific Ocean including the Balsas and the Lerma-Santiago rivers, the two largest. Forty six rivers empty into the Gulf of Mexico, the largest of which includes the Usumacinta, the Papaloapan, the Grijalva, the Coatzacoalcos, and the Panuco. The majority of these rivers is located in southern Mexico (Salazar).

Although the current major rice producing states possess abundant water resources, the traditional areas of dryland rice production in northwestern and south central Mexico have faced increasing water problems. In an attempt to boost rice plantings in traditional rice producing areas, the Mexican government began authorizing an increase in water usage in those areas through the National Water Commission (CNA) in 1997. Even so, some farmers in Sinaloa and other dryland areas have turned from rice to crops that are more profitable, further reducing rice acreage in traditional rice producing areas in Mexico. This trend of decreasing rice acreage is likely to be permanent, as a result of NAFTA opening export market opportunities for vegetables.

Drying Facility Constraint

A second constraint to the production of rice in Mexico occurs after the rice is harvested. Rice is typically harvested as “green” rice at 20% moisture content in Mexico. The green rice must then be transported immediately to drying facilities to prevent spoilage losses. Because few Mexican

farmers own their own drying facilities, most Mexican growers must transport their green rice directly to mills. The limited drying capacity of the few rice mills in Mexico often significantly increases the time between harvest and milling and can lead to large spoilage losses and result in a lower quality of rice available on the market (more broken heads).

Government Support Constraint

The third constraint that will limit the growth of rice production in Mexico is declining government support for rice. Historically, the Mexican government provided generous subsidies to rice farmers through price guarantees and input and credit subsidies. The guaranteed price program was discontinued in 1991, however (Cramer, *et al.* 1993). Input subsidies were also phased out. As a consequence, Mexican rice production dropped in half between 1989 and 1991 (see Table 2).

The drop in agricultural production in Mexico in the early 1990s following the elimination of government price support programs and the specter of NAFTA prompted the Mexican government to once again provide subsidies to agricultural producers. Two agricultural subsidy programs that benefit rice producers are now administered by ASERCA (Apoyos y Servicios a la Comercialización Agropecuaria, i.e., Agricultural Marketing Support and Services): (1) PROCAMPO (Apoyos Directos al Campo, i.e. Direct Farm Support) and (2) a marketing subsidy provided directly through ASERCA. The subsidies provided under PROCAMPO are modest and are scheduled to be phased out. The marketing subsidy is not consistently provided to producers.

The PROCAMPO program was established under the presidency of Carlos Salinas de Gortari in October of 1993 and is scheduled to expire in the year 2009. The implementation of the program coincided with Mexico's obligation under NAFTA to move away from border policies as the means of agricultural price support. PROCAMPO replaced existing price support schemes for major crops (grains, cotton, soybeans, and safflower) and initially implied farm prices above international price levels. Domestic prices, however, have tended to align with international prices over time. Under the program, direct income payments are made to eligible producers based on historical acreage with no production requirement. The payments are to compensate for lower prices expected as trade barriers are lowered under NAFTA. Annual payments were to be fixed in real terms at 350 New Pesos/hectare (ha) (about US\$ 47/acre) through the year 2003 and then were to be phased out over the following 5 years when the tariff reduction under NAFTA is scheduled for completion. The government actually paid rice farmers 626 New Pesos/ha (about US\$28 /acre) and 708 New Pesos/ha (about US\$ 32/acre) during the 1998/99 fall/winter and spring/summer production cycles (Table 6).

PROCAMPO is considered to be a socially superior program to price supports since cash benefits are provided to subsistence producers. Historically, subsistence producers consumed much of their own production on farm and benefitted little from selling crops at the relatively high support prices. Many analysts conclude that PROCAMPO has resulted in lower grain prices in Mexico and, therefore, reduced acreage planted, and lower production of grains while encouraging higher consumption and imports (e.g., Valdes and Hjort).

In contrast, the ASERCA marketing subsidy is intended to promote the marketing of agricultural products by Mexican farmers and, thus, boost their market and profit opportunities. Mexican producers receive one part of the subsidy immediately following planting (Table 7). Then, when the producer sells the harvest to the mills, the last part of the subsidy is paid to producers. In the case of rice, the marketing subsidy is based on the “green” weight of the rice per ton of rice sold. However, the marketing subsidy is not consistently paid to producers. Even though the government may authorize this subsidy payment, based on the availability of funds and pressure by producers, such payments are not required by law. The subsidy was not paid in 1997/98 and there is little possibility that the subsidy will be paid this year (1999/2000). In 1996/97, rice farmers were paid a marketing subsidy of 74 New Pesos/mt (about US\$ 0.50/hundred pounds). For the harvest from the spring/summer production cycle, the subsidy increased to 150 New Pesos/mt (about US\$ 0.70/cwt). Thus, with a small direct payment scheduled to be phased out just as NAFTA is eliminating all remaining import tariffs and only a small and uncertain subsidy for marketing, Mexican farmers will be forced to compete directly with imports with little or no help from the government.

Mexican Rice Trade

Because domestic production of rice in Mexico has fallen short of demand over the years, Mexico has come to rely on imports to make up the difference. Nevertheless, imports as a percentage of the total Mexican rice supply tend to vary widely. For example, imports accounted for 61% of Mexican rice supplies in 1991 but only 41% in 1998 (see Table 2). On average between 1989 and 1998, imports accounted for 45% of the Mexican rice supply. Mexico’s dependence on rice imports has risen in recent years, with imports constituting 50% of total rice supply in 1995.

U.S. Rice Exports to Mexico

The vast majority of the rough rice imported by Mexico originates in the United States. In recent years, the U.S. has accounted for virtually all the rough rice imported by Mexico (Table 8). Even though Mexico has tended to import milled rice from a variety of sources, 92% of Mexican milled rice imports originated from the U.S. in 1997 and nearly all in 1998.

Although an important destination for U.S. rice exports, Mexico is not the largest trade partner for U.S. rice. Mexico accounted for 7.6% of the value and 10.6% of the volume of U.S. exports of rice in 1998 (Table 9). The difference in the percentages between value and quantity reflects the fact that Mexico imports primarily rough rice which is lower in value than milled rice. Mexico has been a rapidly growing market for the U.S. in recent years. U.S. rice exports to Mexico increased by 55% between 1994 and 1998. This rate of growth is more than double the increase in U.S. rice exports to all countries (24%) during that same period.

Although U.S. exports of rice are increasing overall, exports of individual categories of rice have followed distinct patterns. Mexican imports of U.S. rough rice have grown at the expense of milled

and specialty rice imports. Rough rice accounted for 57% of the volume and 45% of the value of U.S. rice exports to Mexico in 1994. By 1998, however, rough rice accounted for 87% of the volume and 80% of value of U.S. rice exports to Mexico.

In contrast, U.S. exports of milled rice to Mexico have declined significantly over the last five years. Milled rice now accounts for little of U.S. rice exports to Mexico. In 1994, milled rice accounted for 14% of the quantity and 18% of the value of U.S. rice exports to Mexico. By 1998, the milled rice share of the quantity and value of all U.S. rice exported to Mexico dropped to 3% and 5%, respectively.

Specialty rices also account for a small and declining share of the US- Mexico rice trade. Over the past five years, U.S. exports long brown rice (husked) have tended to decline while those of mixed length brown rice (husked) have tended to increase. U.S. exports of parboiled rice have exhibited a similar trend with long grain parboiled exports declining and those of mixed length increasing. U.S. shipments of basmati rice to Mexico have remained virtually unchanged at only a fraction of one percent of total rice exports to Mexico. Broken rice has declined from 3% of the quantity and value of U.S. rice exports to Mexico in 1994 to a fraction of one percent in 1998. The users of broken rice may now be purchasing mixed length rice, which would explain some of the growth in the mixed length market.

NAFTA and Mexican Rice Trade

In 1994, the North American Free Trade Agreement (NAFTA) was instituted between the U.S., Canada, and Mexico. The goal of this agreement was to reduce tariffs between the member nations to increase trade. Both tariff reductions and phytosanitary measures implemented under NAFTA have had an impact on Mexican rice trade.

NAFTA Tariff Reductions

Prior to the implementation of NAFTA, Mexico charged a 10% tariff on imports of rough and broken rice and a higher 20% tariff on brown and milled rice. Under the tariff elimination schedule established under NAFTA, however, the Mexican import tariffs were set to decline by 1 percentage point per year for rough and broken rice and by 2 percentage points per year for brown and milled rice. At that rate, both tariffs will be completely eliminated on January 1, 2003. For the year 2000, the duty rate has been reduced to 3% on rough and broken rice and 6% on brown and milled rice. As a consequence, the gap between the import tariffs on rough and broken rice and brown and milled rice has declined from 10 percentage points in the pre-NAFTA period to only 3 percentage points this year.

The declining tariffs and the narrowing gap between the two tariffs have had implications for the level and composition of Mexican imports of U.S. rice. Since 1994, U.S. rough rice exports to Mexico have increased by 135% while those of parboiled and milled rice have declined by 41% and 66%, respectively. Several factors have contributed to the marked decrease in milled rice imports,

even as tariffs on milled rice have been falling faster than tariffs on rough rice. First, rough rice still receives an advantage in terms of tariff rates. Purchasing patterns within Mexico likely changed as well, with the dismantling of the CONASUPO government purchasing agency and the reductions in domestic rice production. Mexican rice production declined precipitously in 1993, and although recovering somewhat in succeeding years, Mexican millers have sought supplemental sources of supply.

Phytosanitary Measures

While the reduction in tariffs has increased the flow of rice from the U.S. to Mexico, NAFTA phytosanitary regulations make this trade more challenging. Chapter Seven of NAFTA establishes Sanitary and Phytosanitary (SPS) Measures that govern trade between the U.S., Mexico, and Canada. The GATT Uruguay Round Agreement and its successor institution, the World Trade Organization (WTO), have developed a set of disciplines to condition the use of these measures in international trade. The first of the two main provisions of the SPS Measures includes “basic rights” which cede to each country the right to take the measures it believes are necessary to protect the health of its plants and animals, as long as such measures are based on scientific evidence and do not arbitrarily or unjustifiably discriminate between its goods and like goods of another party where identical conditions prevail. The second principal provision is that of “risk assessment” in which any SPS measure implemented must be based on scientifically established evidence, ecological conditions, and economic factors. These provisions are an attempt to prevent the use of the SPS Measures as non-tariff barriers to trade.

SPS Measures under both NAFTA and GATT/WTO have generally worked to reduce world rice trade. On September 20, 1993, the Mexican government banned rice imports from Asia due to phytosanitary concerns (Conlon). Mexico’s phytosanitary barrier against Asian rice was lifted in 1996 in response to obligations imposed by the WTO (Trejo) but only with the provision that Asian rice must originate from areas free of diseases and enter the country under extensive quarantine (Rindermann and Cruz). These requirements effectively prohibit any Mexican imports of rice from Asian countries. When a shipload of rice from Asia arrived at the port of Veracruz, Mexican rice growers protested and attempted to block delivery of the shipment out of fear that the rice would be sold at unfair prices (“Farmers Protest...”). The rice growers from Morelos maintained that the imported rice from Asia was of a lower quality than that from their own fields and so would be sold at prices that would undermine their sales. Mexico has also used SPS Measures to slow the entry of rice into Mexico from other countries, including both Uruguay (Mexico Business Monthly) and the United States. In the U.S. case, Mexico claimed that shipments of U.S. rice were infected with smut, most often *Tilletia barclayana* (Manis).

U.S. Competitors for Mexican Rice Imports

Internationally, the U.S. faces serious competition in the Mexican rice market from only four countries: (1) Thailand, (2) Vietnam, (3) Argentina, and (4) Uruguay. All four countries could

mount a serious threat to the U.S. dominance in Mexican rice markets but all face a variety of constraints in gaining access to the Mexican market.

Thailand is the world's largest rice exporter, due in part to the elimination of export taxes and quotas in 1986 (Wailes et al. 16). In 1997, Thailand harvested 14.5 million mt of rice. Thai production levels are projected to increase steadily in the years to come. However, Thailand is experiencing increased competition from Vietnam. In the past decade, Vietnam has made a transition to family farming from the government-controlled systems in place prior to 1988 (Wailes, et al.). With this change in government policy, Vietnamese agriculture has grown rapidly through the increased use and improvement of technology and outside investment. As a consequence, Vietnam became the world's second largest rice exporter in 1996 (Wailes, et al.).

Two main quality issues differentiate Asian and U.S. rice: (1) differences in protein and amylose content and (2) differences in the percentage of broken heads in milled rice. Many Asian rice consumers prefer rice of about 18% amylose and 5% or less protein. U.S. rice ranges from 13% to 25% amylose and 5% to 9% protein. The majority of rice produced in the U.S. contain higher levels of amylose and protein making the rice firm when cooked with kernels that break apart easily, as opposed to the soft and sticky rice many Asians prefer (Lee). Mexican consumers prefer a non-sticky rice more consistent with U.S.-produced rice.

In terms of the percentage of broken heads of rice, Vietnam began a project in 1997 to improve rice quality through improved varieties and better rice production and drying techniques. With the assistance of the Danish International Development Agency, many farmers are now able to purchase new dryers which, by reducing the moisture content of the rice, are decreasing the percentage of broken heads ("More Rice for the Nation"). As more farmers participate in this development program, Vietnamese rice will potentially create strong competition for U.S. short grain (specifically Californian) rice.

In 1994, Mexican rice producers, opposed to cheap rice imports from Asian rice producing countries, prompted the Mexican government to erect a non-tariff barrier (citing sanitary and phytosanitary differences) against imports of Asian rice into the Mexican market. Similar restrictions on rice from non-Asian rice suppliers have not been imposed by Mexico. Although Argentina and Uruguay are not large, low cost producers like Thailand and Vietnam, they produce rice that is similar in quality to that of the U.S. In 1998, Argentina signed a free trade agreement with Mexico that will permit the trade of rice without barriers between the two nations (Osava). Record rice harvests in both Argentina and Uruguay have followed the flooding and crop losses of 1997. Brazil normally imports about 75% of Uruguay's rice (Wailes et al.). When Brazil has a good crop, however, Uruguay is forced to find alternative markets like Mexico which lowers the import price of rice. Expected growth in South American rice production and trade agreements between Mexico and MERCOSUR countries (Brazil, Uruguay, and Argentina) will likely increase the competitive pressure faced by U.S. rice exports into Mexico.

Anti-Dumping Claim by Mexican Rice Industry

The Mexican Rice Council (Consejo Mexicano de Arroz, or COMEARROZ) conducted an investigation of the prices of rice imported from the United States and planned to initiate an anti-dumping claim with the Mexican Secretary of Commerce in June, 1999 (Rudiño). COMEARROZ expressed concerns about the disadvantages faced by Mexican mills and growers resulting from low world prices for rice. Industry sources indicate that the COMEARROZ concerns focus on milled rice imports. Meetings between COMEARROZ and U.S. embassy officials have reportedly resolved the issue without a formal charge being registered (F. Lee).

Mexican Rice Milling Industry

Although an increasingly important customer for sales of U.S. rough rice, continued growth in purchases of U.S. rough rice by the Mexican milling industry faces critical constraints. The constraints range from limited milling capacity, competition with the production and sale of domestic rice, competition with other foreign suppliers, issues of branding, promotion, and quality, and financing constraints.

Mexican rice mills are located primarily in the rice production regions of Mexico. Although data from the USA Rice Federation suggest that many mills are scattered throughout Mexico (Table 10), only 6 mills located in Orizaba, Cordoba, Mexico City, Monterrey, and Guadalajara control approximately 85% of the rice that is imported into Mexico. Most rice is imported when rice supplies from domestic production dwindle each year. The mills dry and store the rice before milling and packing the rice for domestic retail sale. The mills package the rice with different percentages of whole and broken rice as different brands so that the public associates a specific brand with higher or lower quality (fewer or more broken heads).

The Mexican rice packing sector includes the major milling companies which pack their own brands for retail sale. In addition, two large firms and a number of smaller packing companies that do not mill rice are involved in the rice packing and distribution business. Packers purchase bulk bags of milled rice (50 kg and 25 kg) and then re-pack the rice grain in smaller bags for sale at retail under their own brand names. Rough rice is processed and packaged in different containers for retail sale such as 50kg, 25kg, 5kg, 2kg, 1kg, and 750gm bags. The 1-kilo plastic bag is the dominant form of product packaging for retail sale.

Mexican Rice Distribution and Retailing

Millers and packers sell their rice to four different markets: (1) supermarkets; (2) centrales de abasto (wholesale distribution centers); (3) government stores; and (4) packers.

Supermarkets

Supermarkets are the fastest growing food retail channel in Mexico, especially since the arrival of multinational corporations with their state of the art technology. International-based chains include Carrefour, SAMs, WalMart, Auchan, and HEB. Local chains (Soriana, Gigante, Comercial Mexicana, Aurrerra, Chedraui) have been also growing in the number of outlets and in the quality of services offered. Mexico is approaching the second stage of food retail development in which retailers open regional distribution centers and gain economies of scale.

In a 1998 study, 57% of Mexican consumers indicated a preference for supermarkets (tiendas de autoservicio) as the main outlet for purchasing food items (Food Marketing Institute). Regional differences are important, though, with a preference for supermarkets of 39% in Guadalajara and 62% in Monterrey. Mexican demographics, income and consumption patterns trends would continue to support the fast growth of the supermarket format in the future. Consumer preference for the supermarket outlet is even more pronounced for the purchase of packaged foods (alimentos envasados) which include white rice. In the same 1998 study, 69% of Mexican consumers indicated a preference for purchasing rice in supermarkets nationwide, the highest preference among the 20 food categories included in the study (Food Marketing Institute). For this reason, supermarkets are at the center of marketing and promotion strategies for rice brands in Mexico.

Centrales de Abasto

Despite the growing presence of supermarkets and the increasing supply of rice from packers directly to retail outlets, wholesale markets continue to be an important although declining step in the distribution chain, especially for rice that reaches the consumer in bulk form. Some small grocery stores (tiendas de abarrotes) and public market merchants (mercados publicos) still rely on wholesale markets for their bulk rice supply. No reliable statistics are available with respect to the proportion of rice that flows through the wholesale market distribution channel. Only 4% of the outlets in the Mexico City “Central de Abastos” claim to wholesale grains in the food category that includes rice (Cota Guzman, CEDA, 1998). Notably, at least one important rice packer has its distribution center within the Mexico City Central de Abastos.

Government Stores

The government food distribution agency (DICOMSA, or System of Distributors) is a distributor of basic food items to the rural poor in Mexico through a system of 300 government-owned stores in low-income areas (cities of population between 500 and 4,000). As a part of SEDESOL (Ministry of Social Development), DICOMSA helps regulate the retail prices of basic food items by selling at prices below those in private retail stores. DICOMSA purchases rice primarily in 5 kg or smaller packages which are first sent to one of 36 main storage locations before distribution to the DICOMSA stores. Before 1990, DICOMSA annually distributed around 60,000 mt (1,322,773 cwt) of rice through its stores (Table 11). The annual distribution dropped in half after 1990, however,

when DICOMSA closed its stores in the larger cities as a part of an overall effort of the Mexican government to reduce costs.

Most of the rice that DICOMSA buys is American long grain rice due to its low price. DICOMSA purchases the rice each month directly from the rice mills with the lowest bids. The rice millers transport the rice in 50 kg bulk bags directly to DICOMSA storage facilities. From there, DICOMSA has its own fleet of trucks that deliver its products to the stores. The rice is then sold at retail locations either in 50 kg bulk bags or 1 kg retail bags that have been packed by DICOMSA (Granados).

Mexican Rice Consumption

Mexican rice consumption has increased by about 4.2% per year on average over the last decade from 440,000 mt in 1990 to 605,000 mt in 1999. Per capita rice consumption in Mexico has also increased from 11.5 lbs/person in 1990 to 13.2 lbs/person in 1999, a little over half the U.S. rate of about 25 lbs/person. Factors influencing rice consumption levels and patterns in Mexico and the composition of imports include the rice variety preferences of consumers, changes in Mexican incomes, and the markets for products perceived as substitutes for rice in the Mexican market.

Rice Variety Preferences of Mexican Consumers

The saying that “rice is not rice” characterizes the perception of Mexican rice consumers who appear to differentiate markedly between at least two general types of rice sold in Mexico: (1) Morelos (“grueso” or fat) and (2) Sinaloa (“largo” or long). Although both types are technically long-grain rices of the *indica* variety, the Morelos type is shorter and thicker than the Sinaloa type. The most common Morelos type rices are “Morelos” and “Milagro filipino,” both of which are grown in Mexico. Sinaloa is a longer grain rice which is quite similar to U.S. long-grain (No. 2) and Thai (Grade B) rice. The Morelos type rice accounts for 30% of Mexican rice supply while Sinaloa type rice (including imported long grain rice) accounts for the other 70%. Mexican consumers reportedly have definite preferences for one or the other of the two rice types (TAMRC interviews)³. Unfortunately, there is no published market research on the critical issue of Mexican consumer rice variety preferences.

As indicated in Table 12, the Sinaloa type rice is the most highly preferred in Monterrey and surrounding northern areas and in coastal areas while Morelos types are preferred by consumers in Mexico City and the highlands regions. While there are definite geographic preferences for Morelos and Sinaloa rice types within Mexico, there is also some degree of substitutability in consumption. Although the two rice types are used in similar dishes throughout Mexico, there is some difference

³ For a discussion of the general results of the TAMRC surveys, see next section.

in cooking time required at higher altitudes which may contribute to the regional preferences (TAMRC interviews).

Mexican consumers have a choice among a number of rice brands at widely varying prices (Tables 13 and 14). Premium price brands include Verde Valle's parboiled rice. A number of U.S. brands are also prominent in Mexican supermarkets, including *Riceland*, *Great Value*, and *Uncle Bens*.

Mexican Income and Consumer Expenditures on Rice

Data from the Mexican National Survey of Income and Expenditures (MNSIE) (INEGI, 1996) indicate that the national average of monthly expenditures on rice by Mexican consumers is about 25.44 pesos/ household (about \$US 3.35 in 1996 dollars) which is nearly 6% lower than Mexican rice expenditures in 1994 (Table 15). The drop in expenditures on rice between 1994 and 1996 could be attributable to a number of factors, including the effects of the economic crisis in 1995 and 1996 which began with the sharp devaluation of the Mexican peso in December of 1994. The economic crisis during that period also negatively affected expenditures on other cereal grains and foods except corn tortillas. When income drops in Mexico, consumers have a tendency to reduce their consumption of other cereals and shift back to the traditional corn tortillas.

According to the MNSIE, Mexican households with the lowest income spend 21.2 pesos (\$US 2.79) on rice per month, about 6.1% of their average monthly income. Mexican households with the highest income spend 36.39 pesos (\$US 4.79) on rice per month, only about one-third of one percent of their average monthly income. Thus, while expenditures on rice tend to increase as income increases in Mexico, the share of total income spent on rice declines. On average, Mexican households spend 0.92% of their monthly income on rice.

While both urban and rural household expenditures on rice tend to increase as income increases, the upward trend in urban consumer expenditures on rice as income increases is more distinct (Figure 2). However, consumer expenditures on rice in urban areas are lower than those in rural areas at low levels of income but higher than those in rural areas at higher levels of income. Thus, rice appears to be considered to be a staple good in rural areas so that changes in income have little effect on the level of consumption of rice in those areas. In contrast, rice is considered to be one of many foods to choose from in urban areas leading to lower consumption at lower income levels and higher consumption at higher levels of income. This pattern suggests that income growth in Mexico will tend to increase the consumption of rice faster in urban areas than in rural areas.

Substitutes for Rice

The expenditure data also provides some limited insights on food products considered to be substitutes for rice.⁴ A food called "sopa de pasta" (pasta soup) has expenditure patterns across the

⁴More information on substitute foods from the TAMRC surveys is reported in the following section.

various income levels that are similar to those of rice. Pasta soup is a noodle soup with vegetables and perhaps meat. This product would be consumed in a manner similar to “sopa seca,” a rice and vegetable dish that is apparently the main food using rice in much of Mexico. While some meals might include both sopa seca and sopa de pasta, the two are usually substitutes. The average Mexican household spends 0.69% of monthly income on pasta soup, just below the expenditures on rice (Figure 2).

By way of contrast, Mexican households spend an average 35.5 pesos (\$US 4.68) more on corn tortillas than they do on rice. Thus, corn tortillas are the major starch food ingredient in the Mexican diet. On average, Mexican households spend 2.19 % of their monthly incomes on corn tortillas, about 58.0% more than their expenditures on rice (Figure 2).

Survey of Mexican Rice Millers and Consumers

A series of personal interviews with representatives of major Mexican rice millers and consumers was conducted during August of 1999. The millers interviewed represent about 85% of the total Mexican rough rice imports. The general objective of the miller interviews was to determine the main factors, problems, and expectations related to the rough rice imports of Mexican millers.

Because information on rice consumption in Mexico in the existing literature is so sparse, TAMRC determined to conduct interviews with at least some Mexican rice consumers to gain some insight on important issues relating to desired characteristics of rice and the ways in which rice is consumed in Mexico.

Summary of Rice Miller Survey Responses

The specific objective of the Mexican rice miller interviews was to obtain insight into a number of factors affecting their rice purchase decisions, including price, quality, country of origin, tariffs, transportation, services, credit, risk management, and promotion. A formal survey instrument was used to record the responses of the millers (Appendix III). Most questions required the respondents to give a numerical response on a Likert-type scale from 1 to 5 where 1 is “not important,” 2 is “somewhat important,” 3 is “moderately important,” 4 is “important,” and 5 is “very important.” The comprehensive interviews performed by TAMRC professionals lasted three hours on average. The cooperation of COMEARROZ insured the participation of individuals at the highest levels of management within each Mexican rice milling firm in the surveys.

Responses of the Mexican millers are summarized here and organized in order of their relative importance to strategic planning by the U.S. rice industry. The questions asked focused on three areas of primary importance: (1) the image of U.S. rice among Mexican millers, (2) factors with the

potential to impact the access of U.S. rice into Mexican markets, and (3) suggestions to enhance the competitiveness of U.S. rice in Mexico.

Image of U.S. Rice Among Mexican Millers

An understanding of the image of U.S. rice among Mexican rice buyers is critical for building a successful strategic market access plan for Mexico. The survey focused on three issues as indicators of the perception of rice importers: (1) factors affecting Mexican miller choice of foreign supplier, (2) perceptions of the quality of imported rice, and (3) origin preferences for imported rice.

Choice of Foreign Supplier

In response to the survey interviews, Mexican millers expressed their perceptions regarding: (1) the relative importance of factors affecting the choice of a supplier, (2) the U.S. competitors for their rice import purchases, (3) the types of providers preferred, and (4) information services provided by import suppliers.

Relative Importance of Factors Affecting Choice of Supplier

According to the survey, the decisions of Mexican rice millers regarding their choice of foreign rice supplier are affected by a variety of factors. Out of 14 potential factors, millers rated price and quality at the top of the list (“very important”), followed by availability, reliability, tariffs, and transportation (“important”). Sales promotion programs (by alternative suppliers) were considered only moderately important and the country of origin ranked as the least important factor.

U.S. Competitors

Mexican millers regard Uruguay, Argentina, and Thailand as the potential foreign competitors of U.S. rice suppliers in Mexico. They considered the quality of rice coming from those countries to be as good as that offered by U.S. suppliers with price being the key competitive factor. Some millers mentioned that Mexican imports of Argentinian rice in 1998-99 were induced by the lower prices related to the short term decline in Brazilian demand (due to a severe financial crisis in Brazil). They also suggested that they would buy rice from Asian suppliers if the quality and prices were comparable to those in the U.S. The millers indicated Asian suppliers are not currently competitive in the Mexican market due to: (1) phytosanitary restrictions imposed by the Mexican government on imports of Asian rice and (2) Asian rice can only be purchased by the ship load. Given the limited milling and storage capacities of many Mexican rice millers, the ability of U.S. rice suppliers to provide smaller loads of rice by alternative means of shipment (e.g., rail, truck) gives them a competitive edge in the Mexican market over Asian and other foreign competitors.

Type of Provider Preferred

All Mexican millers make import arrangements with U.S.-based exporting companies or brokers. No miller reported using a Mexican importing company or importing directly from U.S. producers or U.S. producer groups. U.S. brokers and exporting companies mentioned included American Rice, Dreyfus, Cargill, ADM, New Field, and Rice Company. Although most Mexican millers

reported a preference to use more than one supplier to foster competition, one U.S. company was consistently mentioned as the main if not the only supplier actually utilized. Various reasons were given to explain the preference for that particular supplier, including the convenience and services offered by the company such as not requiring a letter of credit to close a deal, flexibility of payments, and friendly business services in fluent Spanish. However, some millers expressed an interest in doing business directly with U.S. producers.

Information Services Provided by Import Suppliers

The Mexican rice millers interviewed reported obtaining most of their information, assistance, and related services regarding rice trade-related issues from private companies or the Mexican Rice Council (COMEARROZ). They seldom, if ever, consult the U.S.A. Rice Federation, the U.S. Rice Producers Association, or the U.S. embassy. In fact, most had no understanding of what information critical to their rice import decisions might be provided by U.S. suppliers.

Perceptions of the Quality of Imported Rice

According to the survey, Mexican rice millers believe that rice of good quality can be imported from alternative international sources. Asian and Latin American countries could meet the rice quality requirements of Mexican importers even though American rice has some advantages. One respondent indicated that when rice is imported from the U.S., quality is almost assured. On the other hand, the quality of the rice imported from other countries, like Argentina, may need to be double checked. Mexican millers prefer rice comparable to U.S. Grade No. 2 (55-70), 4% broken, and free of spots.

Most Mexican millers also claimed that they had no difficulties finding rice to meet their specifications from the U.S. market. They mentioned that the brokers they use know what they want very well. However, when asked about quality problems with U.S. rice in the past, some alluded to a rice variety called “Jefferson”. Apparently, two years ago, a ship loaded with “chalky” Jefferson rice arrived in Mexico without meeting the quality requirements of Mexican millers. A complaint was submitted to the U.S. Embassy in Mexico about the incident. The particular mill involved with the import of the “Jefferson” rice still wonders about why such rice could have been exported. Moreover, the miller had the perception that “Jefferson” rice is grown in the state of Texas. For that reason, the miller has refused to purchase “Texas” rice, preferring shiploads from U.S. ports other than Houston. On the whole, however, millers expressed a great deal of satisfaction with the quality and uniformity of U.S. rice.

Origin Preferences

The Mexican millers interviewed claimed that country of origin is not as important as price and quality in their rice purchasing decisions. Nevertheless, some millers expressed a preference for U.S. rice given the comparable quality and price because of: (1) greater assurance of quality, (2) faster and more secure shipping, and c) the possibility to import small volumes.

With respect to preferences for a particular U.S. state as a source of rice imports, most millers did not express a particular preference. Those who did, preferred Arkansas rice because of the perception of better quality and milling yield.

Factors Impacting the Access of U.S. Rice into Mexico

The millers responding to the survey identified five important factors that determine the accessibility of the Mexican market to foreign rice suppliers: (1) tariffs, (2) modes and cost of transportation, (3) credit and risk management, (4) promotional activities, and (5) documentation issues.

Impact of Tariffs on Imports of Rice

Rather than being anxious for continued reductions in the Mexican tariff on rough rice imports under NAFTA, the Mexican millers responding to the survey expressed moderate concern about the continuing elimination of the tariff differential between milled and rough rice. The larger millers, at least, expressed some confidence that the elimination of the tariff differential would not make a large difference in the rough-milled composition of Mexican rice imports. They feel they have been relatively successful in competing with imported white rice so far under NAFTA, particularly given that the tariff differential between rough and milled rice has already declined to only 4% in 1999 and that they also compete with a 0% tariff on U.S. white rice “smuggled” from border cities into Mexican markets. Mexican border cities apparently are allowed to import U.S. milled rice, for regional consumption only, without paying the tariff.

Modes and Cost of Transportation

The Mexican millers responding to the survey stated that the three most important factors for selecting a mode of transportation are (in order of importance): (1) the quantity to be transported; (2) the cost; and (3) reliability.

The millers indicated that the advantages of using ocean shipping include: (1) cheaper rates (up to 70% cheaper), (2) speed of delivery (as little as 8 days and no more than 15 days), and (3) higher likelihood of on-time arrivals. On the negative side, the minimum volume required for purchase when shipping rice by ocean vessel is 1,000 mt which exceeds the short term needs and/or storage capacity of most mills.

In contrast, millers indicated that transporting rice by rail allows more affordable import volumes. Also, the hopper cars used to transport rice can be used for temporary storage. Rail transportation, however, is much slower (30 to 45 days) and less reliable (large variability of arrival times). With few exceptions, U.S. rice shipments are arranged by the supplier. Trucks are not used for rough rice import transportation.

Rough rice transported via ocean vessel typically passes through the U.S. ports of New Orleans or Houston to the Mexican port of Veracruz. Railroad entry ports are Nuevo Laredo which handles most of the rail volume and Piedras Negras, Mexico.

Credit and Risk Management

The terms of credit (or lack of) offered by the supplier was the highest ranked among the factors listed as influencing rice purchases by the millers responding to the survey. Credit was considered more influential than prices or exchange rates. Only very few millers ever use letters of credit for their rice import purchases because of the high cost perceived and because the exporting company that most Mexican millers work with does not require a letter of credit.

According to the survey results, there is no typical pattern in the timing of the purchase decisions by Mexican buyers. Some millers indicated that they normally close their import deals 60 days before the required delivery (30 days for documentation and 30 days for procurement). Others claim that they purchase rice only 25 to 30 days before the desired date of delivery. Still others indicated that they buy every day depending on prices. Most Mexican millers buy at spot prices and only use futures when they think prices will sharply change.

Mexican millers do not routinely use futures markets to hedge their rice purchases and expressed little concern about the risk associated with fluctuations in rice prices and transportation rates. However, risk management is an area of concern for Mexican rice millers as it pertains to fluctuations in the Peso/Dollar exchange rate. All the millers surveyed purchase foreign rice in dollars and must either accept the cost of subsequent depreciations in the exchange rate or find a way to reduce exchange rate risk. Fluctuations in currency exchange rates are a more frequent problem for Mexican rice millers than changes in the dollar price of U.S. rice. Some millers indicated that there are usually at least four depreciations in the exchange rate each year. The dramatic decline in the value of the Peso in 1994-95 had a serious impact on the profitability of most Mexican rice millers because they buy U.S. rough rice in dollars and sell the milled rice in Mexican Pesos. The millers interviewed felt that they had limited flexibility to pass on the costs of currency depreciations to their customers. The exchange rate risk is more pronounced when the purchased rice is shipped by railroad because the delay between purchasing and receiving the rice can be as long as 45 days.

Nevertheless, only one miller interviewed had implemented any measures (only periodically) to manage exchange rate risk. The other millers interviewed offered 3 main reasons for not implementing measures to manage the risk associated with depreciations in the exchange rate: (1) a perceived high cost of such measures, (2) lack of knowledge on how to manage the risk, and (3) an (incorrect) assumption that the broker is already doing it for them.

Promotional Activities

Only two of the millers interviewed claimed to be promoting sales of their rice. Typical means of promotion include T.V. advertisements, pamphlets and point-of-purchase materials, discounts to supermarkets, and cooking and taste demonstrations. The other millers interviewed indicated that cost considerations generally prevent them from promoting sales. Some independent rice packers, however, do some promotion.

Through a series of questions, the millers were also asked specifically about how much they know about the sales promotion programs financed by U.S. private and government groups. Almost unanimously, the millers interviewed indicated that they know little or nothing about such programs. Millers with at least some knowledge of U.S. rice promotion efforts expressed the perception that such efforts are not currently very effective or useful. Some comments received about those programs include the following: (1) “elitist events with no impact on consumers,” (2) “the way they are managed is not appropriate,” (3) “these programs do not help very much,” (4) “taste testing is ok but needs to be consistently done,” and (5) “focus should be TV advertising.”

Even though most millers have used the Commodity Credit Corporation Credit Guarantee Program, at least one miller had never heard of the program. While a few millers have heard about the Facility Guarantee Program, none has ever participated in that program. Nevertheless, all expressed both interest in obtaining more information on both programs and a willingness to participate in them.

Documentation

All Mexican millers interviewed indicated that the documents required to import U.S. rice are not perceived to be an import restriction, regardless of the transportation mode used.

Suggestions for Improving the Competitiveness of U.S. Rice in Mexico

In response to questions by the interviewers, Mexican rice millers offered a number of suggestions for how American rice suppliers might improve their competitiveness in the Mexican market. The main suggestions, in no particular order, include the following:

- *Keep prices down.* Whatever else is done, price must remain low and competitive.
- *Speak Spanish and learn Mexican culture.* Millers indicated that they prefer to work with suppliers that are fluent in Spanish and understand their culture. Business is handled differently in Mexico than in the U.S. According to the millers interviewed, Mexicans want to talk and establish friendships with their business associates to feel comfortable entering into business ventures that will require trust.
- *Provide credit.* One of the biggest millers in Mexico indicated that he simply wants to be treated like just another American customer and not like an “importer.” Mexican rice millers consider themselves to be serious and reliable business people and should be provided credit like any other U.S. rice customer.
- *Direct distribution and sales of U.S. rice in Mexico.* Instead of allowing the majority of U.S. rice to be sold through brokers to Mexican buyers, the millers suggested that U.S. rice suppliers could directly distribute and sell their rice in Mexico. U.S. rice suppliers could keep transportation costs down and increase their profits by shipping large volumes on ocean

vessels and storing the rice in Mexico for distribution and sales within Mexico. Storage facilities would not necessarily have to be built if existing storage capacity was available. One large miller, for example, indicated that they have extra capacity to store around 20,000 to 50,000 mt of rough rice and would be willing to enter into a business arrangement with U.S. rice suppliers for the use of that capacity. Other such arrangements and joint ventures with Mexican buyers may be possible. Several millers indicated that they would like U.S. rice suppliers to know that they are ready to hear proposals. The direct distribution and sales option would facilitate sales of small volumes of rice while taking advantage of cheaper transportation costs, would cut the time between purchase and delivery, and potentially reduce the exchange rate risk faced by Mexican buyers.

- *More direct contact with U.S. rice suppliers.* Several millers indicated a desire for a closer working relationship with U.S. rice suppliers to synchronize supply and imports. Fluency in Spanish would facilitate such business relationships. Other millers expressed a desire to have more opportunities to discuss rice issues of mutual concern with U.S. suppliers.
- *Share the risk.* Mexican millers expressed a desire to have U.S. rice suppliers share some of the price and exchange rate risk associated with purchasing U.S. rice. In this regard, one miller suggested that selling rice in Pesos could be a way to spur U.S. rice exports.
- *Jointly promote rice.* Although few Mexican rice millers are funding any rice promotion efforts, all millers understood the need for promotion and expressed desires for proposals for joint promotion programs with U.S. suppliers.

Summary of Rice Consumer Survey Responses

The survey instrument developed to question Mexican rice consumers on desired rice characteristics and typical uses of rice in Mexico was pre-tested in College Station, Texas with Mexican students. (See Appendix III for the consumer survey developed). The TAMRC staff used the survey instrument in store-intercept interviews in Spanish with actual rice purchasers. As strictly a preliminary effort to gather some information on rice consumption in Mexico, a total of only 20 consumers were interviewed (12 in Mexico City and 8 in Monterrey) in four different supermarkets (Aurrera, Bodega Gigante, and Wal-Mart in Mexico City and H.E.B. in Monterrey). Although the sample size is limited, the responses are indicative of the importance of learning more about rice consumer behavior in Mexico. Any conclusions based on the findings from such a limited number of interviews should be interpreted as preliminary. Interestingly, however, the main conclusions from the consumer survey are broadly consistent with rice miller's perceptions of Mexican rice consumers. Respondents were asked questions in two general areas: (1) consumption patterns and preferences and (2) brands of rice consumed.

Consumption Patterns and Preferences

Mexican consumers interviewed indicated that they purchase rice as frequently as one to three times per month on average and consume rice four to six times per week. About 70% of the Mexican consumers interviewed responded that they serve rice as “sopa seca” which is white rice prepared with some vegetables such as peas and/or beans and perhaps a little meat. Sopa seca is most commonly served in Mexico as a first course before the main meal. About 50% of the consumer respondents serve rice also as an accompaniment to main courses. Less than 20% indicated that they serve rice either as a main dish or in other ways.

When the consumer respondents were asked to list foods they consider to be substitutes for rice, they indicated the following: soups (55%), vegetables (35%), pasta (35%), cream soups (15%), beans (15%), and potatoes (5%). Interestingly, 80% of the respondents listed soup and/or vegetables.

In general, the consumer respondents consider rice to be a high quality food product. All consumer respondents considered rice to be at least moderately acceptable with regard to all twenty potential food characteristics listed in the survey. Of those twenty food characteristics, those considered to characterize rice the least were: (1) uniformity of product, (2) good source of fiber, (3) nutritive, and (4) short preparation time required.

Brands of Rice

Over time, there has been a proliferation of brands of rice available to Mexican consumers as underscored by the interviews with Mexican consumer respondents. More than 50% of the consumers reported that they purchased more than one brand of rice. At the same time, however, as rice millers also indicated, consumers expressed a preference between the two main rice types (long grain or Sinaloa type rice vs. “Morelos” type rice) which appears to be related to consumer cooking habits. The Verde Valle and Morelos rice brands were those most often mentioned by consumer respondents. Only three U.S. brands were mentioned by consumer respondents (all in Monterrey): (1) Riceland, (2) Great Value, and (3) Uncle Bens. The responses of the consumers interviewed suggests that Mexican consumers consider themselves to be moderately to highly brand loyal. The respondents indicated that, on average, the price of their favorite brand would have to increase by approximately 20% compared to other brands before they would switch to other brands. This result appears inconsistent with the high percentage of the respondents that reported purchasing more than one brand of rice. One conclusion might be that price is not a highly important factor in Mexican consumer choices of rice brands to purchase. More research on the price-sensitivity of Mexican rice consumers, therefore, is warranted to determine the potential effectiveness of promotion programs focusing on price discounts and coupons.

Most of the Mexican consumer respondents (65%) indicated that they were unaware of the country of origin of the rice they purchase. Only two consumers (Mexico City) who purchase Morelos type rice were knowledgeable about its Mexican origins. About 70% of the Mexican consumer respondents indicated that they would prefer to buy Mexican-grown rice if they knew the country

of origin of the rice available for purchase. Only 10% of the respondents indicated interest in purchasing rice of U.S. origin.

The issues of rice type and brand loyalty and preference for nationally grown rice are key issues that could have important implications for a strategic marketing plan for Mexico that involves promotion of U.S.-grown rice. Additional research on these issues is needed.

Selling More Rice to Mexico: Issues and Opportunities for U.S.-Mexico Rice Trade

There are only basically two methods of increasing sales of U.S. rice to Mexico:

- Increase total sales of rice in Mexico, regardless of the country of origin, and thereby increase sales of U.S. rice at a constant U.S. market share, or
- Compete market share away from domestic and foreign competitors.

The first method requires an increase in total consumption of rice in Mexico and can be accomplished either through generic rice promotion efforts or through economic or population growth. The second method does not require increased total rice consumption in Mexico but rather a shift of consumption to U.S. rice and away from the rice offered by domestic and other foreign sellers. Such a shift in market share requires more a branded approach to promotion efforts.

Increased Total Sales of U.S. Rice

The most basic means of boosting Mexican imports of U.S. rice is simply to build the level of rice consumption in Mexico at a fixed U.S. market share. Of course, Mexican consumption of rice will increase as Mexico's population and per capita incomes grow, encouraging the Mexican food industry increasingly to source outside national boundaries. Mexico's food expenditure surveys suggest that there is still a strongly positive relationship between income and expenditures on rice, a phenomenon that would not occur in more mature rice markets or for other foods that are on the flatter portion of the income-expenditure curve. Thus U.S. rice producers can expect fairly strong growth in the total Mexican rice market due to income effects alone.

The most important actions to insure that U.S. exporters benefit from income growth are efforts to maintain and enhance U.S. access to Mexican rice markets. The NAFTA negotiations insured that tariff restrictions on the access of U.S. rice to Mexican markets will decline slowly until they are completely eliminated in the year 2003. This will insure that any growth in population and per capita incomes achieved in Mexico that boosts domestic rice consumption will translate into increased exports of U.S. rice to Mexico. Nevertheless, phytosanitary and other nontariff restrictions on imports of U.S. rice will continue to plague efforts to maintain and enhance the access of U.S. rice into Mexico. In fact, market access issues related to nontariff restrictions on U.S.

exports of rice to Mexico are likely to increase as Mexican import tariff rates decline under NAFTA, creating pressure from Mexican consumers for additional supplies of U.S. rice.

Promotion efforts have complemented efforts to enhance the access of U.S. rice into the Mexican market. The USA Rice Federation has conducted generic rice promotion programs in Mexico ranging from the simple, such as distribution of pamphlets that include recipes for the use of rice, to the more elaborate, such as the sponsorship of cooking contests at local culinary schools to encourage up-and-coming chefs to utilize rice in creative ways in their menus. The USA Rice Federation has also encouraged the use of rice through television shows and in-store demonstrations (approximately 300 a year in recent years) showing Mexican consumers how they can incorporate rice into their daily diet. If consumers have any questions about rice, the USA Rice Federation sponsors a toll-free number in Mexico that consumers can call to receive answers to their questions. In 1998, the USA Rice Federation spent \$US 2,178,354 in funds provided under the USDA/FAS Market Access Program and \$US 1,227,199 on the Foreign Market Development program (USDA/FAS). The share of those funds spent in Mexico is not available but was not likely more than 10-20% of the total or about \$US 100,000 to \$US 250,000, an extremely small amount compared to the value of U.S. rice exports to Mexico (\$US 91.4 million in 1998).

Competition for Mexican Rice Market Share

U.S. sales of rice in Mexico can also grow through competitive efforts to gain market share in Mexico. Effective generic promotion programs that encourage Mexican consumers to consume more rice can lead to more rice being consumed in Mexico but may have little impact on the U.S. share of the market. Branded promotion programs attempt to develop the image of U.S. rice by building origin differentiation. The intention of such programs is to get consumers to try U.S. rice, become loyal to U.S. brands, and request U.S. rice brands from their grocers (Wolf). Of the total funds spend by the US Rice Producers Association, the USA Rice Federation, and other groups to promote rice, little is known about the total or the share of the funds spent on branded type promotion programs. Unfortunately, most rice millers interviewed as part of this study indicated little awareness of U.S. sponsored rice promotion programs. Those that had some awareness suggested that they were not highly effective.

Other marketing strategies by the U.S. industry to provide needed services and products to Mexican rice millers can also shift demand from domestic and international rice suppliers to the U.S. One potential opportunity relates to the price risk faced by Mexican rice millers in purchasing rice in foreign markets. All the Mexican rice millers interviewed indicated that price risk is a major deterrent to importing rather than purchasing rice from domestic suppliers. Providing Mexican millers a means to reduce and manage that risk would induce a shift in the source of rice supplies from domestic and other foreign rice suppliers to U.S. producers. Given the potential importance of this strategy for increasing the U.S. share of the Mexican rice market, hedging as a means for Mexican rice importers to managing price is analyzed below, including a consideration of the role that U.S. rice producers might play.

Mexican rice millers also identified transportation and logistics issues as another opportunity for enhancing the competitiveness of U.S. rice in the Mexican market. In this regard, the key issue is the need to balance the needs of many Mexican buyers for smaller shipments of rice against the potential efficiencies from bulk handling of large quantities of rice. This issue as a strategic consideration for U.S. rice suppliers is also discussed below.

Managing Rice Price Risk through Hedging Strategies

Mexican rice millers face at least two major types of price risk in purchasing rice from U.S. sellers: (1) an unexpected change in price and (2) foreign exchange rate risk, since their rice purchases are typically denominated in U.S. dollars. To help manage that risk, Mexico millers can utilize at least two derivative contracts: (1) a rough rice futures contract (denominated in dollars) which has traded at the Chicago Board of Trade (CBOT) since August 2, 1986 and (2) a Mexican Peso/U.S. dollar contract which has traded at the Chicago Mercantile Exchange (CME) since April 25, 1995.

While each of the derivative contracts available to the Mexican miller that buys U.S. rice should reduce a considerable amount of the price risk, they do not eliminate all price risk because the contracts are “cross-hedges.” In other words, the particular type of rice being imported by Mexican millers may not be exactly the same as the rice traded at the CBOT. However, the Mexican Peso/U.S. Dollar exchange rate should be a more precise hedge.⁵

Some Mexican rice millers manage price risks using these derivative instruments (TAMRC surveys, discussed above). More often, Mexican rice millers depend on an U.S. trading company to offer short-term forward prices and manage price risk on their behalf. The risk management services have contributed to the importance of this single U.S.-based trading company in the U.S.-Mexico rice trade.

Risks related to currency exchange rate fluctuations are a larger problem for Mexican rice importers, according to the TAMRC interviews. Most mills do not undertake currency hedges. The lack of currency risk management, coupled with the significant concerns expressed by millers, suggests an opportunity for provision of risk management services to sell more U.S. rice to Mexico. The analysis that follows explains hedging techniques and presents the benefits to trade from price and exchange rate risk management.

Example: Long (Buying) Hedge

Hedging is often viewed as the purchase of insurance with the level of insurance being determined by the relationship between the cash and futures price of the underlying commodity. Hedging is the buying or selling of futures contracts to offset the risks of changing prices in the cash markets.

⁵ Importantly, however, a Mexican miller purchasing rice from Thailand, for instance, has no rice futures contract available with which to hedge (unless they use the CBOT contract which is less likely to be as correlated with the quoted cash price offered) and no currency contract with which to hedge if the price to be paid is denominated in Thai Baht.

This risk-transfer mechanism makes futures contracts extremely useful tools for controlling costs and protecting profit margins.

In this example, we assume that a rice mill is planning to buy 10,000 hundred pounds (cwt) of rice in two months' time (March) and is concerned that the price of rice will increase between now (January) and the time of purchase. Let's say that rough rice prices are quoted locally at \$5.90 per cwt, and the March futures price is trading at \$6.10. To lock in the \$5.90 per cwt price, the mill purchases five Chicago Board of Trade rough rice futures contracts (each contract equals 2,000 cwt). In March, we assume that the local price indeed did jump from \$5.90 per cwt to \$6.20 per cwt. However, the rough rice futures contracts also increased in price to \$6.35. The mill "offsets" the original long position, by selling each contract for \$6.35. The mill therefore made $(\$6.35 - \$6.10) * 10,000 = \$2,500$ in futures trading. However, the mill had to pay $(\$6.20 - \$5.90) * 10,000 = \$3,000$ more than they expected. The gain from the futures trade offsets much of the extra payment needed to cover the cash purchase. Therefore, the mill is out of pocket only \$500 by hedging rather than \$3,000 by not hedging.

The hedge was partly successful because cash and futures prices tend to move in a roughly parallel pattern, since they react to the same supply/demand factors. In general, hedgers are most interested in the difference between the cash price and futures price – the basis. In this instance, because of the basis difference, the hedge was not perfect. Indeed, hedges are rarely perfect. The key point is, however, that the mill was better off hedging rather than waiting to purchase in the spot market.

Potential Benefits of Hedging

Many international trading corporations that purchase commodities/raw materials from abroad use U.S.-based futures contracts to assist in risk management. Likewise, a Mexican rice buyer could utilize U.S.-based futures contracts in order to hedge the price uncertainty faced in purchasing rice in international markets. Importantly, countries like Thailand competing for rice sales in international markets are not able to offer the same risk management opportunities that the U.S. can.

In this section the benefits of hedging are illustrated through the perspective of a buyer of U.S. rice in Mexico that would like to smooth out the price volatility associated with rice purchases. The same risk management tools can be used by a U.S.-based corporation selling to Mexican rice importers. Risk management would enable the U.S. firm to smooth out revenue patterns and to offer a more stable price to the importer, for up to one year in advance. Undertaking risk management on behalf of foreign importers would allow U.S. rice sellers to offer an important service of forward pricing to their trade partners.

To illustrate the advantages of buying from the U.S. simply from a risk management standpoint, data provided by the Mexican Rice Council (COMEARROZ) was used for the analysis. The data set included cash prices paid and quantities bought for several Mexican importers of U.S. rice. Also, results from the TAMRC Mexican rice miller survey were used to develop a realistic framework for a representative rice importer.

One large rice importer was chosen who purchased varying quantities of rice from a U.S. exporter on 171 different occasions between January 19, 1996 through April 20, 1999. Information from the TAMRC survey revealed that this Mexican importer occasionally manages price risk using futures contracts. Specifically, in anticipation of a purchase of rice from an U.S.-based exporter, the Mexican importer often buys futures contracts about 10 working days before the purchase of the rice.

Three alternative scenarios for this representative importer are analyzed: (1) rough rice futures contracts are used, (2) rough rice futures and peso/U.S. dollar futures contracts are used, and (3) no futures contracts are used.

Importantly, in this analysis we focus on the marginal contribution of each derivative contract because it is not uncommon for other countries to invoice in U.S. dollars even though they are based in another country. Thailand, for example, still faces significant foreign exchange rate exposure due to the unavailability of U.S. dollar/Thai Baht futures contracts. The same is the case for Uruguay and Argentina. The three scenarios analyzed, therefore, focus on the advantages of buying U.S. rice over rice originating from other countries where futures contracts are not available.

Assumptions

In this analysis we assume that the Mexican importer wishes to minimize both the costs associated with purchasing U.S. rice and the variability of price to be paid each time a transaction takes place. This assumption leads us to employ a mean-variance framework, where it is possible to take into account: (1) the degree of risk aversion of the importer and (2) the transaction costs incurred from buying futures contracts.

We also assume that the Mexican importer would lock into the ‘nearby futures contracts’ for both rough rice and foreign exchange. Figure 3 plots the cash prices paid for the representative importer along with the futures price from the rough rice futures contract traded at the Chicago Board of Trade. The volatility associated with the cash price is obvious in the figure where price jumps sharply from one transaction to the next. Such an observation implies that risk management might be rewarding to the company. What can also be observed from Figure 3 is that even though the CBOT futures price does not move exactly with the cash price paid by the company, it does trend in the same direction and seems to move up and down with the cash price. This relationship between the futures and cash prices implies that the futures contract is likely to be of assistance to this representative importer.

Finally, we also set the representative importer’s level of risk aversion to a level generally assigned to risk averse traders (Kroner and Sultan). We also set the round trip commission charge equal to \$50 per futures contract.

Results of Hedging Strategy Analysis

Hedging generally results in lower risk and, therefore, lower costs than the unhedged strategy (Table 16). Hedging with rice futures lowers the costs of the representative Mexican rice importer by about 2%. However, even greater reduction in costs can be achieved by the use of both rice and

foreign exchange rate contracts. That is, hedging with both contracts significantly outperforms hedging with just one contract by approximately 17% and not hedging at all by approximately 19%. Including the cost of brokerage fees, etc. incurred by purchasing futures contracts does indeed increase the overall costs that would be incurred by the importer but not to a level that would warrant not using the derivative contracts⁶.

The results presented here illustrates the rewards of using futures contracts by a Mexican importer of U.S. rice. The scenarios were calculated using real data and applying a realistic framework based on market research results. Using rice and foreign exchange rate futures contracts simultaneously and accounting for transaction costs can improve costs over an unhedged scenario by approximately 20%. Foreign exchange rate risk management offers more benefits for Mexican rice importers than does the flat price risk associated with the rice purchases, primarily because the price of rice is less variable than the exchange rate.

Several important implications arise out of this analysis. First, the results suggest that the U.S. may be in a more competitive position than other countries simply due to the fact that several relevant derivative contracts are available to importers of U.S. rice that may not be available to importers of rice from other regions of the world.

Second, while the results suggest that the importer can smooth out payments (reduce the volatility of net price paid) over time, exactly the same risk management principles could be applied from the exporters perspective. That is, while the analysis illustrates that an importer can smooth out net payments by using hedging techniques, an exporter can also smooth out prices that are offered to buyers of U.S. rice. In particular, in order to remain competitive, the U.S. exporter could offer to accept payments for rice in Mexican Pesos (and the exporter can directly hedge receipts of the pesos with U.S. dollar/Mexican Peso derivative contracts) and also offer a guaranteed rice price for as far out as one year into the future. This would enable the U.S. exporter to lock in a guaranteed selling price, offer the purchaser a fixed price out into the future, and, at the same time, eliminate price uncertainty for the importer. Because other countries may not be able to offer such a risk management facility, U.S. rice exporters can use the contracts to enhance U.S. competitiveness over that of other foreign suppliers in the Mexican rice market.

Importantly, a Mexican importer purchasing rice from Thailand, for instance, has no rice futures contract available with which to hedge. The importer could use the CBOT contract but it is less likely to be as correlated with the quoted cash price offered by Thai exporters. The Thai exporters also have no currency contract with which to hedge if the price to be paid is denominated in Thai Baht. A similar situation holds for Mexican purchases of rice from other countries like Argentina and Uruguay, that cannot offer risk management incentives. For a rice exporting country like Argentina that pegs its currency to the dollar, the price risk associated with foreign exchange rate

⁶ It is worth noting that the representative importer purchases large quantities of rice and so the transaction costs as a percentage of the purchase are fairly small. A smaller importer purchasing much less rice would incur higher transaction costs (as a percent of purchases) and so it is likely that the percentage improvement after accounting for transaction costs is likely to be less in this instance.

uncertainty can be mitigated by using U.S. futures contracts to hedge the Argentinean foreign exchange rate risk. This reduces the competitive advantage that the U.S. can offer in the short run. However, any devaluation in Argentina's currency vis-à-vis the U.S. dollar would still result in further risk for purchasers of non-U.S. rice. Mexican importers of rice from Uruguay would not have the same risk management tools available to a purchaser of rice from Argentina if the contracts were not denominated in dollars, thus illustrating the advantage of the U.S. exporters over exporters from Uruguay.

Logistics and Transportation Cost Issues

Given the geographic proximity of the U.S. to Mexico and the well-developed U.S. grain export logistics and handling systems, transportation and logistics issues are key elements in the competitive ability of the U.S. rice industry to deliver high-quality, low-cost rice to Mexican buyers. Competitive pricing is a key requirement for Mexican buyers who can choose from among alternative suppliers in the global rice market. U.S. suppliers, however, face a key tradeoff in competitively supplying rice to the Mexican market: the need to balance the requirements of many Mexican rice buyers for smaller rice shipments against the potential efficiencies from bulk handling of large quantities of rice.

Mexican buyers are price-conscious for a given minimum quality threshold that U.S. rice satisfies. The costs of rice transportation and handling could be reduced if shippers were able to use bulk handling systems. Where possible, rough rice exported to Mexico is handled in bulk, utilizing the Mississippi River barge system. Rough rice in bulk, either ocean-going or in hopper cars, is relatively less costly to ship than white rice in sacks. A supplier who can assemble large multi-car shipments, for example, would likely receive substantially lower transportation rates and could pass on the cost advantage to Mexican buyers. In a competitive market, consumers in Mexico would benefit from the cost savings and consume more rice, thus increasing U.S. - Mexico rice trade.

Currently, Mexican rice importers purchase relatively small quantities of rice, compared with the size of export shipments typical for other grains. The Mexican rice millers interviewed for this study explained that they limit the size of shipments because of high storage costs in Mexico and the limited storage capacity at their mills. These practices expose Mexican millers to the risk of stiff price competition from a packer that takes advantage of the bulk system to import white rice from the U.S. in large quantities.

The U.S. rice industry faces a difficult balancing act on this issue. If a supplier responds to the requests of Mexican importers for smaller shipments, transactions costs are higher but the company succeeds in selling rice to Mexico. However, the consumer in Mexico faces higher prices of rice than would prevail if the most efficient handling system were used, thus dampening rice consumption in Mexico. Individual traders can, and have, developed successful businesses by providing the necessary smaller quantities of rice to their Mexican customers. But the U.S. rice industry, overall, might benefit more from a strategy that aims at using the most efficient logistics in U.S. - Mexico rice trade.

A number of changes in business practices would be needed to execute a strategy to enhance logistics and transportation. Some factors, such as high interest rates in Mexico, are not directly under the control of the U.S. industry. However, targeted investments in infrastructure could possibly improve the ability of U.S. - Mexican trade partners to ship rice efficiently. A number of such projects are under discussion by U.S. and Mexican firms.

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Appendix I. Literature Review Summary

This section presents the findings of a critical review of all pertinent literature, both in the U.S. and Mexico, that relates to the Mexican rice market. Several studies were found, and each is described separately in this section. The findings from the literature search indicate that, while useful background information on Mexico's rice market is available, there has been limited research on consumers in Mexico, particularly since the economic crisis in 1994. While economic work has touched on U.S.-Mexico rice trade, very little analysis of the structure and purchasing criteria of the Mexican rice buyers has been published. These limitations in prior research led to the focus of this research on in-depth, personal interviews with Mexican industry representatives.

A 1993 evaluation of the Mexican rice industry and the impact of NAFTA by researchers at the University of Arkansas examines Mexico's rice production practices, the prospects for trade liberalization, and some marketing characteristics (Wailes, et al.). Most of the information on which the project is based was given by the SARH (Secretaría de Agricultura y Recursos Hidráulicos). This study makes a thorough contribution in outlining production practices at that time. However, the University of Arkansas effort offers very limited information on the differences in rice consumption within Mexico--among regions, between urban and rural consumers, and between different income groups. Nor does the study analyze the practices and preferences of the Mexican rice trade.

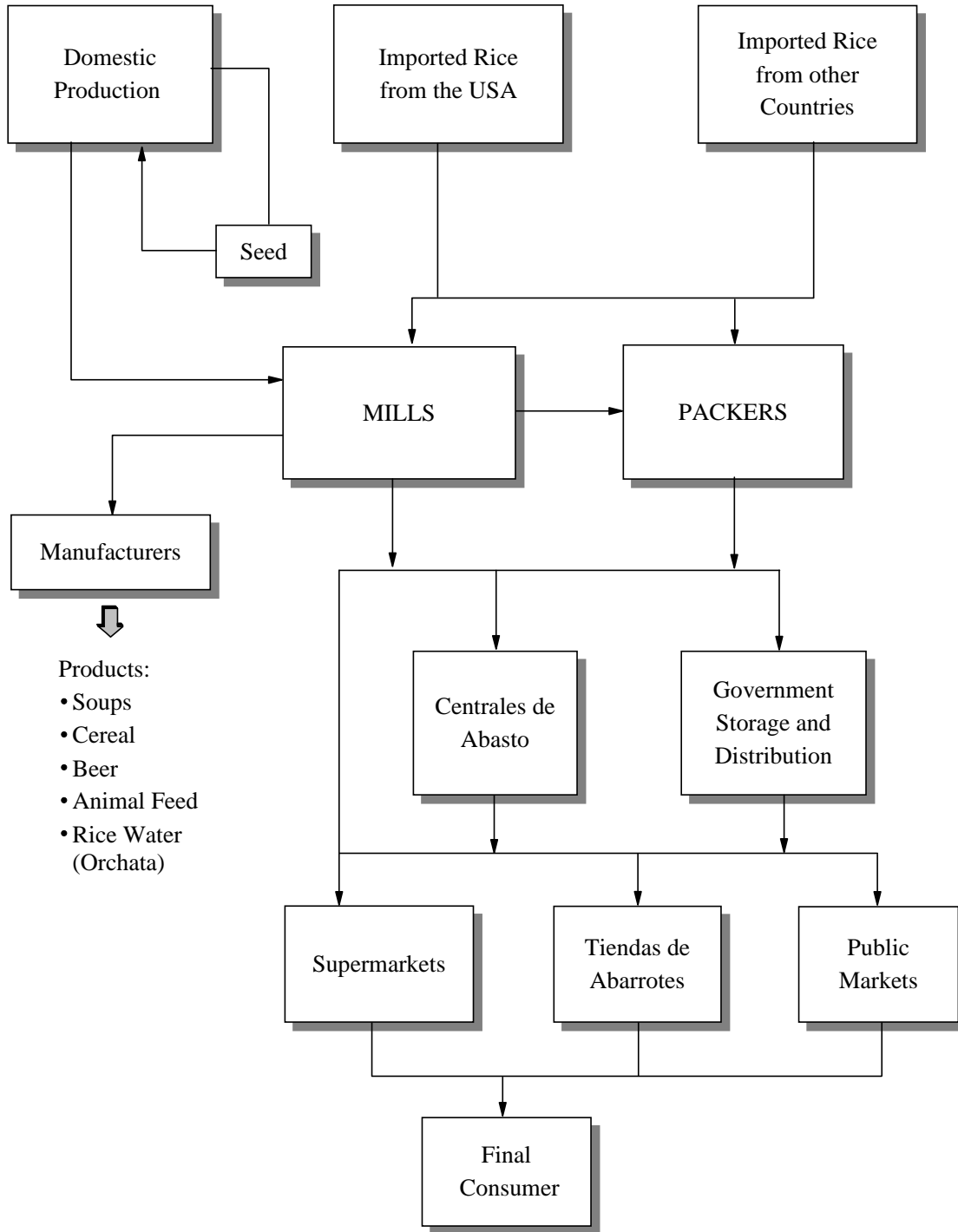
A more recent study by University of Arkansas researchers (Hansen, et al) utilizes a global model to assess the effects of elimination of Mexico's tariffs from pre-NAFTA levels to zero over a 10-year transition period. The Arkansas Global Rice Model is an econometric representation of the world rice economy and contains a sub-model for Mexico. The Mexican sub-model is a linear representation of production, consumption, trade, and price linkages to the world price (Thai 5% broken). Tariff removal in Mexico is simulated and the model solved for market-clearing prices and quantities. The results indicate that rice area harvested in Mexico decreases and imports increase when tariffs are removed. U.S. prices increase marginally. While the Arkansas Global Rice Model is a comprehensive effort, the published reports provide little detail on the product breakdown in the model. Predictions for U.S.-Mexico rice trade in rough and milled forms are not reported.

Researchers at the Autonomous University of Chapingo in Mexico examined the likely effects of NAFTA during 1994-1998 on the Mexican rice industry (Rindermann and Gomez Cruz). They provide information on production trends from 1970 to 1998, costs of production at the farm level, and commentary and analysis on trade-related issues. The topics covered in the trade analysis include macroeconomic factors and trade and domestic policies that affect competitiveness of Mexican rice growers. The study focuses on market structure and policy issues and omits discussion of business and consumer purchasing patterns needed to develop a sound marketing strategy.

INFOMEXICO, under the direction of Aurelio Romero, prepared a *Market Assessment for US Rice* for the USA Rice Federation in 1995, which presented findings from telephone interviews, 650 consumer intercept interviews, and six focus group studies. Opportunities for U.S. rice relate to the majority of the population being young (under 20), shopping patterns moving toward greater use of supermarkets, meals consumed away from home increasing in number, and economic growth in border states and coastal resorts. A limitation of this research is that the focus groups and inquiries about consumers' perceptions of foreign countries are not specific to rice. The survey results suggest that price is the most frequently mentioned factor that Mexicans consider when making food purchases. U.S. rice is perceived to be high priced and out of the reach of many consumers' budget constraints, according to this report. The report suggests that a label indicating "U.S. Origin" for a food product would probably mean that the item is more expensive, although many consumers would consider buying it anyway. The main recommendations from the consumer side is to identify U.S. rice as a "brand" in order to establish brand awareness, brand preference, and brand loyalty among Mexican rice consumers. They also suggest general education programs to promote rice sales. The report also touches on the issue of "how business is done in Mexico." Language barriers, credit arrangements and payments, and currency exchange rate fluctuations were named as significant factors in business-to-business relationships. Communication, distribution and logistics problems throughout Mexico were also cited. The report stressed the need for more relationship building between industry participants. Successful long-term deals must be built on mutual trust and accountability of the parties involved, and will take time and effort on the part of U.S. exporters.

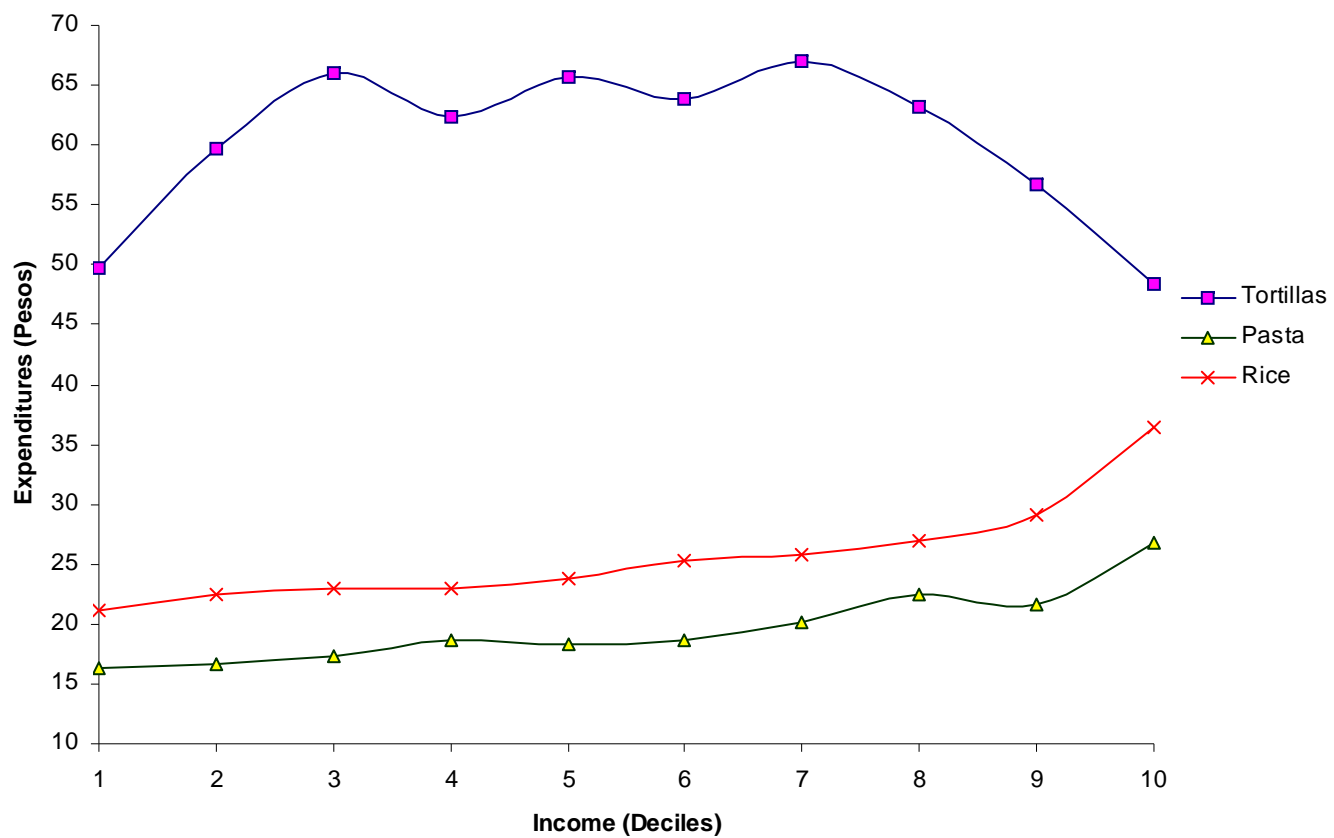
Appendix II. Figures and Tables.

Figure 1. Mexican Rice Market Channel.



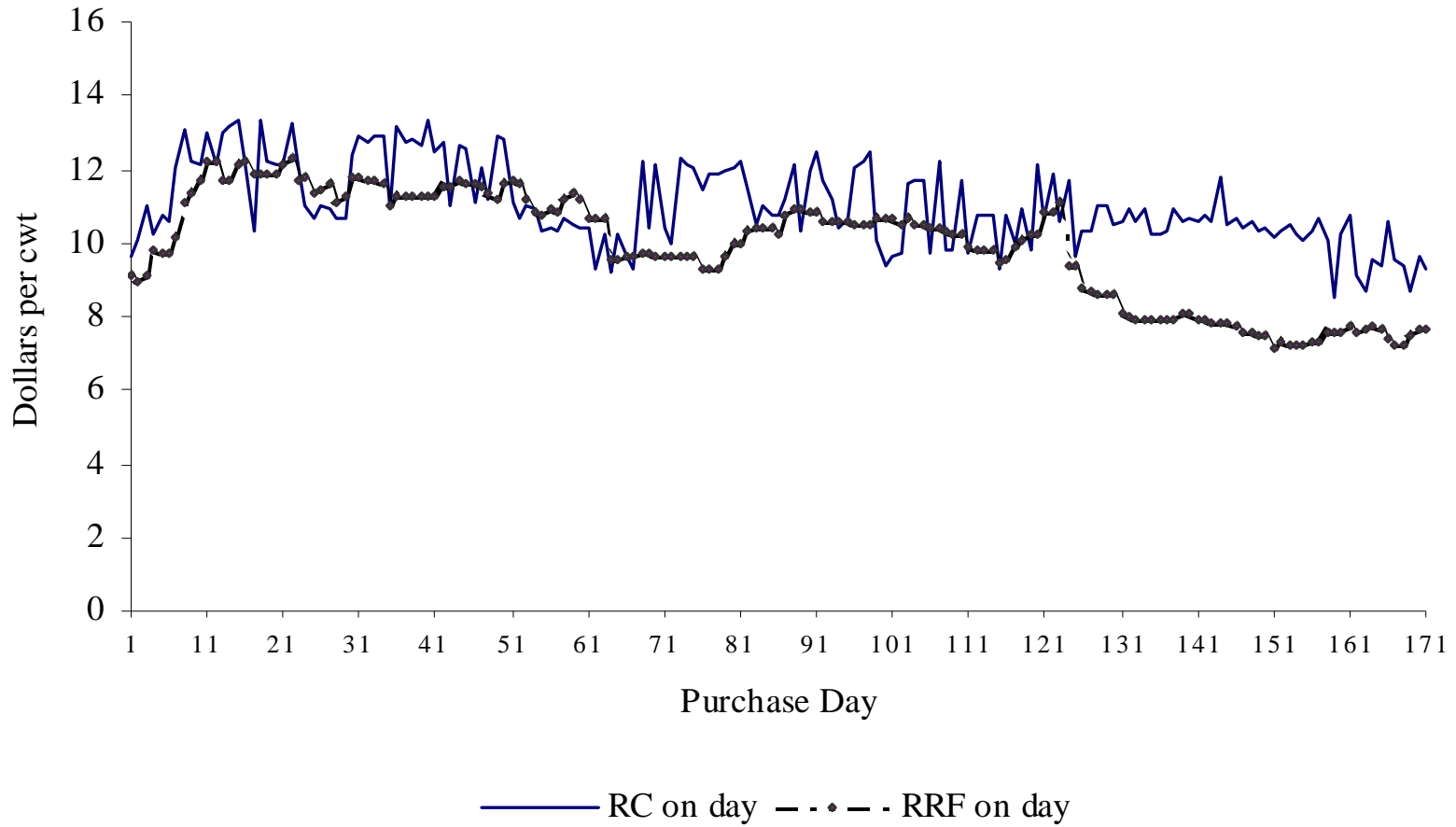
Source: TAMRC, 1999.

Figure 2. Mexican Monthly Household Expenditures on Rice, Pasta, and Tortillas by Decile, 1996



Source: INEGI. *Encuesta Nacional de Ingresos y Gastos de los Hogares*, 1996.

Figure 3. Cash Prices and Futures Prices, January 1, 1996 through June 30, 1999



Source: Chicago Board of Trade and Chicago Mercantile Exchange databases.

Table 1. Mexican Production of Rough Rice by Region, 1990-1996.

Region	1990	1991	1992	1993	1994	1995	1996
	----- metric tons-----						
Campeche	68,516	49,690	43,946	27,357	51,660	36,445	46,080
Colima	23,996	10,423	15,745	11,262	13,822	14,508	19,517
Chiapas	1,213	2,860	269	3,574	2,594	2,647	2,851
Guerrero	7,080	6,781	2,368	2,380	2,752	4,112	6,638
Jalisco	8,493	5,567	9,134	5,698	8,049	9,554	15,821
Estado de Mexico	2,391	1,210	629	600	675	1,870	1,947
Michoacan	16,989	18,941	27,240	16,095	24,562	37,454	38,933
Morelos	26,986	24,063	22,182	24,938	20,159	24,931	29,855
Nayarit	14,782	11,640	24,246	16,426	21,712	28,277	26,225
Oaxaca	7,035	10,815	7,000	9,443	6,400	8,600	8,160
Puebla	1,917	2,019	1,629	973	414	306	166
Quintana Roo	213	2,659	561	0	1,089	345	12,021
San Luis Potosi	12	116	0	0	0	0	0
Sinaloa	85,481	64,618	110,415	26,429	83,038	59,626	11,355
Tabasco	19,181	17,768	18,066	1,979	13,926	9,018	17,106
Tamaulipas	20,145	10,881	7,289	5,521	11,035	6,793	5,403
Veracruz	89,098	107,194	103,303	134,486	111,354	122,094	150,082
Yucatan	860	0	0	0	0	0	0
TOTAL	394,388	347,245	394,022	287,180	373,616	367,030	394,075

Source: SAGAR, 1999.

Table 2. Production, Supply, and Disappearance of Rice in Mexico, 1989-1999.

Year	Area Harvested	Yield	Rough Production	Milled Production	Imports	Exports	Total Domestic Consumption	Ending Stocks
	1,000 ha	mt/ha	----- 1,000 metric tons -----					
1989	140	2.57	540	360	136	0	446	121
1990	75	2.67	300	200	175	0	440	56
1991	70	2.71	285	190	385	0	460	171
1992	70	2.86	300	200	275	0	480	166
1993	50	2.80	210	140	250	0	485	71
1994	91	2.82	385	257	245	0	500	73
1995	75	3.11	349	233	300	0	525	81
1996	80	3.34	400	267	279	0	545	82
1997	100	3.00	450	300	308	0	565	125
1998	100	3.13	469	313	310	4	585	159
1999	95	3.16	450	300	340	1	605	193

Source: U.S. Department of Agriculture, PS&D database.

Table 3. Irrigated and Non-Irrigated Total Production of Rough Rice by Region in Mexico.

Region	1990		1991		1992		1993		1994		1995		1996	
	Non-Irr. (mt)	Irrigated (mt)	Non-Irr. (mt)	Irrigated (mt)	Non-Irr. (mt)	Irrigated (mt)	Non-Irr. (mt)	Irrigated (mt)	Non-Irr. (mt)	Irrigated (mt)	Non-Irr. (mt)	Irrigated (mt)	Non-Irr. (mt)	Irrigated (mt)
Total	155,068	239,320	132,555	214,690	116,413	277,609	138,721	148,459	151,716	221,900	136,360	230,670	174,078	219,997
Campeche	61,470	7,046	31,234	18,456	27,135	16,811	16,833	10,524	47,545	4,115	29,826	6,619	34,212	11,868
Colima	1,902	22,094	232	10,191	29	15,716		11,262		13,822		14,508		19,517
Chiapas	1,210	3	2,405	455	269		3,574		2,594		2,647		2,851	
Guerrero	609	6,471	391	6,390	409	1,959	914	1,466	796	1,956	1,033	3,079	1,449	5,189
Jalisco		8,493		5,567		9,134		5,698		8,049		9,554		15,821
Estado de Mexico		2,391		1,210		629		600		675		1,870		1,947
Michoacan	407	16,582		18,941		27,240		16,095		24,562		37,454		38,933
Morelos		26,986		24,063		22,182		24,938		20,159		24,931		29,855
Nayarit	1,338	13,444	1,182	10,458	1,461	22,785	1,058	15,368	1,550	20,162	2,199	26,078	2,925	23,300
Oaxaca	7,035		10,815		7,000		9,443		6,400		8,600		8,160	
Puebla		1,917		2,019		1,629		973		414		306		166
Quintana Roo	39	174		2,659	14	547				1,089		345		12,021
San Luis Potosi		12		116										
Sinaloa		85,481		64,618		110,415		26,429		83,038		59,626		11,355
Tabasco	19,181		8,751	9,017	5,980	12,086	1,819	160	6,024	7,902	2,894	6,124	7,682	9,424
Tamaulipas		20,145		10,881		7,289		5,521		11,035		6,793		5,403
Veracruz	61,017	28,081	77,545	29,649	74,116	29,187	105,061	29,425	86,432	24,922	88,711	33,383	114,884	35,198
Yucatan	860													

Non-irr. = Non Irrigated.

Source: SAGAR, 1999

Table 4. Irrigated and Non-Irrigated Total Planted Area of Rough Rice by Region in Mexico.

Year	1990		1991		1992		1993		1994		1995		1996	
	Non-Irr. (ha)	Irrigated (ha)	Non-Irr. (ha)	Irrigated (ha)	Non-Irr. (ha)	Irrigated (ha)	Non-Irr. (ha)	Irrigated (ha)	Non-Irr. (ha)	Irrigated (ha)	Non-Irr. (ha)	Irrigated (ha)	Non-Irr. (ha)	Irrigated (ha)
Total	65,108	54,500	47,253	48,521	37,893	59,043	35,270	28,022	53,298	43,361	46,728	43,437	51,885	39,475
Campeche	31,684	2,000	16,079	6,355	12,570	5,757	6,335	3,905	20,972	1,020	20,376	2,170	17,516	
Colima	880	3,820	93	2,882	11	3,482		2,073		2,710		2,455		3,392
Chiapas	711	4	645	185	275		2,119		2,288		2,172		1,771	
Guerrero	234	1,373	201	1,150	338	410	473	310	459	510	407	575	559	785
Jalisco		2,153		1,254		2,102		1,241		2,065		2,241		3,841
Estado de Mexico		395		260		105		120		135		220		338
Michoacan	260	2,989		3,219		4,439	7	2,984	75	3,269	90	5,620	391	5,287
Morelos		3,570		3,278		2,873		3,105		2,564		2,929		3,776
Nayarit	336	3,197	287	2,290	366	5,118	271	4,158	384	5,829	593	6,605	787	5,574
Oaxaca	2,010		2,200		1,750		2,000		1,850		1,800		2,000	
Puebla		260		334		222		130		60		50		25
Quintana Roo	133	95		925	17	251				454		749		2,413
San Luis Potosi		3		191										
Sinaloa		26,443		17,003		25,023		5,459		16,512		11,367		2,453
Tabasco	9,350		4,270	2,582	3,155	3,361	1,526	158	3,035	2,682	1,268	2,957	2,815	2,426
Tamaulipas		4,115		2,329		1,887		972		2,240		1,283		1,141
Veracruz	19,260	4,083	23,478	4,284	19,411	4,013	22,539	3,407	24,235	3,311	20,022	4,216	26,046	4,260
Yucatan	250													

Source: SAGAR, 1999.

Table 5. Irrigated and Non-Irrigated Total Yields for Rough Rice by Region in Mexico.

Region	1990		1991		1992		1993		1994		1995		1996	
	Non-Irr. (mt/ha)	Irrigated mt/(ha)	Non-Irr. (mt/ha)	Irrigated mt/(ha)	Non-Irr. (mt/ha)	Irrigated mt/(ha)	Non-Irr. (mt/ha)	Irrigated mt/(ha)	Non-Irr. (mt/ha)	Irrigated mt/(ha)	Non-Irr. (mt/ha)	Irrigated mt/(ha)	Non-Irr. (mt/ha)	Irrigated mt/(ha)
Total	2,947	4,534	3,278	4,840	3,448	4,900	4,302	5,562	3,155	5,587	3,731	5,507	3,591	5,744
Campeche	2,757	3,623	2,584	3,517	2,710	3,451	2,899	2,977	2,662	4,034	2,760	3,368	2,304	3,178
Colima	2,174	5,839	2,795	4,166	2,636	4,521		5,433		5,228		5,910		5,793
Chiapas	1,751	750	3,729	2,528	1,140		1,687		1,134		1,219		1,610	
Guerrero	2,603	4,713	1,965	5,690	1,210	4,778	1,932	4,744	1,734	4,854	2,538	5,440	2,601	6,984
Jalisco		4,018		4,457		4,356		4,663		4,482		4,279		4,235
Estado de Mexico		6,053		4,654		6,048		5,000		5,000		8,500		5,760
Michoacan	4,788	5,677		5,901		6,236	2,714	5,552	5,000	7,607	5,000	6,677	4,898	7,365
Morelos		7,559		7,341		7,721		8,032		7,862		8,512		7,907
Nayarit	4,055	4,272	4,599	4,864	3,992	4,610	3,904	4,175	4,058	3,790	3,838	3,951	3,717	4,180
Oaxaca	3,500		5,002		4,000		4,970		4,000		5,000		4,295	
Puebla		7,373		6,137		7,338		7,485		6,900		6,120		6,640
Quintana Roo	1,182	3,107		3,078	824	2,655				2,967		1,627		8,014
San Luis Potosi		4,000		2,974										
Sinaloa		3,397		4,292		4,531		4,994		5,784		5,311		4,629
Tabasco	2,664		2,567	3,694	2,234	3,847	1,633	4,000	2,292	3,214	2,474	2,632	2,753	3,985
Tamaulipas		5,000		4,719		3,910		5,956		5,000		5,295		4,735
Veracruz	3,273	6,998	3,591	7,100	4,038	7,859	5,110	8,765	3,793	7,902	4,523	7,928	4,517	8,262
Yucatan	3,822													

Source: SAGAR and SAGAR-FAO in the official data base of SAGAR. Received by fax 17 June 1999

Table 6. PROCAMPO Subsidy Paid to Grain Producers by Season, 1994/95-1998/99.

	1994/95	1995/96	1996/97	1997/98	1998/99
----- Nominal New Pesos per Hectare -----					
Fall/Winter					
Payment	400.0	440.0	484.0	556.0	626.0
Annual % change	-	10.0	10.0	14.9	12.6
Spring/Summer					
Payment	440.0	484.0	556.0	626.0	708.0
Annual % change	-	10.0	14.9	12.6	13.1

Note: The Spring/Summer cycle is the major season for Mexican rice production.

Source: Ponce Coss, 1999.

Table 7. ASERCA Commercialization Subsidy, per Metric Ton of Rice Sold, by Crop Cycle.

Fall/Winter	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99
----- Nominal New Pesos per Metric Ton -----								
Fall/Winter								
Payment	60.0	80.0	120.0	74.0	74.0	74.0	N S	N S
Annual % change	-	33.3	50.0	-38.3	0.00	0.00	-	-
Spring/Summer								
Payment	60.0	80.0	120.0	74.0	74.0	74.0	N S	150.0
Annual % change	-	33.3	50.0	-38.3	0.00	0.00	-	102.7*

* Percent change from 1996/97

N S = No Subsidy.

- = Not Applicable.

Source: Fonseca, 1999.

Table 8. Rice Exporting Country Shares of Mexican Rice Imports by Product Type, 1996-1998.

Type of Rice/Exporter	1996	1997	1998
	----- % -----		
Rough Rice			
Colombia	0	0	*
United States	100	100	100
Brown Rice			
China	0	0	*
France	0	*	*
Italy	0	0	*
Japan	*	0	0
Morocco	0	*	0
Spain	0	*	0
United States	100	100	100
Milled Rice			
Cameroon	0.1	0	0
Canada	*	0.2	0
China	0	0	*
Colombia	0	*	0
Indonesia	*	0	0
Italy	*	*	*
Japan	*	0	0
Malaysia	0	0	*
Switzerland	*	0	0
Taiwan	*	0	0
Turkey	0	*	0
United States	99.0	91.6	100
Uruguay	0.7	8.2	*
Broken Rice			
China	0	0	*
Guyana	0	0	96.6
United States	100	100	3.4
Uruguay	*	0	0

Note: * = less than 0.1%

Source: Calculated from Bancomex statistics: Centro de Negocios, (http://www.bancomext.com/esp/n_est_c2.html), downloaded 6 July 1999

Table 9. U.S. Rice Exports to Mexico by Product Type, Quantity and Value, 1994-1998.

	1994		1995		1996		1997		1998	
	Quantity	Share	Quantity	Share	Quantity	Share	Quantity	Share	Quantity	Share
	mt	%	mt	%	mt	%	mt	%	mt	%
Rough Rice	146,451	57.5	226,692	73.5	295,112	75.7	342,420	88.8	343,959	87.0
Rice, Basmati, Brown	76	0.0	137	0.0	2,837	0.7	111	0.0	0	0.0
Brown Rice	42,647	16.7	4,359	1.4	27,593	7.1	10,966	2.8	26,623	6.7
Parboiled Rice	21,318	8.4	23,090	7.5	13,229	3.4	10,933	2.8	12,509	3.2
Milled Rice	35,703	14.0	47,953	15.5	49,716	12.8	19,814	5.1	12,069	3.1
Rice, Broken	<u>8,516</u>	<u>3.3</u>	<u>6,230</u>	<u>2.0</u>	<u>1,254</u>	<u>0.3</u>	<u>1,231</u>	<u>0.3</u>	<u>378</u>	<u>0.1</u>
Total	254,712	100.0	308,461	100.0	389,742	100.0	385,475	100.0	395,537	100.0
Total U.S. Exports	2,995,751	--	3,277,340	--	2,842,033	--	2,509,156	--	3,723,315	--
	Value	Share	Value	Share	Value	Share	Value	Share	Value	Share
	\$1000	%	\$1000	%	\$1000	%	\$1000	%	\$1000	%
Rough Rice	30,060	44.9	46,020	62.2	65,674	69.2	76,040	81.4	72,942	79.8
Rice, Basmati, Brown	22	0.0	79	0.1	686	0.7	31	0.0	0	0.0
Brown Rice	13,466	20.1	1,656	2.2	8,417	8.9	4,113	4.4	8,101	8.9
Parboiled Rice	8,840	13.2	9,440	12.8	5,725	6.0	4,736	5.1	5,484	6.0
Milled Rice	12,612	18.8	15,365	20.8	14,020	14.8	8,153	8.7	4,776	5.2
Rice, Broken	<u>1,910</u>	<u>2.9</u>	<u>1,453</u>	<u>2.0</u>	<u>321</u>	<u>0.3</u>	<u>317</u>	<u>0.3</u>	<u>98</u>	<u>0.1</u>
Total	66,910	100.0	74,013	100.0	94,843	100.0	93,390	100.0	91,401	100.0
Total U.S. Exports	1,015,177	--	996,528	--	1,031,042	--	932,432	--	1,208,366	--

Source: National Trade Database, U.S. Rice Exports for Rice by Country 1994-1998 (<http://www.stat-usa.gov/tradex.nsf>)

Table 10. Number of Rice Mills in Mexico, by state, June 1999.

State	Number of Mills
Veracruz	9
Sinaloa	7
Jalisco	6
D.F.	4
Morelos	3
Chiapas	2
Estado de Mexico	2
Guerrero	2
Tabasco	2
Tamaulipas	2
Campeche	1
Guanajuato	1
Michoacan	1
Nayarit	1
Nuevo Leon	1
Oaxaca	1
Puebla	1
Queretaro	1
Total	47

Source: Bagdonas, 1999.

Table 11. Rice Distributed by DICOMSA Public Sector Stores, 1990-1998

Year	metric tons
1990	59,297
1991	32,845
1992	32,659
1993	30,984
1994	36,828
1995	36,644
1996	34,459
1997	32,720
1998	30,009

Source: Granados, 1999.

Table 12. Consumer Preferences for Types of Rice in Mexico, 1999

	Prefer Morelos type	Prefer Sinaloa type
	% of those with a preference	
Monterrey	14	86
Mexico City	64	36
Total	44	56

Source: TAMRC staff interviews, Aug. 1999

Table 13. Retail prices of rice products, average of 11 daily observations, June 2-Aug. 11, 1999.

Product	Minimum Price (pesos per kilo)	Maximum Price (pesos per kilo)
Arroz, 1 Kg. Chico Quebrado	4.21	5.56
Arroz, 1 Kg. Gde. Entero	6.94	7.69
Arroz, Catarinos, Bolsa 1 Kg.	6.99	8.50
Arroz, Marca Institucional, Bolsa 1 Kg.	6.43	7.78
Arroz, Mexica, Bolsa 1 Kg.	6.90	9.30
Arroz, Morelos, Bolsa 1 Kg.	6.69	11.35
Arroz, Soberano, Bolsa 1 Kg	7.83	9.60
Arroz, Verde Valle, Bolsa 1Kg	8.04	11.55

Source: PROFECO. [Http://www.profeco.gob.mx/precios/basicos.htm](http://www.profeco.gob.mx/precios/basicos.htm) (various days)

Table 14. Rice Prices in Mexico DF Supermarket (Bodega Gigante) on August 27, 1999.

Brand	Price of 1 kg bag in pesos	Comments
Covadonga - Morelos Super extra	11.20	
Verde Valle	9.65	parboiled
SOS Tipo Morelos	7.65	
SOS Largo	7.65	
SOS Extra-integral	8.70	
SOS Precocido	8.70	
Santa Clara Super Extra (El arroz de Mexico)	8.20	
Escudo de Morelos	7.20	
Arroz La Pasiega - Sinaloa	9.60	
Huijache Super Extra	7.65	advertised at 5.80
Catarino Super Extra	8.40	
MEXICA	8.00	
Marca Gigante Super Extra (store brand)	7.50	advertised at 6.00
Marca Gigante Morelos	7.95	advertised at 6.35
Arroz Extra Verde Valle	8.70	advertised at 6.60
Morelos Verde Valle	7.15	
Pirambe	9.10	
Perla	3.95	broken?

Source: TAMRC, 1999.

Table 15. Household Monthly Average Expenditures on Cereals in Mexico by Urban or Rural Areas, for Various Income Deciles and Selected Types of Cereals, 1996.

	Pesos											
	I	II	III	IV	V	VI	VII	VIII	IX	X	TOTAL	
National												
Cereals	96.26	120.44	149.71	152.05	168.83	171.82	216.61	201.85	235.18	226.13	174.59	
Corn Tortillas	45.42	50.97	63.92	57.76	64.05	54.29	62.69	64.89	68.14	46.59	59.09	
Pasta Soup	19.15	17.88	21.77	24.15	20.04	23.37	27.23	23.30	26.07	36.64	21.96	
Rice	25.00	24.37	24.01	26.35	24.21	26.15	28.26	28.25	29.59	35.81	27.03	
Urban												
Cereals	103.85	142.55	145.53	168.53	164.56	177.81	206.14	210.85	237.03	230.57	179.00	
Corn Tortillas	44.96	60.24	56.36	62.43	58.13	58.26	67.57	68.28	54.74	46.66	58.40	
Pasta Soup	18.12	17.88	21.77	24.15	20.04	23.37	27.23	23.30	26.07	36.64	21.96	
Rice	21.64	20.94	23.47	22.89	23.35	25.37	27.44	28.89	29.26	37.56	25.98	
Rural												
Cereals	80.50	94.64	108.76	132.11	144.80	159.12	175.04	182.89	204.15	207.33	151.36	
Corn Tortillas	41.64	43.06	48.89	69.27	66.20	76.40	65.69	80.27	79.60	77.33	70.22	
Pasta Soup	20.51	18.57	19.45	20.97	22.51	23.64	26.65	25.19	30.10	39.89	24.94	
Rice	27.17	28.35	28.99	29.67	22.13	28.65	32.91	30.57	33.56	36.60	30.03	

Source: INEGI, *Encuesta Nacional de Ingresos y Gastos de los Hogares*, 1996.

Note: Income deciles arranged in increasing order, with I being low-income and X being highest income. Monthly income in decile I is 344-709 pesos and decile X is 4,479 - 10,853 pesos.

Table 16. Comparing Average Hedging Performance for Representative Rice Importer.

Strategy	Percentage Improvement in Costs over the Unhedged Scenario ^a
Unhedged	
Hedge with only Rice Futures (no transaction costs)	2.11%
Hedge with only Rice Futures (including transaction costs)	2.07%
Full Hedge (Rice and Currency) (no transaction costs)	19.03%
Full Hedge (Rice and Currency) (including transaction costs)	18.82%

^a Indicates the (certainty equivalent) reduction in costs.

Appendix III. Surveys.