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THE MEXICAN DAIRY ECONOMY AND POTENTIALS OF LIBERALIZED TRADE FOR THE U.S. DAIRY INDUSTRY

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In June 1990, President Bush and Mexican President Carlos Salinas de Gortari agreed to initiate a bilateral agreement to reduce and/or eliminate tariff and non-tariff barriers to trade, and thereby strengthen economic relations between the U.S. and Mexico. Under the direction of the Office of the U.S. Trade Representative and Mexico's Secretaria de Comercio y Fomento Industrial (SECOFI), nine bilateral groups were established to exchange information on major trade issues. The nine issue areas are automotive trade, insurance, petrochemicals, rules of origin, technical barriers, transport, financial services, tariffs, and agriculture. In December 1990, Canada was invited to join the negotiations and accepted the invitation in February 1991. In May 1991, the U.S. Congress voted to extend *fast-track* authority to negotiate international trade agreements, thus paving the way for President Bush to negotiate a trade agreement directly with Mexico and Canada. The three countries began negotiations in July 1991 with the hope of concluding an agreement in 1992.

The economic potential of such an agreement for each of the three countries involved depends on many factors and many, as yet, unknowns. This report provides background information needed for an assessment of the potentials of the agreement for the U.S. dairy industry. The first section reviews the salient features of Mexico's general economy, and of recent Mexican policy approaches toward trade with the rest of the world and protectionism at home. The second section describes characteristics of Mexico's dairy industry, including dairy pricing practices, and policies affecting trade in dairy products. The third section describes the recent history of Mexico's dairy product trade with the United States and other countries, and discusses the various policies in Mexico and elsewhere that impact Mexico's propensity to import dairy products. The final section offers our summary of the potentials for increased exports of U.S. dairy products to Mexico based on the above reviews. Much of the information contained in this report is based on interviews carried out in June 1991 with several people involved in the Mexican dairy industry.

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THE MEXICAN GENERAL ECONOMY[1]

Although Mexican policymakers have given some attention to the agricultural sector in the past 50 years, Mexican development strategy has never stressed this sector. From 1950 to 1970 the focus of Mexican development policy was on import substitution, rather than on export promotion. The intent was to adopt a strategy which would lead to the development of its industrial sector utilizing labor-intensive technologies, thus exploiting its cheap labor supply, and saving currency that would otherwise have been spent on imports. High tariffs and nontariff barriers were imposed on imports, direct foreign investment and foreign ownership of assets were restricted, the peso exchange rate was tightly controlled and access to foreign exchange was restricted, and the government took direct control of over 1,000 business enterprises and established complex regulations on businesses it did not control. In the 1970s, spurred on by steady and sizable revenues from petroleum exports, priority was given by the de la Madrid government to the banking, petroleum, telecommunications and selected manufacturing and food distribution sectors, while productivity in other sectors of the economy was permitted to lag. This, together with increased government spending on social programs led not to sustained growth, but to inflation, a loss of foreign exchange, and an outflow of capital. The private sector, in general, became complacent behind a high wall of protective tariffs and nontariff trade barriers, and foreign direct investment was restricted for fear it would lead to foreign dominance over the Mexican economy.

Throughout this period, Mexican agriculture suffered from the emphasis on industrial and macro-economic policies. In general, Mexico has faced the classic development dilemma of trying to maintain producer incentives while at the same time providing food to its consumers at low prices. Generally, this dilemma was managed through a complex arrangement of price controls administered by government agencies -- closer to a centrally planned system than to a free market system. Subsidies were plentiful for both consumers and producers, especially during the petroleum-led development era. Lack of proper attention to the agricultural sector, a rapidly growing population, and a major drought in 1979, however, led to increased imports of basic agricultural commodities.

In 1981, Mexico shifted to a crisis and austerity-based economic policy. Drastically lower oil prices and oil revenues, together with a stagnating general economy, led to high inflation and an inability to service an expanding external debt. This forced the Salinas government to implement new strategies. On the macro-policy front, tight fiscal and monetary policies were pursued along with wage and price controls. The exchange rate was liberalized so that whereas in 1980 the ratio of the Mexican peso to the U.S. dollar stood at 23:1, in 1990 it was 2813:1. The Mexican exchange rate is probably still slightly overvalued, but it is now much closer to an equilibrium rate as evidenced by the current near equality between the controlled rate (on imports and exports) and the market rate (U.S. Department of Agriculture 1991a).

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[1]This section draws heavily from Adelman and Taylor 1990, Levy and Szekely 1987, and on National Dairy Promotion and Research Board 1991.

The more significant of these new strategies, however, was the opening of Mexico's borders to greater international trade, and thus the movement toward a more market-oriented economy. One especially effective policy was the creation of the *maquiladora* program which permits duty-free imports of equipment, raw material and components from the United States for assembly and processing by Mexican workers before re-export (Levy and Szekely 1987, p. 139). *Maquiladoras* are U.S.-owned firms (for the most part) operating on the Mexican side of the border with cheap Mexican labor. They are encouraged because they provide jobs and pay taxes to the Mexican government. Goods processed in Mexico by these firms are re-exported to the United States, with import duties imposed only on the value added in Mexico. This program has led to particularly strong economic growth in the Mexican cities along the border with the United States.

Privatization of previously government-owned businesses has been another focus of the Salinas government. The number of government-owned enterprises has been reduced from 1,100 in 1982 to 350 in 1990, through mergers, liquidations, and outright sales (World Bank 1991, pps 155-56). The huge state telephone and steel monopolies also are scheduled for sale.

Another step toward opening its borders occurred in 1986 when Mexico joined the General Agreement on Tariffs and Trade (GATT). Finally, the Salinas government is now seeking to further its free-trade objectives through trade agreements with Chile and Venezuela, and through the North American Free Trade Agreement with Canada and the United States. The move toward a more market-oriented economy is clearly a commercial issue, but it is also a means to achieve institutional reform in the social, political, and legal spheres.

The dramatic changes in Mexico's macroeconomic policies have shown that the Government of Mexico is prepared to alter the course of the economy in significant ways. New policies, initiated in December 1987, are moving Mexico toward a more open economy based on the principles of free trade and competitive entrepreneurship. This, together with a reduction in foreign debt, has greatly reduced inflation, increased foreign investment, reduced the budget deficit, slowed the peso's depreciation rate, and accelerated economic growth. All this suggests a potential for increased trade with the United States.

THE MEXICAN DAIRY ECONOMY

In 1980 Mexico initiated a program aimed at becoming self-sufficient in certain key agricultural commodities. The program to achieve this objective was known as SAM, Sistema Alimentario Mexicano (Adelman and Taylor 1990, Roberts and Mielke 1986, and Levy and Szekely 1987, p. 159). Its principal mechanisms were high levels of subsidies to both producers and consumers. SAM aimed to establish a formula for sharing risks between the government and the peasantry in order to reach production

goals for maize, beans, and other products. The government committed itself to providing peasants with fertilizers, seeds, and other inputs at low prices, it promised to see that products would be bought at established prices, and it guaranteed a minimum income in the event that the crop was lost to a natural disaster. Peasants, in turn, committed themselves to devote their land and labor to achieving the stated production goals. Unfortunately, this policy was very expensive and could not be sustained in the face of high rates of inflation, declining oil revenues, and a large external debt, so it was terminated in a cost-cutting move after only three years of operation.

Also, in an effort to increase agricultural efficiency, the government approved the Agricultural Development Law in 1981 which permitted peasants to integrate their lands with those of large landowners. This assured large landowners that no more lands would be expropriated. Under this law, large landowners could negotiate openly and directly with peasants to use the latters' land in exchange for a wage and a negotiated share of the total profits. At the same time and as a further anti-inflation policy, certain key retail food prices (and hence also key farm product prices) were fixed, and not allowed to rise even though production costs were rising. Dairy products were among those subject to price controls. However, lack of a price incentive meant that milk production failed to expand so as to keep pace with increased demand. Ever-widening domestic production shortfalls have led to steadily increasing imports of dairy products since 1982 (see Table 4, page 19).

Marketing Channels and Practices

The formal marketing and distribution system for fluid milk and manufactured dairy products in Mexico is similar to that of the United States. Milk is collected from farmers, transported to handlers, processed, shipped to retailers and purchased in a variety of retail outlets by consumers, or home delivered. Size and location of producers determines whether milk will first be assembled at a cooling station prior to delivery to the processor. The major fluid milk processors are Grupo Alpura, Grupo LALA, Guilsa, Nestle, and Boreal. The latter is a former government run co-operative, recently privatized.

Water is frequently added to fluid milk by transporters and by producers purely to increase the volume of sales (Schulthies and Schwart 1991). This is apparently a legal practice, but one with obvious limits. Also, processors commonly substitute vegetable fat for butterfat in pasteurized fluid milk and in manufactured dairy products (Rodriguez 1990). This "filling" of milk is legal so long as no more than 80 percent of the butterfat is replaced, and so long as the final consumer product is appropriately labeled. Clearly this is done because vegetable fat is a cheaper source of fat than is purchased butter or butteroil.

Mexico's domestic milk market is somewhat peculiar, however, in that an estimated 30-50 percent of domestic raw milk production does not flow through formal

marketing channels -- it is consumed either as unpasteurized, unchilled fresh fluid milk, or processed into cheese by dairy farmers and sold direct to consumers (U.S. Department of Agriculture 1990a). It is likely that all of the milk produced by the *traspatios* and most of the milk produced on *dual-purpose* farms (see section below on *Milk Production* for a description of these different types of farms) is of this nature. Since this milk is difficult to track, it is also difficult to precisely quantify total milk production, processing and consumption in Mexico.

Dairy Institutions

Another salient feature of the Mexican milk industry is the high level of government participation, at least up to recent times. On the import side, a single organization is authorized to import nonfat dry milk. This quasi-government organization, CONASUPO (Compania Nacional de Subsistencias Populares), is a sub-agency of SECOFI (Secretario de Comercio y Fomento Industrial). A goal of CONASUPO in the past was to increase farmers' incomes as well as to provide dairy products to consumers at low cost. This was accomplished through a variety of producer and consumer subsidy programs. One means of providing consumer subsidies has been to ensure a limited amount of competition to private sector operators while at the same time performing certain essential marketing functions in such a way as to guarantee low prices to consumers. Operating in this fashion, CONASUPO has been able to control the volume of critical food products moving through the formal marketing system, and to guarantee the availability of these food products to consumers at low prices (Engles and Segarra 1990).

Since its inception in 1972, LICONSA (Leche Industrializada Conasupo), an arm of CONASUPO, has had responsibility for administering consumer subsidy programs for low- and middle-income families. It has done so by rehydrating imported nonfat dry milk in its own plants and making the product available to low income consumers at subsidized prices through its own retail stores. LICONSA performs various subsidized marketing functions that would otherwise be performed by the private sector -- dairy product storage, transportation, and coordination of wholesale and retail services -- in order to keep the final cost to consumers low. LICONSA has also provided producers located around milk purchasing centers with technical assistance and credits for the purchase of heifers, veterinary supplies, balanced feed mixes, cooking tanks, embryos, bull semen, and other inputs. Producers pay for this assistance with milk sold to LICONSA.

Officials estimated that LICONSA accounts for about 17 percent of the milk market. By 1990, LICONSA was operating 16 manufacturing plants with a labor force of over 7,000 people. It was also operating 1,400 retail stores in marginal rural and urban areas, distributing about 5 million liters of reconstituted milk per day along with other food products. LICONSA's total milk capacity in 1990 was estimated at over 6.9 million liters per day through its primary product lines of rehydration, powdered milk, ultra high

treatment milk, and regular pasteurized milk. Between 40 and 50 percent of the pasteurized milk market and an estimated 30 percent of the nonfat dry milk market is supplied by LICONSA.[2] About 70 percent of LICONSA's milk is distributed to the poor.

Since 1990, however, LICONSA's role has greatly changed. Its production subsidy programs have now been entirely suspended, and it is retiring from the milk processing and distribution business by privatizing its processing facilities, and divesting of its processing affiliates and retail operations in urban areas. In the future it will focus entirely on low income consumer subsidy programs, with a goal of reaching 80 percent of the population targeted for such assistance by 1994. Those targeted for assistance are children under 12 years of age from families earning less than twice the minimum wage (about US$7.78 per day in 1991). LICONSA served approximately 5.5 million children in 1991, distributing 3.5 million liters of milk a day. It seeks to serve 11 million children by 1994. While LICONSA's milk processing activities are still substantial, three of its rehydration facilities (at Chihuahua, Veracruz, and Aguascalientes) recently have been sold to Mexican producers in joint ventures with foreign investors (U.S. Department of Agriculture 1991a). These plants will still process nonfat dry milk purchased by CONASUPO, but it is hoped that local fluid milk producers will be the major suppliers of these plants in the future.

To quantify the extent to which milk consumption is subsidized in Mexico, we estimated aggregate measures of support in the form of consumer subsidy equivalents (CSEs).[3] CSEs are measures of the amount of income for which a consumer would have to be compensated if all government programs in effect at the time of measurement were removed. Included in these calculations are the effects of all policies impacting consumer prices (domestic price support policies as well as import and export controls), all subsidies on processing and distributing milk, and all exchange rate distortions. CSEs can be positive or negative depending upon the nature of the policies employed. If the calculated CSE is positive, the policies examined provide a consumer subsidy. If the calculated CSE is negative, the policies examined serve as an implicit tax on consumption. CSEs estimated for Mexico for the 1982-89 period are shown in Table 1.

The CSEs shown in Table 1 verify that Mexican consumers have received a substantial subsidy on milk consumption since 1982. During 1988/89 the subsidy reached levels two to three times higher than the levels of the early- to mid-1980s. CSEs for beef have also been positive throughout this period -- considerably higher than for milk until 1988/89. CSEs for pork and poultry have been negative for all of these years.

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[2]Personal communication from Enrique Sada Fernandez, Director General of LICONSA, June 1991.

[3]The CSEs were calculated by Constanza Valdes according to the procedure described in Webb et al. (1990).

Table 1. Consumer Subsidy Equivalents for Milk in Mexico as a Percent of the Price of Milk, 1982-89.

Subsidy Item	1982	1983	1984	1985	1986	1987	1988	1989
				percent				
Price supports and border controls	4.80	4.90	2.49	2.01	3.11	3.67	5.89	6.07
CONASUPO subsidies	2.25	1.64	0.41	-0.02	2.31	2.53	7.31	9.81
Exchange rate distortions	-0.73	-0.84	-0.04	-0.05	-0.66	-0.68	-0.02	0.05
Total CSE	6.32	5.70	2.86	1.94	4.77	5.51	13.18	15.93

SOURCE: (See text).

Milk Production

Production Systems[4]

Milk for the commercial market is produced under three distinct systems in Mexico: the *confined* system, the *pastoral* system, and the *dual-purpose* system. These systems differ in terms of the technology used and productivity per cow, as well as in terms of geographic location.

The *confined* system comprises approximately 14 percent of the national dairy herd and yields 55 percent of the domestically produced milk. Cows in this system are mostly Holstein. The average herd size is 230 cows, although herds of 1,000 cows are not uncommon. Cows in these herds produce 4,000 to 6,000 liters per year,[5] and are fed alfalfa and other forages that dairy farmers produce themselves or purchase locally, along with purchased concentrates. Balanced feed supplements are commonly used. Artificial insemination is the typical breeding practice used in this system of production. Some producers in this group replace culled cows from their own high quality herds; most import heifers from the United States or Canada for replacement purposes. In general, the *confined-system* herds are very well managed, with extensive record keeping, herd health programs, and careful genetic management.

Farm operations of the *confined* system are quite similar to those of large dairy farms found in California and in the southwestern region of the United States. A major difference, however, is that the majority of these herds are milked by hand due to the

[4]This section draws heavily from Asociacion Nacional de Ganaderos Lecheros 1988, and U.S. Department of Agriculture 1990a.

[5]For purposes of comparison, the average production per cow in the United States in 1990 was 7,107 liters.

low cost of labor in Mexico. Only 32 percent of the *confined-system* dairy farms have milking machines. A limited number of producers use cooling tanks. The *confined-system* dairy farms are clustered around the border states of Jalisco and Coahuila and the altiplano states of Queretaro, Mexico and Hidalgo.

The *pastoral* system of dairy production represents approximately 23 percent of the national dairy herd and yields about 17 percent of Mexico's domestic milk production. Most of the cows in this system are crosses between Zebu and Holstein or Brown Swiss. This cross results in a hardier animal better able to withstand the rigors of the more tropical regions, but one that is less productive than are purebred Holstein or Brown Swiss cattle. This hybrid animal generally produces 2,400 to 4,000 liters of milk per year. The average herd size in this system is approximately 40 cows. These cows are generally maintained on native or improved pasture, and fed grains fortified with oilseed meals and corn stalks. Nutritional deficiencies are common and the genetic makeup is not well-managed. Herds in this system are widely distributed throughout Mexico's central and northern regions. Facilities for cooling milk are rare on these farms, and other facilities are generally inadequate for achieving maximum production efficiency.

The *dual-purpose* system milk producers in Mexico are primarily beef producers who gain additional income from milking their lactating beef cows. Management of these herds is relatively crude compared to the other systems. *Dual-purpose* producers are fairly isolated and lack easy access to good roads or marketing systems. The cattle in these herds are primarily Zebu. They are a hardy breed and well suited to survive the rigors of the tropics where these operations are most commonly found: i.e., in the States of Tamaulipas, Veracruz, San Luis Potosi, Tabasco, Campeche, Oaxaca, Colima, Chiapas, and the Yucatan. This production system contains about 63 percent of all dairy cows in Mexico, but accounts for only about 28 percent of the total Mexican milk supply.

Cows in this system are fed on native pasture which is abundant during the rainy season extending from September through December. This seasonal increase in feed leads to increased milk supplies during this period. Cows in the *dual-purpose* system yield 540 to 750 liters per year.[6]

The low cash costs of producing milk in this production system (see subsequent section on *Cost of Production*) has made the *dual-purpose* system attractive to those who are interested in increasing domestic milk production. Associations of cattlemen are working to increase the productivity of this system by crossing the Zebu cattle with the Holstein or Brown Swiss breeds, and are working to improve the quality of pastures serving this system. A popular breeding program, for example, is to cross a male Holstein with a female Zebu. This cross, known as an F-1 cross, is said to be 3 to 4

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[6]Bredahl et al. 1985, and personal communication from Francisco Barba Hurtado, Director Corporativo de Asuntos Externos - Nestle - Camara de Productos Alimenticos Elaborados con Leche, June 1991.

times more productive than the "Criollo" or Zebu breed.[7] Domestic breeding stock shortages, however, have hindered development of this breeding program.

A fourth system, known as *traspatio* (literally, in the backyard), is not very well defined nor well understood. Herds in this system can be found in and around the large cities of Mexico and range in size from 5 to 30 cows. They produce raw milk for sale directly to consumers, and it is believed that they make a significant contribution to the overall milk supply of these cities.

Seasonality of Production

Seasonal milk production patterns in Mexico are closely linked to the particular type of production system under consideration. The least amount of seasonal fluctuation is found in the *confined* system. This is due to the high level of management employed, and to the closely monitored feeding programs of this system, where highly productive cows are consistently producing at near economically-optimal levels.

The *pastoral* system will show somewhat more seasonal variability in milk production since this system is more dependent upon the availability of pasture. Pasture conditions, of course, change in response to changes in the level of seasonal rainfall, in addition to seasons of the year.

The greatest amount of seasonal variability occurs in the *dual-purpose* production system because herds in this system are almost exclusively pasture-based, and located in the tropical areas where seasonal variations in rainfall are the greatest.

During periods of milk scarcity, goat's milk is frequently blended with cow's milk and used in processed dairy products -- primarily cheese.[8] Goat milk does not appear to be a significant factor in Mexico's dairy industry beyond this particular role.

Since the tropical region produces only 28 percent of the domestic milk supply, this region's influence on the seasonality of milk production in all of Mexico is not dominant. However, in view of the fact that this region is seen by many private and government groups as offering the greatest potential for Mexico's dairy industry, this situation may change in the future. A key to realizing this potential, is a high level of infrastructural investment (roads, storage facilities, transportation, etc.) to gain access to this isolated and underdeveloped region. This region is located far from the major

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[7]Personal communication from Jose Luis Cruz, agricultural economist at the U.S. Embassy, Mexico City, June 1991.

[8]Personal communication from Carlos Barron, Consultor en Planeacion e Integracion de Empresas, June 1991.

dairy consumption centers, and currently lacks good roads and efficient marketing and distribution systems.

Opinions differ as to which production system will likely experience the most growth in milk production. Proponents of the *confined* system believe these producers will remain the most competitive and most capable of overcoming expected future increases in costs of production. On the other hand, a representative of the cattlemen's association suggested that in the state of Jalisco, a leading milk producing state dominated by *confined-system* operations, if every resource were available to milk producers, it would take 10 years to re-establish production to 1980 levels in this state, and another 20 years to bring these same herds up to the level of technology used in the United States.

Cost of Production

The cost of producing milk in Mexico varies greatly by production system, by size and management of herd, and, undoubtedly, by region. Current and detailed analyses of the cost of producing milk in the whole of Mexico based on either systematic surveys on synthetic methods are not available. The costs shown in Table 2 are based on estimates provided by Asociacion Ganadera Nacional Productores de Leche and are representative of June 1991 costs for *confined-system* dairies in northern Mexico with an average herd size of 120 cows, producing an average of 5,490 liters (11,309 pounds) of milk per year. Depreciation on fixed assets and returns to capital were estimated at 10 percent and 2.6 percent, respectively, of beginning year building and machinery value, following Baker et al. (1990). Depreciation on dairy animals or cost of replacements was *not* included here.

Table 2. Estimated Costs of Producing Milk in Northern Mexico, June 1991.

	Pesos per liter	Percent of total cost
Variable costs		
Feed	582.93	70.6
Labor	85.07	10.3
Other	65.73	8.0
Fixed costs	4.69	0.6
Depreciation	69.05	8.4
Returns to capital	17.95	2.2
TOTAL ECONOMIC COSTS	825.42	100.0

SOURCE: Asociacion Ganadera Nacional Productores de Leche, Mexico.

Assuming an exchange rate of 3,000 pesos per U.S. dollar in 1991, the total cost shown above is equivalent to $13.36 per hundredweight. This estimate compares favorably with estimates for the United States. The USDA (U.S. Department of Agriculture 1990b) estimates the 1989 total economic cost of milk production in the Pacific Region to be $12.44 per hundredweight and in the Southern Plains to be $14.39 per hundredweight.

A recent study (Guerrero et al. 1991) of the cost of producing milk in the Mexicali area in 1991 yielded an estimate quite similar to that shown here. Guerrero et al. estimated the cost for a 250-cow herd to be $15.62 per hundredweight. This estimate included $2.32 for herd replacements. Thus, when herd replacement costs are excluded, the two independently derived estimates are virtually the same. Since most *confined-system* dairy producers in Mexico purchase their replacement animals from the United States rather than raise their own, we can expect this expense to be substantially greater in Mexico than in the United States. Hence a full accounting of costs should include either herd replacement costs or an estimate of herd depreciation.

Additional information supplied by FIRA (the National Development Bank of Mexico) suggests that feed and labor costs on *dual-purpose* dairy farms is only about 38 percent of the feed and labor costs on *confined-system* dairy farms. The capital requirements on *dual-purpose* farms are likely significantly lower than on the *confined-system* farms, so depreciation and capital charges are also less. Although this does not speak to the opportunity costs of using resources on *dual-purpose* dairy farms for producing milk, it does indicate why there is so much interest in increasing the productive efficiency on *dual-purpose* farms, and in promoting more of this type of dairy operation.

A more dated study (Ramirez 1987) also confirms that milk can be produced quite efficiently in Mexico. This study examined 1983 cost records for dairy farms in five states closer to Mexico City (Jalisco, Queretaro, Coahuila-Durango, Veracruz, and Puebla). Herds included in the analysis were, for the most part, relatively large, high-producing, *confined-system* herds consisting of Holstein cows. In four of the five states, average herd size of the farms studied ranged from 89 to 447 cows and average production per cow in the herd ranged from 5,640 pounds per year to 9,392 pounds per year. (In the Veracruz sample, average herd size was only 14 cows). Total economic costs, including an estimate for returns to capital and an estimate for dairy cow depreciation (or cow replacement) ranged from the equivalent of $10.24 to $13.71 per hundredweight of milk produced (valued at the 1983-84 average exchange rate of 144 pesos to the U.S. dollar).

The above cost estimates should only be taken as rough guides to the cost of producing milk. They are likely biased in favor of the more efficient producers. Nevertheless, they suggest that milk can be produced quite efficiently in Mexico. One of the reasons for this is the low cost of labor. A second reason is the low capital requirement for dairying. Offsetting factors, however, are the higher feed costs and the higher cost of replacement animals.

It should also be emphasized that these cost estimates merely provide insight into the character of Mexican milk production. They reveal little about how Mexican milk producers respond to changes in the price of milk and/or in the price of inputs used in milk production. For many purposes, including trade analyses, knowledge of the latter responses is essential. Again, we are unaware of any recent studies yielding such response parameters. In its trade modelling work, USDA has assumed an own-price supply elasticity of 0.35, a beef cross-price elasticity of 0.05 and a coarse grain cross-price elasticity of -0.01 (Sullivan et al. 1989). More refined estimates must await further research.

Producer Subsidies

A full social accounting of the costs of producing milk would include an estimate of the subsidies paid producers, as suggested by Baker et al. (1990). As indicated earlier, Mexico has in the past provided substantial subsidies to milk producers. LICONSA has traditionally subsidized small producers by supplying breeding stock and genetic material, and by purchasing raw milk at a guaranteed price. Additional subsidies for balanced feed, insurance, technical assistance, irrigation, and credit were also available.

New policies adopted by the Salinas government, however, are aimed at phasing out these subsidies as soon as possible. LICONSA is now selling its producer support facilities, such as genetic centers, animal feed mills, and milk processing facilities. As stated earlier, it is also pursuing new strategies for establishing producer prices more closely aligned with market-clearing levels. A few subsidies remain in the form of providing some feed, fertilizer, crop insurance, technical assistance, and credit to low income producers. The overall level of subsidization, however, has diminished markedly. The intent is to support producer prices at world market levels or at specific U.S. regional milk price levels. The hope is to align the Mexican dairy industry more closely with the dairy industry in the rest of the world and thus achieve more competition. It is also hoped that this policy shift will help put downward pressure on domestic prices and thus lower inflation.[9]

The problem with this policy is that dairy production and dairy exports in most of the rest of the world are also highly subsidized. According to a representative of the Mexican cattlemen's association, the international price of nonfat dry milk is lower than the cost of producing an equivalent amount of milk in Mexico because of subsidies by other countries. Thus, without some form of local protection, Mexican producers claim they will be forced out of business. In the past, the Mexican government used open markets as a way to keep producers in line when they became too demanding. Now

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[9]Personal communication from Prof. Jose Luis Calva, Seminario de Investigacion del Doctorado, Area de Economia Agricola, June 1991.

Mexican dairy producers are demanding protection from subsidized imports and production subsidies elsewhere.

Producer Subsidy Equivalents

To assess the extent to which Mexican producers are advantaged or disadvantaged by dairy policy, we estimated aggregate measures of support in the form of producer subsidy equivalents (PSEs). PSEs are measures of the amount of income for which a producer would have to be compensated if all government programs in effect at the time of measurement were removed. Included in these calculations are the effects of all policies impacting producer prices (domestic price support policies as well as import and export controls), all subsidies on inputs, all direct income supplements to farmers, and all other fiscal transfers of benefit to producers. PSEs can be positive or negative depending upon the nature of the policies actually employed. If the calculated PSE is positive, the policies examined constitute a producer subsidy. If the calculated PSE is negative, the policies examined serve as an implicit tax on production.

The Government of Mexico has had a long history of guaranteeing the purchase of domestically produced milk at a fixed price. This price level was maintained via farmgate purchases of raw milk by LICONSA. While Mexico's milk price support policy has changed in recent years, producer prices are still administered as described in the section below on *Milk Pricing and Price Determination*. Milk price policy has attempted to keep this important product within reach of lower-income families. Thus, both domestically produced milk and milk reconstituted from imported products is made available to low-income consumers at subsidized price levels. Imported fresh milk has generally been sold at 20-30 percent above controlled prices in an effort to discourage such imports and to encourage local production.

The Government of Mexico has also had a long history of controlling imports of dairy products (see section below on *Factors Affecting Mexican Imports*) in order to restrict imports to levels that would not disrupt local production. CONASUPO has been the monopoly importer of grains, oilseeds, and nonfat dry milk, through government-to-government arrangements, and for sale to its processing affiliates or to the private sector. In the case of milk, its processing affiliate is LICONSA. Both LICONSA and private sector buyers pay CONASUPO the same price for milk to be processed and sold on the commercial market, while LICONSA pays significantly less for milk to be allocated to Mexico's social programs. The Government of Mexico has also shielded domestic producers from low cost imports with tariffs on imports and with restrictive import licenses.

Mexico has also employed input subsidies to stimulate milk production. Agricultural credit has been made available to milk producers at less than market rates of interest. The bulk of this credit has been channelled through BANRURAL, FIFA, and the commercial banks, all of which provide working capital loans for up to one year. Intermediate-term credit is provided by FICART, an agricultural trust fund of the

Finance Ministry. Interest rates on such loans are set below commercial lending rates and vary according to farm income, type of producer, and product produced. Most of the loans made available through BANRURAL and FICART go to low-income producers. FIRA's portfolio is divided between middle and high income producers. Commercial banks distribute their portfolios among all three income classes of producers.

As part of the economic reform program, credit subsidies are now being reduced, and BANRURAL, FIRA, and FICART are being restructured. All interest rate controls were removed in April 1989, and BANRURAL no longer serves high income farmers or sustains insolvent producers. BANRURAL now can finance only low-income farmers with economic potential. Further, BANRURAL and FIRA now provide subsidized credit only to *ejidatarios* and small producers, while commercial farmers previously served by BANRURAL are served only by commercial banks.

Nutritionally balanced feed rations provided by the government's feed processing affiliates, ALBAMEX and ICONSA, also have been provided at prices below free market levels. Dairy farmers using soybean meal and sorghum receive a price subsidy administered by CONASUPO. Domestic and imported soybeans are purchased at guaranteed or world prices and sold to processors at a lower price, with CONASUPO absorbing all marketing costs.

In addition, the Government of Mexico provides direct income transfers to low income producers, provides subsidized insurance to livestock producers, provides technical assistance to milk producers, carries out research and development programs to aid dairy farmers, and invests in various programs designed to improve the marketing and production infrastructure serving dairy farmers. Milk producers receive direct subsidies via a tax incentive certificate (CEPROFI) which can be used to pay any federal tax. For farmers who have no federal tax obligation, these certificates can be converted into cash or accepted in payment of debt owed to national banks.

Finally, Mexico consistently undervalued its currency during the 1980s, providing an implicit subsidy to livestock producers. This too must be considered in calculating the total producer subsidy equivalents. The estimated PSEs for dairy in Mexico over the 1982-89 period are shown in Table 3.[10] As these data indicate, the price policies and border controls implemented by Mexico over the 1982-89 period actually imposed a tax on Mexican milk producers (i.e., the total PSE was negative in most years). That is, these policies kept producer prices of milk *below* competitive levels. Mexican milk producers, thus, appear to be justified in seeking a redress for many of their pricing problems (for a comparison of PSE estimates for other livestock products, see Appendix, Table A1.)

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[10]The PSE's were calculated by Constanza Valdes according to the procedure described in Webb et al. (1990).

The data in Table 3 also show that for most years, the feed subsidy dominated all direct and indirect subsidies, although this dominance has diminished in recent years. The total of all subsidies and implicit taxes, nevertheless, has been negative in all but two of the eight years included in the analysis. Overall, producers in Mexico during these years have been taxed for the privilege of producing milk. All this is quantitative evidence of the fact that Mexico has, up to recent times at least, placed more emphasis on subsidizing milk consumption and isolating itself from foreign competition, than on encouraging the development of its domestic dairy production sector.

Table 3. Producer Subsidy Equivalents for Milk Production in Mexico as a Percent of the Price of Milk, 1982-89.

Subsidy Item	1982	1983	1984	1985	1986	1987	1988	1989
				percent				
Price Supports and Border Controls	-4.99	-5.10	-2.59	-2.09	-3.23	-3.82	-6.12	-6.53
Credit	0.47	0.74	0.60	0.55	0.50	0.40	0.34	0.06
Balanced Feed	2.13	7.12	3.13	-0.06	1.08	0.61	2.17	0.14
Fiscal Transfers	0.00	0.00	0.00	0.23	0.33	0.33	0.28	0.16
Exchange Rate Distortions	0.74	0.85	0.04	0.05	0.66	0.69	0.02	-0.05
Total PSE	-1.65	3.61	1.18	-1.33	-0.66	-1.79	-3.30	-6.23

SOURCE: (See text).

Restrictions on Feedgrain Use

The quality of feedgrains available for use in dairy rations clearly impacts milk production levels. In Mexico, feedgrains that are classified for human consumption -- higher quality coarse grains (corn, oats, and barley) -- cannot be fed to livestock. Producers with sufficient land to raise their own feedgrains can avoid this restriction. Dairy producers who must buy some or all of their feed supply on the open market, however, are considerably disadvantaged in that they must use lower quality feeds with which to supplement the diets of their animals (Schulthies and Schwart 1991).

Land Tenure

The present land tenure system -- the *ejido* system -- has its roots in the Mexican revolution of 1910 (Schulthies and Schwart 1991, and Levy and Szekely 1987). Following this revolution, the Mexican government began expropriating large land holdings of wealthy landowners and distributing them to peasant communal groups. These communal land holdings, called *ejidos*, were typically divided into very small subsistence plots. They are owned by the government but operated under usufruct status by peasant farmers (*ejidatarios*). Under the original law, the *ejidatarios* were

allowed to farm the land and pass it on to their children, but could not legally sell nor lease it.

The lack of government attention to and investment in the *ejido* system has resulted in a large number of small farms with outdated technology, poor management, and low milk production per cow. Further, the *ejido* system limited the *ejidatarios'* ability to obtain credit since they did not have title to the land and thus could not use it as collateral for loan funds. In recent years, the laws have been changed so that some *ejidatarios* have been permitted to lease their land. More recently (in November 1991) President Salinas sent to Congress a proposal that would allow companies to own farmland (something entirely new for Mexico since the revolution), would permit individual ownership and sale of *ejidos*, and would abolish the state's obligation to give land to the landless (*The Economist* 1991). This proposal (passed in March 1992) will more completely reform land ownership policy in Mexico. More importantly, it is expected to contribute to increased efficiency in agricultural production in that it would permit more efficient-sized farms to develop and operate. Presumably, it was the latter consideration that led to the new Salinas proposal, although it is also true that the government was running out of land to distribute to the landless. Nevertheless, little productivity advancement will take place on these lands without accompanying investment in physical and institutional infrastructure, research, extension education, etc.

Milk Pricing and Price Determination

Prior to 1988, milk prices in Mexico were controlled by the government at every level of the marketing system -- producer prices, prices to processors, prices to retailers, and prices to consumers. Following 1988, a price liberalization scheme was implemented whereby dairy prices would be negotiated on a regional basis.[11]

Under the latter scheme, representatives of producers, processors, retailers and the government negotiate a fixed consumer price. This consumer price must fall within the guidelines of the Economic Solidarity Pact which stipulates that prices cannot rise by more than the current rate of inflation (U.S. Department of Agriculture 1989a). With the consumer price serving as the anchor price, other prices in the marketing channel are determined on the basis of traditional or "reasonable" margins. Producer prices are also negotiated with some consideration given to costs of production. Prices other than consumer prices may fluctuate based on current supply and demand conditions. Producers, for example, may be offered lower prices during the rainy season when local supply rises, or higher prices during the dry season when local supply is short relative

[11]Personal communication with Humberto Jimenez, Director Tecnico, Comision Nacional para el Fomento de la Produccion y Aprovechamiento de la Leche.

to demand.[12] Premiums are paid to farmers for chilled milk (U.S. Department of Agriculture 1990a).

Since prices are now negotiated on a regional or state basis, there is some variability in the price-setting procedure. Depending on the political power of each group, prices could favor one group more than another. The wholesale to retail margin, for example, on bottled milk has been reduced substantially (by 50% or more) in recent years as compared to the mid-1970s.

Recently, the prices of selected dairy products, such as yogurt and certain cheeses, have been entirely liberalized; that is, the consumer price is no longer fixed by regulatory or negotiating authorities. Some view this as liberalization in name only, since there was still considerable political pressure on the dairy industry to maintain low prices to consumers, at least until after the August 1991 national election for several congressional seats. On the other hand, a processor representative (in private communication) speculated that the North American Free Trade Agreement would force all dairy prices to be liberalized by the time the agreement is signed.

One of the primary goals of the Salinas government has been to curb inflation. This preoccupation with inflation is seen by some as an end in itself, and often is pursued at the expense of industry growth. In the case of dairy, efforts to keep consumer (and thus producer) prices low have severely restricted the level of domestic production. Budget cuts leading to reductions in agricultural production subsidies have also had a detrimental effect on milk production. Simultaneously, milk producers have had to deal with higher input costs as a result of price liberalization in input markets. Thus, producers continually are squeezed by high input prices on the one hand and low producer prices for their output on the other.

The government has been criticized by producers and producer groups for trying to align domestic prices with international prices as part of its free market policy. Mexican milk producers argue they are thus unfairly forced to meet highly subsidized international milk prices.

MEXICAN DAIRY TRADE

Need for Dairy Product Imports

Estimates of total milk production, milk and dairy product imports, and apparent consumption of milk (measured at farm level quantities) in Mexico from 1960 to 1990

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[12]Some individuals indicated in private communications that price controls are relaxed in areas of cities serving upper- and middle-class citizens, allowing a more market-oriented approach to milk pricing. If true, this may represent an additional, and incremental approach away from retail price control.

appear in Table 4. The import data are estimates reported by the Food and Agricultural Organization (FAO), updated with revisions supplied by Economic Research Service, USDA. These estimates appear to conform closely with the bulk of estimates available from other sources. FAO estimates of Mexican milk production, however, are substantially at odds with those made by local agencies,[13] thus the latter were taken as the more appropriate estimates.

Clearly, milk production in Mexico did not keep pace with population increases during the 1980s. Indeed, Mexican milk production declined by 14 percent between 1985 and 1990, to levels lower than the late 1970s. Consequently, Mexico has had to rely on imports to satisfy much of its demand for milk and dairy products. Even so, apparent consumption of milk in the form of all dairy products declined from a high of 107 liters per capita in 1980 to 80 liters per capita in 1990. For comparison purposes, per capita disappearance of milk (measured at farm level quantities) in the United States was 245 liters in 1980 and 260 liters in 1990. This would seem to suggest there is great potential for additional sales of milk and dairy products in Mexico in the future.

Milk and Dairy Product Imports

Fluid Milk Imports

Mexico has imported bottled and bulk fluid milk since the early 1970s, and substantial amounts of it during 1989 and 1990 (Table 4). The National Dairy Promotion and Research Board (1991) reports that in 1990, 59 million pounds (28.6 million liters) of retail-packed milk and 12.3 million pounds (6 million liters) of bulk fresh milk were imported into Mexico -- virtually all of it coming from the United States. These figures are slightly at odds with the data reported by FAO (see Table 4), but it seems clear that Mexico does import substantial amounts of fluid milk. Given the high cost of transporting fluid milk, one would presume all of this milk comes from Texas or adjacent states.

Cheese Imports

Mexico also imports substantial amounts of cheese and has done so increasingly throughout the 1980s. Based on USDA data (U.S. Department of Agriculture 1991a), of the 1990 cheese imports, 19.2 percent came from the United States, 29.3 percent from South America, 29.6 percent from the European Economic Community, and the remaining 21.9 percent from various other countries. Only Japan and Canada import more cheese from the United States than does Mexico. Still, only 15.4 percent of total U.S. cheese exports went to Mexico in 1990 representing less than 0.1 percent of total U.S. cheese production.

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[13]See, for example, Consejo Nacional Agropecuario 1991, and Rodriguez 1990.

Table 4. Domestic Milk Production, Imports of Dairy Products, and Apparent Consumption of Milk in Mexico, 1960-1990.

Year	Domestic Milk Production	Imports					Apparent Consumption	
		Fresh Milk	Evaporated and Condensed	Cheese	Butter	Nonfat Dry Milk	Total[a]	Per Capita
	million liters	----- metric tons -----					million liters	liters
1960	1,867	0	50	351	29	11,120	1,873	49
1961	1,941	0	0	43	8	12,870	1,944	49
1962	2,019	0	10	77	0	23,970	2,024	49
1963	2,169	0	0	277	262	28,360	2,184	51
1964	2,672	0	0	73	1,438	23,460	2,715	62
1965	3,508	0	150	74	13	15,580	3,512	78
1966	2,846	0	0	132	224	17,430	2,856	61
1967	3,392	0	6,510	323	406	23,800	3,423	71
1968	3,490	0	40	160	430	21,900	3,507	71
1969	3,626	0	0	329	1,413	28,790	3,671	72
1970	4.483	2	13,248	835	3,552	35,792	4,617	87
1971	4,694	2	12,961	591	3,312	49,125	4,821	88
1972	4,915	367	15,687	755	2,508	52,621	5,029	90
1973	5,225	613	14,558	491	5,503	45,887	5,413	94
1974	5,550	1,429	15,137	1,237	8,092	92,385	5,822	98
1975	5,809	1,137	16,153	1,342	3,051	20,855	5,937	97
1976	5,907	546	14,610	2,357	8,718	53,602	6,195	98
1977	6,181	316	11,760	1,975	14,403	65,521	6,611	102
1978	6,510	1,040	11,357	2,779	13,832	59,605	6,929	105
1979	6,642	1,310	28,042	1,666	18,899	67,689	7,223	106
1980	6,742	3,345	111,441	2,429	25,152	237,426	7,697	111
1981	6,856	8,636	139,012	2,875	26,671	129,647	7,897	111
1982	6,924	3,831	59,991	1,974	18,949	71,331	7,577	104
1983	6,768	5,489	4,993	4,338	17,453	177,306	7,308	98
1984	6,860	10,330	3,069	2,713	19,339	112,057	7,426	97
1985	7,173	12,302	6,367	7,611	26,706	197,779	7,993	102
1986	6,373	13,126	5,750	10,341	16,647	170,966	6,944	87
1987	6,201	6,064	5,274	13,958	18,757	178,341	6,848	83
1988	6,159	12,153	1,206	6,510	22,235	182,744	6,840	81
1989	5,577	59,643	607	7,898	30,206	239,952	6,532	76
1990	6,142	32,493	2,800	10,364	27,103	287,886	7,022	80

[a]Apparent consumption measured in milk equivalents on a milkfat basis assuming 1070 metric tons equal 1 million liters of milk (1 liter of milk equals 2.06 pounds of milk) and the following kilograms of raw milk are required to produce one kilogram of the associated manufactured dairy product: 1 kilogram for fresh milk, 2.2 kilograms for evaporated and condensed milk, 8.0 kilograms for cheese, 28.1 kilograms for butter, and 0.2 kilograms for nonfat dry milk.

SOURCE: United Nations *Trade Yearbook* and Consejo Nacional Agropecuario 1990.

From 1983-87, about 75 percent of Mexican cheese imports came from the United States, 10 percent from Argentina and Uruguay, and the remainder mostly from the European Economic Community. Since 1987 the share of both South America and the European Economic Community has increased while that of the U.S. has declined to about 20%.

Evaporated and Condensed Milk Imports

Evaporated and condensed milk has become a much less popular import item during the mid to late 1980s than it was during the 1970s and early 1980s (Table 3). The huge increase in the early 1980s was most likely a short-run response to Mexican milk-production shortfalls. The longer-term solution to production shortfalls was to substitute cheaper sources of fluid milk -- i.e., milk reconstituted from butteroil and nonfat dry milk. Since 1982, Mexican imports of evaporated and condensed milk have become a rather insignificant part of her total imports of dairy products. Since 1983, well over one-half, and in some years over three-fourths, of Mexican imports of evaporated and condensed milk have come from the United States. Most of the remainder has come from Canada in the early 1980s and from the European Economic Community in more recent years. Of the total evaporated and condensed milk exported by the United States in 1990, 35.4 percent went to Mexico. This amount represented about 1% of total U.S. production of these products.

Nonfat Dry Milk Imports

Nonfat dry milk, along with butterfat, are the largest dairy product import items for Mexico. On a milkfat basis, over 90 percent of Mexican imports of dairy products have been in the form of nonfat dry milk and butter or butteroil. This not only reflects the fact that Mexico is a deficit milk producer, it also indicates the emphasis the Mexican government places on providing a low cost consumer product with which to support its social programs for the poor.

Based on USDA data (U.S. Department of Agriculture 1991a), of the total nonfat dry milk imported into Mexico in 1990, 7.4 percent came from the United States, 26.2 percent came from New Zealand, 54.4 percent came from the European Community, and the remaining 12.0 percent came from various other countries. Of United States exports of nonfat dry milk, nearly 41 percent went to Mexico in 1990. This was only 5.3 percent of total U.S. production of nonfat dry milk in 1990, down from 20 percent in recent years. The U.S. share of nonfat dry milk exports to Mexico since 1983 averaged about 35 percent, while that of Canada averaged 10 percent, New Zealand 15 percent, and the European Economic Community about 40 percent. There has been a great deal of variability in these percentages from year to year due, apparently, to the availability and price of nonfat dry milk in the respective countries. For example, U.S. supplies were severely restricted during 1988-90 so that U.S. exports (to Mexico in particular) were greatly reduced through this period.

Butter and Butteroil Imports

Mexico imports substantial amounts of butter and butteroil, primarily to reconstitute drinking milk. Along with nonfat dry milk, this is a major ingredient needed for reconstitution. Based on USDA data (U.S. Department of Agriculture 1991a), of the *butter* imports into Mexico in 1990, 20.9 percent came from the United States, 14.3 percent came from the European Community, 52.2 percent came from New Zealand, and the remaining 12.5 percent came from various other countries. In the same year, 34.3 percent of Mexican *butteroil* imports came from the United States, 38.4 percent came from New Zealand, and the remainder came from the European Community. In 1990, 1.6 percent of total U.S. butter and butteroil production was exported to Mexico. During the 1980s, one-third of Mexican butterfat imports have come from the United States, one-half from the European Economic Community, and most of the remainder from New Zealand.

Other Dairy Product Imports

The National Dairy Promotion and Research Board reports that about 7 million quarts of ice cream and 12,000 metric tons of yogurt were imported into Mexico from the United States in 1990 (National Dairy Promotion and Research Board 1991). According to the same source, this represents well over 90 percent of all such imports into Mexico. Although this does not represent a huge market for U.S. processors, it is suggestive of a potential future market.

Factors Affecting Mexican Imports

Import Licenses, Import Duties, and Other Regulations

All food products sold in Mexico must be registered with the Mexican Secretariat of Health (SSA) to ensure compliance with food safety and labelling laws. The registration procedure is outlined in a recent report by the National Dairy Promotion and Research Board (1991).[14] Once the registration is obtained it is valid for a period of five years. After a registration number has been assigned, an exporter must also obtain health certificates and any required import licenses before individual shipments can be accepted in Mexico. Mexico has many regulations concerning the sanitary integrity of food products, but has experienced considerable difficulty enforcing them. Generally, sanitary regulations have not been a significant barrier to trade.

Import licenses, on the other hand, certainly do act as barriers to trade. They are only granted by CONASUPO and are still required for the most important dairy

[14]The registration procedures were revised in September 1991 so that this description is already somewhat out of date.

product imported -- nonfat dry milk -- even though the number of products overall for which licenses are required has been substantially reduced in recent years. Licenses are normally granted for a certain volume and are valid for importation of the product over the remainder of the calendar year in which issued. To do business in Mexico in a subsequent year, the exporter must obtain a new license.

Import duties also act as significant barriers to trade in that they raise the net cost to exporters of doing business in Mexico and lead to reduced consumption of the commodity in Mexico. Most dairy products imported into Mexico are subject to an import duty of 10-20 percent ad valorem. These duties, too, have been reduced substantially from the levels of the early 1980s and before (of 100 percent ad valorem or more), but they still exist for many dairy products and they are significant. Nonfat dry milk and butteroil, the two most important imported products, are no longer subject to a duty, however.

Figure 1 illustrates the economic consequences of licenses which serve to restrict the amount that can be imported, and/or of import duties which serve to drive a wedge between the local price and the world price. In this diagram S and D are supply and demand schedules for the respective country groupings, ES is the excess supply schedule of the major exporters, and ED is the excess demand schedule of Mexico and other importers. An import license acts much like an import quota, restricting the amount that can be imported into Mexico from q to q′ in the middle panel. The same result would follow from imposition of a fixed import duty of an amount equal to p2-p1. In either case, "world" equilibrium price would be driven down to p1, the importers' price would be driven up to p2, and imports would be restricted. In the one case the license holder earns an economic rent, and in the other case the government earns duty revenue. In both cases there is a net social loss measured by the blackened triangle of the middle panel.

Since Mexico is such a small actor in the total world dairy industry, it is not likely that Mexican import licenses or duties have much impact on world dairy prices. These policies would, however, act to restrict imports of dairy products into Mexico and lead to higher than necessary Mexican consumer prices.

■ = Net Social Loss ▨ = Duty Revenue or Economic Rent

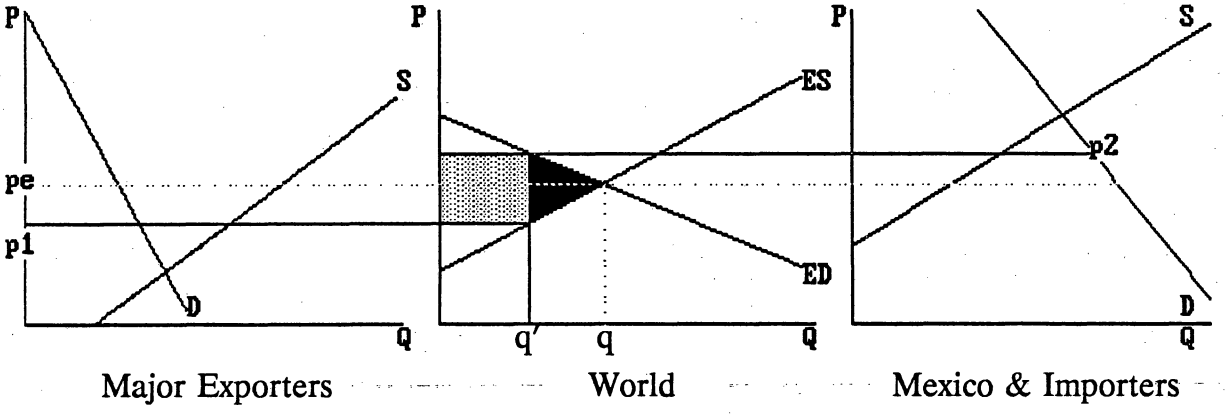

Figure 1. Illustration of the Economic Impacts of Import Licenses and Duties.

Import license requirements and import duties on dairy product imports into Mexico currently in effect are shown in Table 5.

Table 5. Import License Requirements and Import Duties on Mexican Dairy Product Imports.

Product	License	Duty
Fluid milk	no	10%
Nonfat dry milk	yes	0%
Evaporated milk	yes	10%
Condensed milk	no	10%
Yogurt	no	20%
Whey	no	10%
Butter	no	20%
Butteroil	no	0%
Cheese	yes	20%
Lactose	no	10%
Ice cream	no	20%

SOURCE: U.S. Department of Agriculture, 1989b

Mexico's weighted average import tariff is now 5 percent, compared to a weighted average import tariff of 6 percent in the United States (U.S. Department of Agriculture 1991b).

Dairy Policies of Other Countries

The European Economic Community (EEC) and the United States are major exporters of dairy products to Mexico, as we saw in the previous section. This is true because of the volume of milk these two countries produce. Other countries (e.g., New Zealand and probably also Argentina, Uruguay, and Brazil) can produce milk more cheaply than can the United States or most member states of the EEC, but do not at present produce the volume necessary to be major traders. Thus, the dairy policies adopted by the EEC and the United States are crucial to Mexico.

Both the EEC and the United States support the price of milk to local producers above world equilibrium price levels. In fact, EEC price supports for milk in the early 1980s were set so high that in 1984 a marketing quota program was implemented to slow down the accumulation of government stocks of butter and nonfat dry milk. This quota program has not always been effective in reducing surpluses, but in 1988-89 it was, so that EEC (and indeed world) stocks of dairy products were down substantially. Except for parts of 1988-89, however, the EEC has offered countries like Mexico surplus bulk dairy products (primarily butter, butteroil, and nonfat dry milk) at prices well below world price levels.

The United States also accumulates surpluses of dairy products as a result of its price support and import control programs. Some of this is exported through a variety of export programs. To remain competitive with the EEC, the United States also subsidizes exports. Several subsidy programs are available: P.L. 480, the Export Credit Guarantee Programs (GSM-102 and GSM-103), the Dairy Export Incentive Program authorized by the 1985 agricultural legislation, and programs which make direct sales out of Commodity Credit Corporation (CCC) stocks accumulated as a result of USDA's price support activities. The 1985 and 1990 farm bills, in fact, mandated that USDA make direct sales of 150,000 tons of dairy products per year. To do so, of course, the USDA must offer these products at prices competitive with other countries (mainly the EEC's) sales. P.L. 480 and Section 416 aid to Mexico in recent years have been less significant than have some of the other subsidy programs. Also Mexico has not, until 1992, been eligible for aid under the Dairy Export Incentive Program. A considerable portion of Mexico's importation of dairy breeding stock and bull semen in the recent past has apparently been financed under U.S. credit guarantee programs.

Direct sales by USDA to Mexico since 1980 are shown in Table 6 along with the per unit value of these sales and an estimate of the U.S. price of the appropriate dairy product. Here we see that these sales were made at about 1/2 the U.S. price level except in 1988-89, when world surpluses had shrunk to near zero levels. We can assume that the implied U.S. subsidies were near the EEC subsidy levels for all of the years shown in Table 6.

Table 6. Direct Sales of Dairy Products by USDA out of CCC Stocks, 1980-91.

Year	Product	Metric Tons	Unit Price	U.S. Price
1980	Nonfat dry milk	40,042	$1,035	$1,949
1981	Nonfat dry milk	60,015	1,225	2,052
1982	Cheese	3	1,000	3,049
1983	Nonfat dry milk	60,015	848	2,055
1984	Nonfat dry milk	20,000	770	2,004
1985	Nonfat dry milk	15,000	741	1,852
1986	Nonfat dry milk	41,100	783	1,777
1987	Nonfat dry milk	50,000	860	1,748
1988	Nonfat dry milk	30,000	1,260	1,769
	Butteroil	4,900	1,748[a]	2,921
1989	Butteroil	6,764	2,538[a]	2,820
1990	Butteroil	1,950	2,029[a]	2,251
1991	Butteroil	9,855	2,173[a]	2,630

[a]Per unit price of butter equivalent of butteroil.

SOURCE: Tabulations provided by Foreign Agricultural Service/USDA and U. S. Department of Agriculture, *World Dairy Situation*. Circular Series. (Various issues).

Figure 2 illustrates the economic consequences of export subsidy programs by major exporters. The schedules represented by S, D, ES, and ED in this diagram are to be interpreted as in Figure 1. An export subsidy of p1-p2 will cause prices (to both consumers and producers) in the exporting countries to rise to p1 and prices (to both consumers and producers) in the importing country to fall to p2. The objective of such a program is to increase exports. That this will happen is shown in the middle panel of the figure, as exports increase from q to q'. The costs are substantial, however. There is a transfer of income from the exporting countries to consumers in the importing countries, but producers in the importing countries are discouraged from producing at appropriate levels since their price falls. The social losses from such a program (shown by the blackened triangle in the middle panel) could be large.

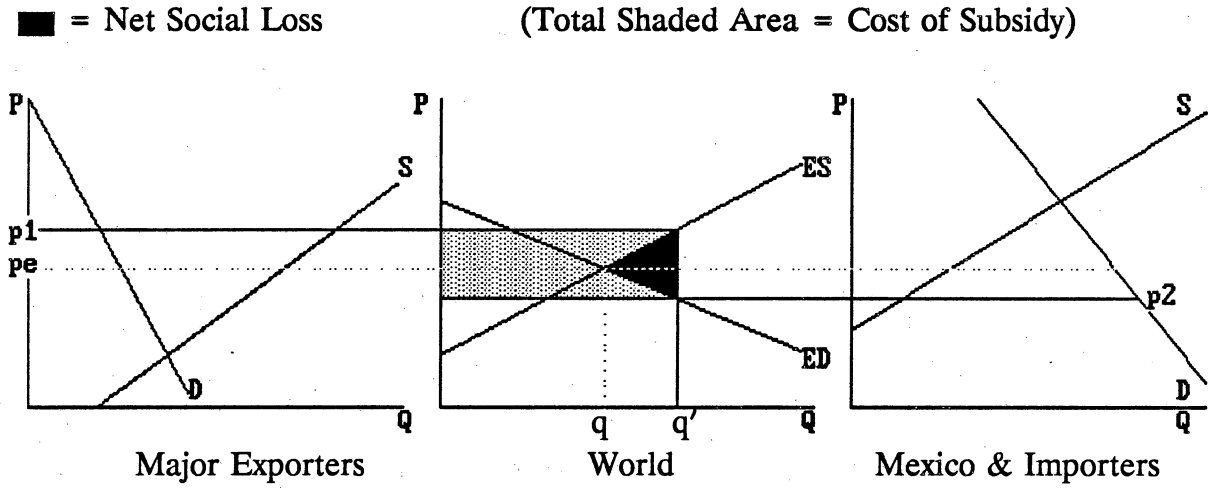

Figure 2. Illustration of the Economic Impacts of Export Subsidy Programs.

The U.S. price support/government purchase program for dairy is protected with restrictive import quotas authorized under Section 22 of the Agricultural Adjustment Act of 1933, and by tariffs on dairy products entering the United States. The import quotas are certainly the most restrictive of the two policies, but tariffs also have an affect. For example, an ad valorem tariff of 6.25 percent is imposed on all cheeses, and a fixed tariff of $0.056 per pound is imposed on butter. The EEC protects its price support/government purchase program with variable levies on imports. These levies keep the net price on imports at EEC markets equal to a threshold price set high enough that lower-priced imports do not otherwise undermine the EEC price support program.

Impact of Trade Liberalization in Dairy

It seems clear that if the United States were to liberalize its dairy sector unilaterally, U.S. milk prices and milk production would fall noticeably (albeit not greatly) as would exports of dairy products. As Table 7 shows, U.S. prices for the major dairy products were well above world price levels for 1982-1987. The exception was in 1988-89 when world stocks of butter and nonfat dry milk were quite low. Even then, U.S. butter and cheese prices were substantially above reported world price levels. Clearly the dairy price support program in the United States, together with its import quotas and duties on dairy products, are effective in protecting the U.S. dairy industry from foreign competition. Thus, if the North American Free Trade Agreement means removal of all forms of protection in dairy by the United States, Canada, and Mexico, U.S. milk and dairy product prices would fall, making whatever surplus we may have cheaper to Mexico. Lower U.S. prices would mean lower U.S. production, however, and slightly increased domestic demand, so that there may well be *no* U.S. surpluses for export to Mexico. Indeed, we might even expect the United States to import some bulk dairy products as U.S. trade barriers fall. Canada would face much the same dilemma, albeit to a greater extent due to the relatively higher producer subsidy level in Canada as compared to the United States.

The more likely scenario is that United States and Canadian dairy policies would change very little under a North American Free Trade Agreement, but both countries potentially stand to gain from an ability to export additional value-added dairy products to Mexico as the latter's import barriers come down. Since Mexico's import barriers have already come down and one would expect them to stay down, it would appear the Free Trade Agreement will have little additional impact on imports from the U.S. and Canada until, say, an income-induced shift in Mexican demand occurs.

Table 7. Ratios of U.S. Wholesale Prices to World Prices of Selected Dairy Products, 1982-90.[a]

Year	Butter	Cheese	Nonfat dry milk
1982	1.61	1.74	2.49
1983	1.90	2.12	2.56
1984	2.48	2.51	2.99
1985	3.07	2.35	2.93
1986	3.11	2.55	2.54
1987	3.17	2.47	1.92
1988	2.18	1.65	1.09
1989	1.53	1.56	1.26
1990	1.65	1.77	1.55

[a]World prices are prices at Northern European ports. They are reported as a range for two periods of the year -- spring and fall. The ratios shown here are the annual average U.S. price as reported by National Agriculture Statistical Service, USDA, divided by the simple average of the midpoints of the ranges given for the world price.

SOURCE: U.S. Department of Agriculture. *World Dairy Situation*. Foreign Agricultural Service. Circular Series. (various issues).

Several recent studies have demonstrated that worldwide liberalization in the dairy industry would have major impacts around the world. In a study commissioned by the World Bank, Tyers and Anderson (1986) used a multi-commodity (wheat, rice, coarse grains, meats, dairy, and sugar) simulation model of world agriculture to project expected 1985 consequences of free trade in dairy on 30 countries and country groups. The first projection assumed 1980-82 domestic-to-border price ratios would remain unchanged to 1985. This projection then assumed a continuation of 1980-82 protectionist agricultural policies everywhere and was used as the basis of comparison for subsequent simulations. This simulation is referred to as the reference scenario. A second projection assumed removal of all forms of dairy market intervention -- domestically as well as across borders. In the latter projection, 1980-82 domestic-to-border price ratios in all non-dairy markets were assumed unchanged from their actual levels through 1985. Thus, whatever protection existed in 1980-82 in the remaining agricultural industries was assumed to be continued through the projection period. Here it was assumed that the border price for milk in every country would be the New Zealand producer price for milk, plus an allowance for processing milk into exportable form, as well as an allowance for transportation from New Zealand to the border. All milk product quantities were converted into fluid milk equivalents so all dairy products could be treated, for analytical purposes, as a single commodity.

The study found that under removal of protectionist policies for dairy in all countries, but retention of protectionist policies in all other agricultural sectors, world prices for milk and world trade in dairy products would nearly double! Imports to Mexico and other deficit countries were projected to increase substantially as barriers in dairy were removed (as indeed has happened following Mexican trade liberalization), and exports from New Zealand, Australia, Argentina, Brazil, India and the United States were projected to increase. The European Free Trade Association's (EFTA) share of world exports was projected to fall from 13 to 2 percent. Argentina and Brazil would shift from positions of net importers to net exporters, accounting for 13 percent of world exports. Exports from the EEC would also increase slightly, although its share of world exports would fall from 54 percent in the reference scenario to 47 percent under trade liberalization in dairy. The United States's share of world exports would increase from 8 percent to 14 percent, as some of the market freed up by trade liberalization is captured.

Because the world price of dairy products is projected to be so high under this trade liberalization scenario, milk prices in Canada, the United States, and several developing countries would change little from current supported levels. Milk prices in Australia and South America would increase significantly, but not by as much as in the low-cost countries of New Zealand and Argentina. In the EEC, milk prices would also increase slightly in spite of the current high level of protection in the EEC. Milk prices in EFTA would drop by 18 percent, and in Japan by over 30 percent. Significant price decreases were projected to occur in Mexico as producer price support and subsidy policies were removed. In general, global liberalization of the dairy sector would raise the price to producers in the major dairy countries currently having relatively low rates

of protection, while for several countries with relatively high rates of protection there would be little price impact. The major exceptions would be in Japan and EFTA.

If trade liberalization *in all of agriculture* were to occur everywhere in the world, we should expect somewhat less drastic milk price changes to occur as substitutions in production take place and as the resulting lower feed prices in Western Europe lead to lower costs of milk production in that region. Indeed, it is quite possible that world prices for milk would increase but that the free-trade equilibrium price in the United States would still be *below* current support price levels in the United States. Under these conditions, U.S. milk production would fall and the United States would become a net importer rather than a net exporter of dairy products. The United States would by no means get out of milk production -- no other country is a large enough milk producer to supply itself plus the United States. By the same token, however, the United States would not be able to compete with New Zealand or a few other countries for much, if any, of the milk needs of other countries.

This is precisely the result found by Tyers and Anderson (1986) when all forms of protection in agriculture were removed, and in all countries of the world. World dairy prices were projected to increase by only 67 percent, although world trade in dairy products would differ little from that in the previous scenario. More recent studies (see Baker et al. 1989, Blayney and Fallert 1990, and Roningen and Dixit 1989) confirm these general results, although they differ somewhat on the magnitude of projected price effects. Roningen and Dixit, for example, project a New Zealand price increase of 71 percent and a U.S. price decrease of 15 percent from multilateral industrial market liberalization. This would certainly lead to a reduction in U.S. milk production in the long run, and likely reduced exports of dairy products.

SUMMARY OF PROSPECTS FOR U.S. EXPORTERS OF DAIRY PRODUCTS

Mexico appears to be able to produce milk quite efficiently. Recent trade liberalization and new land reform policies will only enhance its ability to do so in the future, particularly if the implicit tax on milk production is eliminated. If Mexican dairy farmers are able to obtain the concentrates and other inputs necessary to sustain an expanded national herd, one might expect increased milk production in the future. This possibility would clearly be enhanced by a free trade agreement that leads to reduced feed grain prices for Mexican producers. Certainly Mexico has the labor supply from which to draw this increased production would require. Also, this would be the cheapest way for Mexico to increase the available supply of milk and dairy products. Even though emphasis seems to be on increasing the efficiency and viability of the *dual-purpose* dairies, the greatest increases in milk production per unit of scarce resources will come from expanding the *confined-system* herds. The animals needed for this expansion will likely come from the United States, as has been the case in the past. Most analysts foresee a continuing if not widening gap between milk consumption and

milk production in Mexico into the future. Nevertheless, the prospects for increased imports of dairy animals and genetic material from the United States are quite good. Similarly, the demand for dairy equipment, technical consultants, and dairy nutrition specialists could be strong.

Given the high cost of transporting and storing soft manufactured dairy products, and given the thin market for these products in Mexico at the present time, it does not appear likely that U.S. exporters will be able to develop a sizable market in Mexico for such products until Mexican per capita incomes increase dramatically. Per capita incomes in Mexico fell between 1983 and 1988, increased slightly in 1989-90, and are expected to rise more quickly in the 1990s. Thus, there is some prospect for increased sales of ice cream and yogurt, for example, in Mexico in the future.

The rate of growth in Mexican per capita incomes will likely be the most critical factor on the demand side of the market. The issue is not only by how much will incomes increase, but also by how much will demand for dairy products increase as incomes increase. In a recent study using 1977 survey data from 11,561 Mexican households from 11 different statistical areas, Heien et al. (1989) estimated the income elasticity of demand for dairy products in Mexico to be at or slightly greater than unity. This is about 5-6 times higher than income elasticities estimated for the United States. Thus, if the policies Mexico is pursuing result in significant income increases, there will likely be increased demand for almost all types of U.S. dairy products.[15]

The prospects for substantial exports of cheese to Mexico do not appear great. The dominant cheese types consumed in Mexico are *queso fresco* and *queso blanco*. Neither of these types are produced in the United States. Both are short-shelf-life cheeses. The demand for specialty or aged cheeses in Mexico is not substantial now, nor is it likely to increase in importance in the near future, again unless per capita incomes increase substantially or consumer tastes change. Mexican consumers prefer beans, not cheese, as their primary source of protein. This preference will not be changed quickly, if ever. Thus, unless United States processors begin producing a product that Mexicans prefer, imports of the types of cheeses produced in the United States into Mexico are not likely to increase in the near future in response to either income increases or price reductions.

Similarly, we see limited opportunities for increased imports of butter into Mexico. Current USDA estimates put Mexican per capita consumption of butter at about one-

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[15]We might expect the income elasticity from survey data to be somewhat higher than one estimated from time series data representing the entire population of Mexico. Furthermore, we might expect the income elasticity estimated from 1977 data to be different from one estimated from a different year or years, since Mexican per capita incomes have changed so dramatically between the mid 1970s and today. Nevertheless, preliminary research based on time series analysis suggests that the estimate reported by Heien et al. (1989) may be within reason, particularly for the early- to mid- 1970s.

fifth that in the United States. Based on aggregate statistics from Mexican sources, even this estimate may be high. In any event, modest increases in Mexican per capita incomes (currently about one-tenth of per capita income in the United States), or modest decreases in the retail price of butter in Mexico will do little to change the demand for a product that is even less important in the traditional Mexican diet than it is in the North American diet. We have serious reservations, for example, that the own-price elasticity of demand for butter in Mexico is as high as -0.70 as assumed by Sullivan et al. (1989).

As demand for higher quality manufactured dairy products in Mexico increases in response to expected future increases in Mexican income levels, Mexican processors would need access to larger supplies of a standard quality of milk. This may force many small Mexican milk producers out of business, since the quality of their milk is not dependable and the cost of assembling this milk is high relative to that of the larger producers. Large producers (on both sides of the border) would benefit. Schulthies and Schwart (1991) see this as a significant potential impact of the North American Free Trade Agreement, and a boon to Texas milk producers as well. They go on to speculate that even if Mexico does not officially raise milk safety and quality standards, market pressures will force this to happen.

The best prospects for dairy product exports to Mexico into the foreseeable future, however, will most likely continue to be nonfat dry milk and butteroil for use in reconstituting fluid milk or to be sold in dry form. The demand for these products will likely continue to be strong by virtue of the fact that when reconstituted they yield a reasonably low-priced form of fluid milk with which to make up the shortfall in local production, and Mexican government policy is to continue and expand the provision of milk to the nation's poor at low cost. Further, import restrictions on these products are now minimal (at the present time, import licenses are required for nonfat dry milk but not butteroil, and there are no import duties on either product). In addition, the lack of refrigerated storage and transportation facilities dictate continued reliance on nonfat dry milk. This, together with the fact that given the basic resources available and the expected growth in population over the next 10 years or so, it is not likely that Mexican milk production will keep up with demand.

The greatest problem likely to face U.S. exporters of nonfat dry milk and butteroil is competition with other countries for this market. Given the current price support policies for dairy, it is impossible for the United States to compete with New Zealand for these products. New Zealand, however, does not produce the volume necessary to supply the entire Mexican market. Thus, the United States must be able to compete with other countries for this market. Here the problem is primarily the European Economic Community. If the EEC is not convinced (through GATT, the North American Free Trade Agreement negotiations, or otherwise) to reduce its export subsidies on dairy products, it will be increasingly difficult for the United States to increase, or perhaps even maintain, present levels of exports of nonfat dry milk and butteroil to Mexico. The North American Free Trade Agreement, in and of itself, will not resolve this problem.

To this point we have concerned ourselves primarily with the demand potential of increased incomes in Mexico resulting from growth stimulated by the NAFTA, or by Mexico's movement toward privatization and freer markets, or both. How much income growth will occur, of course, is an unknown. Unknown also are the future costs of imports. It is conceivable that, under a free trade agreement and with a little help from GATT, world prices of dairy products will rise. The latter may well off-set any demand increases due to rising income levels.

There are other factors that also need to be considered, as Schulthies and Schwart (1991) point out. The more significant of these are likely environmental issues and transportation. If water quality and quantity issues are stressed in the free trade agreement, expansion of the Mexican dairy industry could be hampered, and/or costs of production or imports could be increased. Transportation facilities in Mexico (rail as well as highway) are apparently poor and deteriorating. Further, there are restrictions that prevent U.S. truckers from operating in the Mexican interior. Lack of adequate transportation facilities, together with inferior refrigeration facilities, may be the most severe restrictions to increased dairy product imports into Mexico.

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APPENDIX

Table A1. Producer Subsidy Equivalents for Livestock Products in Mexico as a Percent of Producer Price, 1982-89.

Product	1982	1983	1984	1985	1986	1987	1988	1989
	- - - - - - - - - - percent - - - - - - - - - -							
Beef (Total PSE)	-1.12	-2.83	-7.41	-13.92	6.49	7.53	-2.57	-5.21
(Net PSE)[a]	-20.96	-26.91	-9.46	-16.92	-20.43	-15.17	-2.95	-4.29
Pork (Total PSE)	15.97	15.34	16.16	19.97	33.82	43.67	45.83	36.07
(Net PSE)[a]	-2.49	-7.05	14.38	17.61	11.41	26.73	45.58	36.75
Poultry (Total PSE)	44.93	44.66	33.11	32.85	30.09	25.83	28.73	22.12
(Net PSE)[a]	33.87	30.45	31.82	31.15	10.46	8.13	28.47	22.79
Milk (Total PSE)	-1.65	3.61	1.18	-1.33	-0.66	-1.79	-3.30	-6.23
(Net PSE)[a]	-2.38	2.76	1.13	-1.38	-1.33	-2.48	-3.33	-6.18

[a]Total PSE excluding exchange rate adjustment.

SOURCE: (See text).