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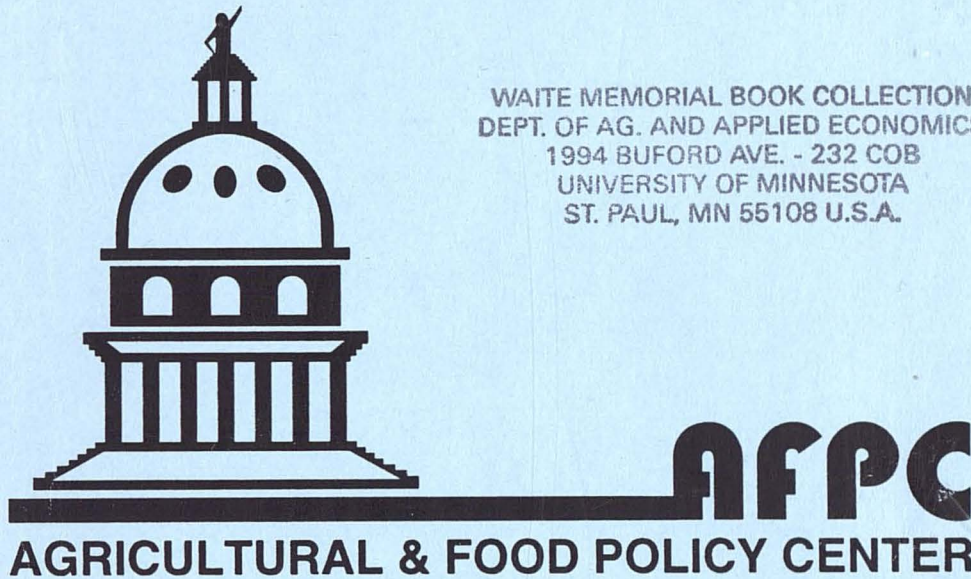
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NAFTA AND THE U.S.  
DAIRY INDUSTRY

AFPC WORKING PAPER 93-3

May 1993



Department of Agricultural Economics  
Texas Agricultural Experiment Station  
Texas Agricultural Extension Service  
Texas A&M University



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## NAFTA AND THE U.S. DAIRY INDUSTRY

### Executive Summary

- Mexico's dairy industry is more diverse than that of the United States. Dairy farms in Mexico range from small family operations to large commercial operations comparable to those in California. They raise a wide variety of breeds (dual and dairy) breeds. While the percentage increase in production is much less in the United States, substantial investment, restructuring, and modernization will need to occur for the

### NAFTA and the U.S. Dairy Industry

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- Increasing population, particularly in the young age groups, creates increased demand potential in a country where the per capita consumption of dairy products was once (1980) higher than in the United States. Demand for dairy products is largely satisfied by imports of largely subsidized nonfat dry milk. Dairy distribution to the low income population. Cheese per capita consumption is about 40 percent of that in the United States and should increase as disposable income increases. Higher valued products such as

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- The United States has an absolute advantage in supplying the domestic market with fluid milk, ice

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# NAFTA AND THE U.S. DAIRY INDUSTRY

## Executive Summary

- Mexico's dairy industry is more diverse than that of half the United States. Dairy farms in Mexico range from large modern confined holstein operations comparable to those in California or New Mexico to small dual purpose (beef and dairy) breeds. While the percentage increase in production is faster than in the United States, substantial investment, restructuring and modernization will need to occur for the Mexican industry to be competitive with the U.S. industry.
- Increasing population, particularly in the younger age groups, creates increased demand potential in a country where the per capita consumption of fluid milk was once (1980) higher than the United States, but is now less than half U.S. consumption. Demand for fluid milk has been satisfied by imports of largely subsidized nonfat dry milk that is reconstituted and distributed to the low income population. Cheese per capita consumption is about 40 percent of that in the United States and should increase as disposable income increases. Higher valued products such as ice cream also have substantial niche market potential with the higher income populous.
- With economic growth expected to be accelerated by NAFTA, it is likely that dairy product demand will continue to outstrip supply. The potential, therefore, exists for substantial imports of milk and milk products.
- The United States has an absolute advantage in supplying the Mexican market with fluid milk, ice cream, and other soft product imports, due largely to location.

Nonfat dry milk imports compete in a subsidized market with Germany (EC) being the largest supplier.

- Substantial opportunities exist for expanded U.S. exports such as dairy replacement heifers, bulls, semen, and equipment related to milking.
- Expanded milk production in Mexico will be heavily dependent on increased investment in production, refrigeration, processing and transportation. Liberalized policies toward foreign investment should facilitate this required flow of capital.
- Federal milk marketing orders (and their state equivalents) blanket the border with Mexico. Consideration will need to be given to implementing order provisions on the pricing and pooling of milk that maintain a level playing field between participants (producers, cooperatives and/or processors) in the Mexican and U.S. dairy industry.
- The Dairy Export Incentive Program provides a useful policy tool for maintaining U.S. competitiveness with the EC in exports of nonfat dry milk, butter and cheese to Mexico.



# NAFTA AND THE U.S. DAIRY INDUSTRY

## Chapter 1 Introduction

Mexico and the United States agreed to consider a trade agreement in June 1990, there have been a number of studies of the implications for the dairy industries in both countries (Rodriguez; Schulthies and Schwart; Harris and McClain; Hallberg, Cronney, Smith, and Valdes; Warren). While these studies have contributed to improved understanding of Mexico's dairy industry and its interaction with the U.S. dairy industry, conflicting conclusions have been drawn. For example, Warren concludes that Mexico's dairy industry is at a distinct competitive disadvantage relative to the U.S. dairy industry. Hallberg et al., however, concludes that Mexico's dairy industry appears to be quite cost-competitive. Warren sees little potential for increased investment in Mexico's dairy industry while most other studies do not even mention the investment issue.

Over time, there have been improvements in both the quantity and quality of data available on the Mexican dairy industry. Policies regarding issues such as investment in Mexico have changed and the impacts of unilateral trade liberalization by Mexico have begun to be realized. This is not to suggest that we have all the data needed to answer questions on the future of U.S. trade in dairy products with Mexico. However, with increased data, recent experiences, and the conclusions of previous studies, some stock-taking regarding the current state of knowledge on the potential impact of NAFTA on the dairy industries of the respective countries seems appropriate -- particularly in light of the future need for Congress to exercise its right of approval of NAFTA.

## Objectives

The overall objective of this working paper is to explore the state of knowledge regarding the impact of NAFTA on the U.S. dairy industry. Specific objectives include:

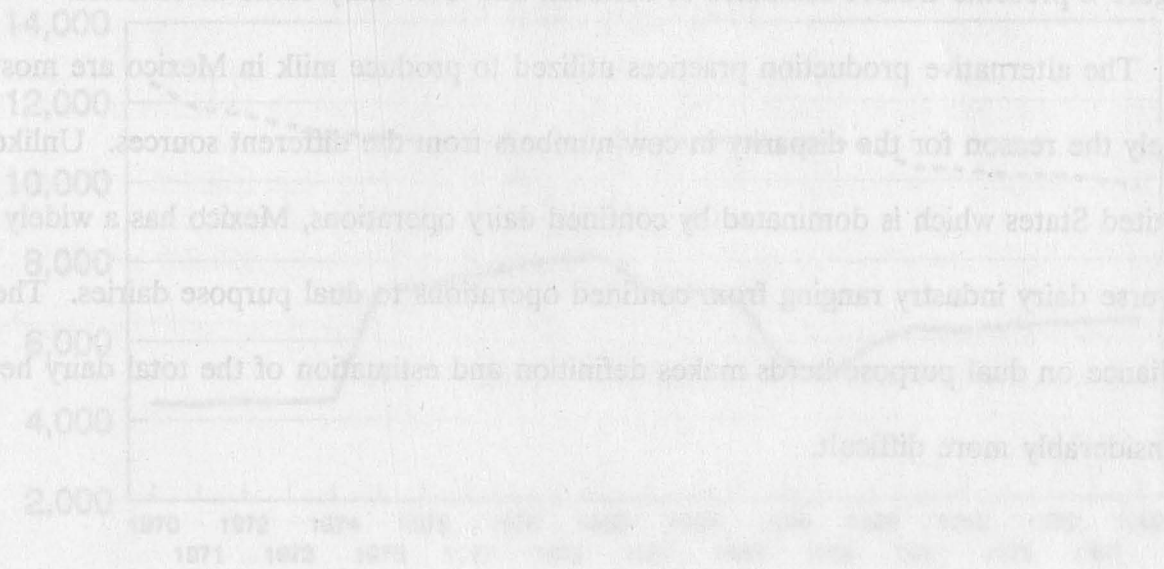
- To describe production patterns in Mexico as they exist and are likely to evolve in the future. Specific concern exists with production conditions in each of the major production areas, their locations relative to major consumption centers, and their implications for sales of U.S. dairy heifers.
- To describe current consumption patterns for dairy products in Mexico. Future consumption patterns will likely be influenced by changes in government policies, evolving demographics, and realized income growth.
- To evaluate the implications of the production-consumption patterns for future trade with Mexico. Particular emphasis will be placed on the changes in policy that have occurred, and how they have influenced trends and sources of supply. The impacts of NAFTA provisions on changes in trade patterns will also be explored.
- To identify the major U.S. issues regarding trade with Mexico. Specific concerns relate to investments in the Mexican and U.S. dairy industry, the relationship of U.S. milk marketing orders and cooperatives to NAFTA, price support policies and export subsidies.

## Procedures

The primary reliance in this study is on secondary data and on findings and issues raised in previous studies. While the quantity of data on the Mexico dairy industry has



improved, there are questions regarding its quality. In several instances, to complement the available data we relied on discussions with authoritative sources in Mexico and with U.S. dairy interests that deal in Mexico. A special effort was made to put the data in a form that the U.S. dairy industry can readily relate to, and to provide comparisons with the scope and magnitude of the U.S. industry. While this report is intended to be national in scope, obviously, our comments are influenced by the proximity of the Texas dairy industry to Mexico.



## **Chapter 2: Milk Production in Mexico**

Total milk production in Mexico increased from 11.1 billion pounds in 1970, reached a peak of 23.8 in 1980, declined to 15.3 in 1985, and increased to 23.6 billion lbs in 1992 (Figure 1 and Table 1). The decline in production in the mid-1980s appears to have been attributable to government price controls and related policies. Milk production estimates for Mexico are generally the same regardless of the source (e.g., Mexican or U.S. data).

Estimates of the number of cows in Mexico are much more diverse and therefore felt to be less reliable. Depending upon the source, there was between 3.9 and 6.4 million cows used in the 1991 production of milk in Mexico. USDA estimates are considerably higher than those of their Mexican counterparts, however, officials in Mexico appear to be less concerned with estimating the number of cows than with total milk production. Figure 2 presents USDA estimates of Mexican and U.S. dairy cattle inventories.

The alternative production practices utilized to produce milk in Mexico are most likely the reason for the disparity in cow numbers from the different sources. Unlike the United States which is dominated by confined dairy operations, Mexico has a widely diverse dairy industry ranging from confined operations to dual purpose dairies. The reliance on dual purpose herds makes definition and estimation of the total dairy herd considerably more difficult.



Figure 1. Total Milk Production in Mexico and the United States, 1970 to 1992.

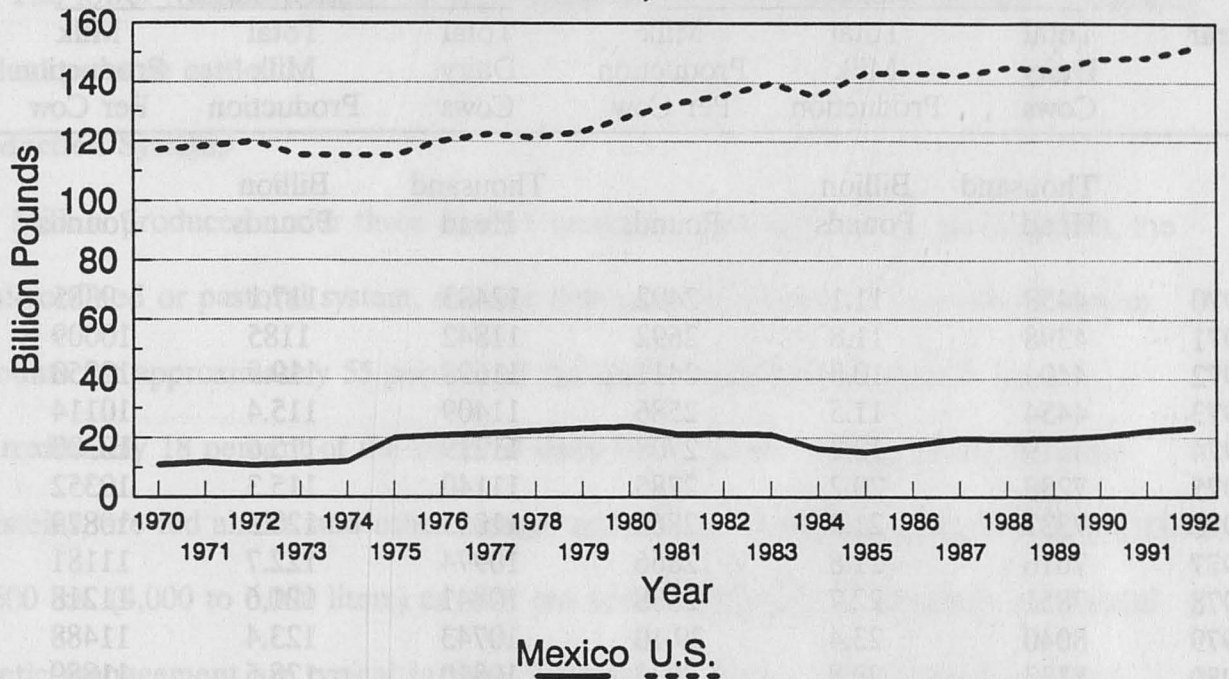
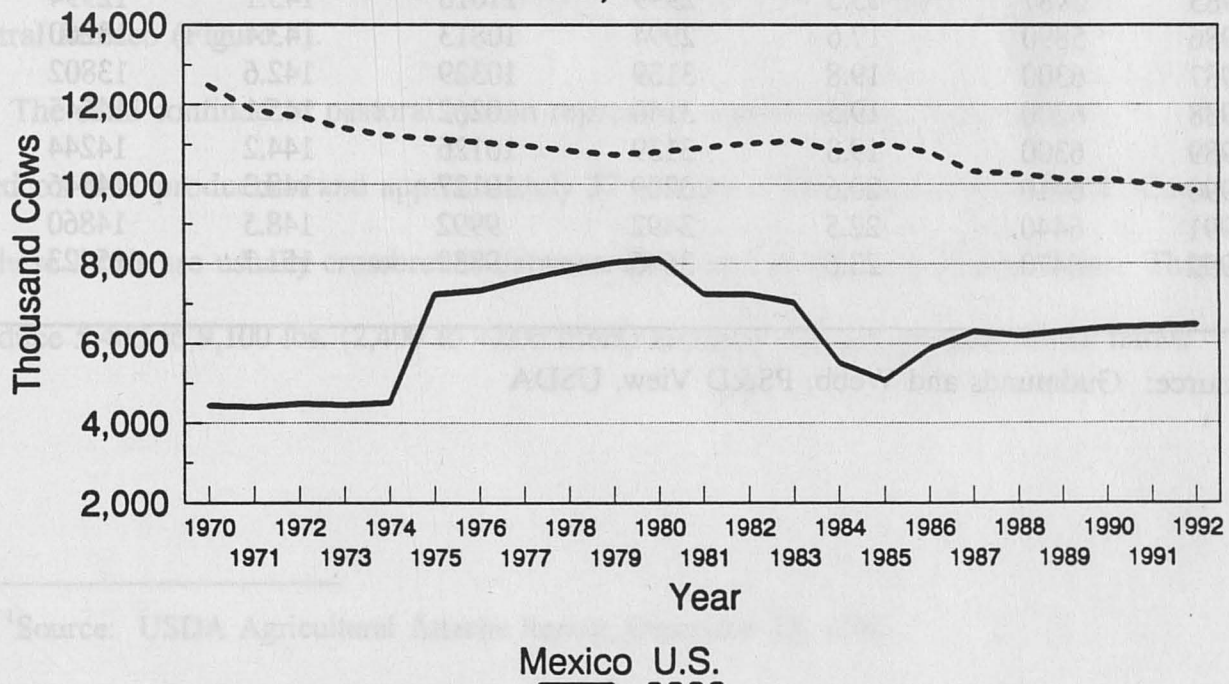


Figure 2. Total Milk Cows in Mexico and the United States, 1970 to 1992.



Source: Gudmunds and Webb, PS&D View, USDA

**Table 1. Total Cows, Milk Production, and Average Milk Production Per Cow in Mexico and the United States, 1970-1992.**

Year	Mexico			United States		
	Total Dairy Cows	Total Milk Production	Milk Production Per Cow	Total Dairy Cows	Total Milk Production	Milk Production Per Cow
	Thousand Head	Billion Pounds	Pounds	Thousand Head	Billion Pounds	Pounds
1970	4450	11.1	2492	12483	117.1	9385
1971	4398	11.8	2692	11842	1185	10009
1972	4494	10.8	2411	11698	119.9	10250
1973	4454	11.5	2586	11409	115.4	10114
1974	4519	12.2	2708	11219	115.6	10300
1975	7238	20.2	2785	11140	115.3	10352
1976	7337	21.0	2860	11055	120.3	10879
1977	7616	21.8	2866	10974	122.7	11181
1978	7851	22.7	2888	10841	121.6	11218
1979	8040	23.4	29.10	10743	123.4	11488
1980	8133	23.8	2932	10810	128.5	11889
1981	7244	21.4	2954	10923	133.0	12177
1982	7247	21.6	2976	11033	135.8	12309
1983	7034	21.1	3000	11098	139.7	12585
1984	5520	16.3	2959	10833	135.5	12503
1985	5087	15.3	2999	11016	143.1	12994
1986	5890	17.6	2994	10813	143.4	13260
1987	6300	19.8	3139	10329	142.6	13802
1988	6200	19.5	3140	10262	145.1	14145
1989	6300	19.8	3139	10126	144.2	14244
1990	6410	20.6	3209	10127	148.3	14646
1991	6440	22.5	3492	9992	148.5	14860
1992	6470	23.6	3646	9839	151.7	15423

Source: Gudmunds and Webb, PS&D View, USDA



Utilizing USDA estimates of cow numbers, milk output per cow in Mexico shows a slight upward trend over time but at about 24 percent of the United States level (Figure 3). The lower Mexican output per cow again reflects the lower milk producing capacity of dual purpose cattle.

### **Production Systems**

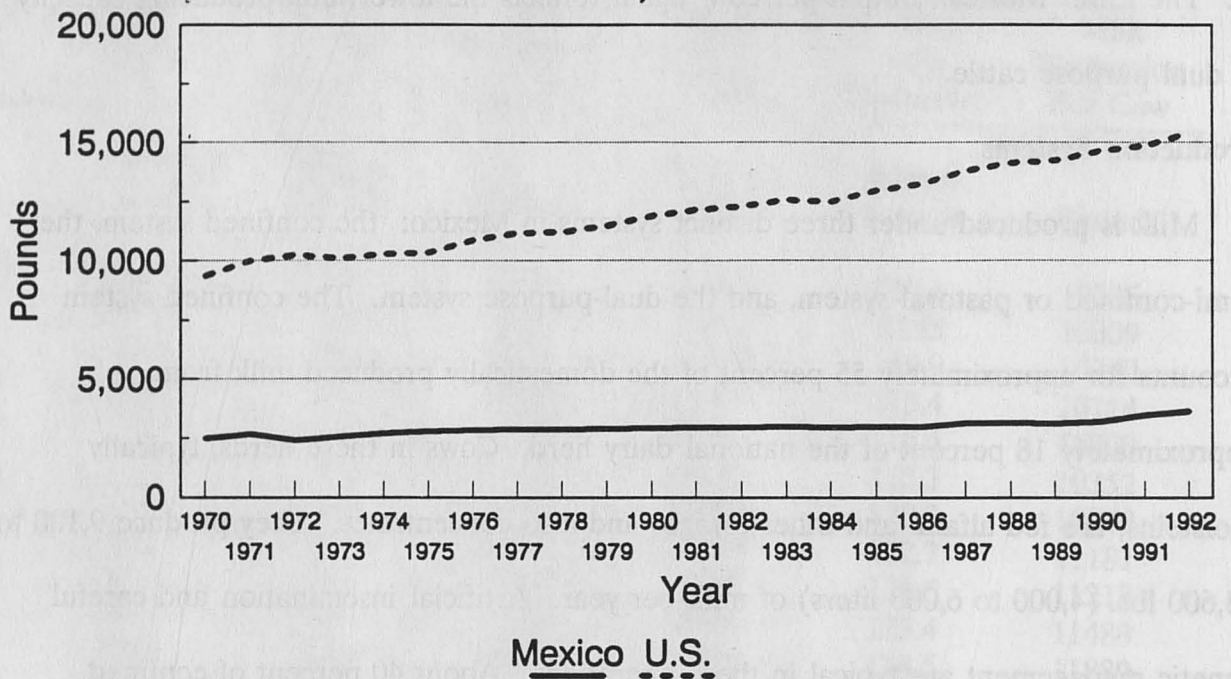
Milk is produced under three distinct systems in Mexico: the confined system, the semi-confined or pastoral system, and the dual-purpose system. The confined system accounts for approximately 55 percent of the domestically produced milk from approximately 18 percent of the national dairy herd. Cows in these herds, typically Holsteins, are fed alfalfa and other forages and also concentrates. They produce 9,100 to 13,600 lbs. (4,000 to 6,000 liters) of milk per year. Artificial insemination and careful genetic management are typical in these operations. About 40 percent of confined dairies in northern Mexico have milking machines and cooling tanks.<sup>1</sup> These operations are located primarily along the borders of California, New Mexico, and Texas and in central Mexico (Figure 4).

The semi-confined or pastoral system represents approximately 15 percent of Mexico's milk production and approximately 37 percent of the national dairy herd. Cows in these herds are usually crossbreeds between Zebu and Holstein or Brown Swiss. They produce 5,400 to 9,100 lbs. (2,400 to 4,000 liters) annually and are maintained on native

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<sup>1</sup>Source: USDA Agricultural Attache Report, December 15, 1992.

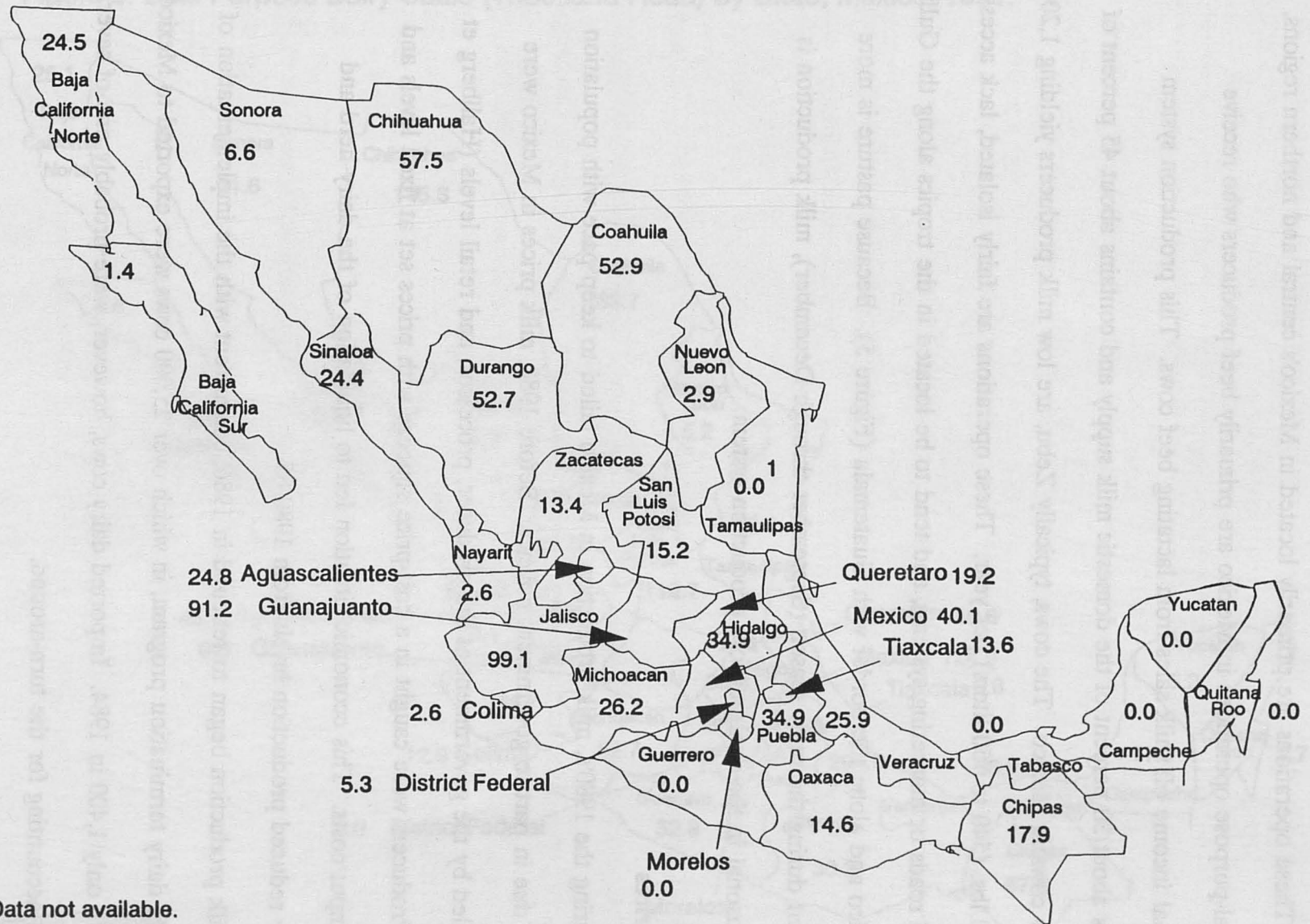
Figure 3. Milk Production Per Cow in Mexico and the United States, 1970 to 1992.



Source: Gudmunds and Webb, PS&D View, USDA



Figure 4. Confined Dairy Cattle Stocks (Thousand Head) by State, Mexico, 1991.



<sup>1</sup>Data not available.

Source: Direccion General de Estadistica Agropecuaria, SARH

or improved pasture, supplemented by corn stalks and some grains fortified with oilseed meals. These operations are primarily located in Mexico's central and northern regions.

Dual-purpose operations in Mexico are primarily beef producers who receive additional income off milk sales from lactating beef cows. This production system provides about 30 percent of the domestic milk supply and contains about 45 percent of all dairy cows in Mexico. The cows, typically Zebu, are low milk producers yielding 1,200 to 1,700 lbs. (540 to 750 liters) per year. These operations are fairly isolated, lack access to good roads or marketing systems, and tend to be located in the tropics along the Gulf of Mexico and along the border with Guatemala (Figure 5). Because pasture is more abundant during the rainy season (September through December), milk production is very seasonal in the dual purpose production system.

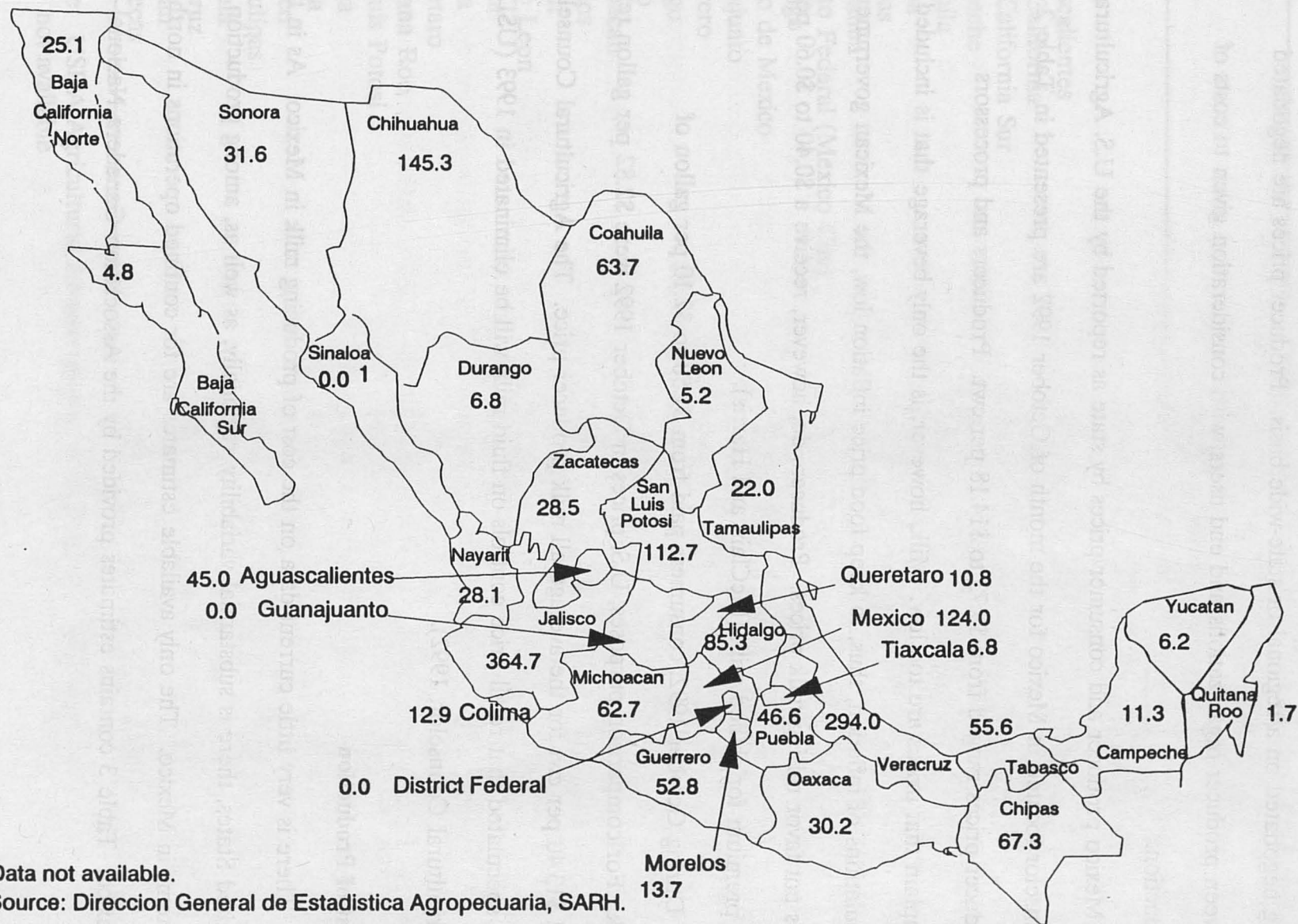
### **Milk Prices**

During the 1980's, milk production in Mexico failed to keep pace with population growth due in part to government policies. Before 1988, milk prices in Mexico were controlled by the government at the producer, processor, and retail levels (Hallberg et al.,). Producers were caught in a cost-price squeeze with prices set at fixed levels and rising input costs. This economic situation led to liquidation of the dairy herd and sharply reduced production levels from 1980-85.

Milk production began to rebound in 1986, concurrent with the implementation of the U.S. dairy termination program, in which over 25,000 cows were exported to Mexico up from only 1,400 in 1984. Imported dairy cows, however, were probably one of several factors accounting for the turn-around.



Figure 5. Dual Purpose Dairy Cattle (Thousand Head) by State, Mexico, 1991.



<sup>1</sup> Data not available.

Source: Direccion General de Estadistica Agropecuaria, SARH.

Beginning in 1988 a price liberalization scheme was implemented with milk prices being negotiated on a regional or state-wide basis. Producer prices are negotiated between producer organizations and end users, with consideration given to costs of production.

Mexico producer and consumer prices by state as reported by the U.S. Agricultural Counselor located in Mexico for the month of October 1992 are presented in Table 2. Producer prices ranged from \$9.73 to \$14.18 per cwt. Producers and processors complain that prices are too low. Milk, however, is the only beverage that is included in calculations of inflation, thus, to keep food price inflation low, the Mexican government does not favor raising milk prices. Producers do, however, receive a \$0.40 to \$0.60 per cwt premium for chilled milk (McClain and Harris).

During October 1992, consumers paid from \$1.50 to \$2.10 per gallon of milk. For comparison purposes, U.S. prices in October 1992 were \$2.82 per gallon retail and \$13.40 per cwt for the average all milk producer price. The Agricultural Counselor has speculated that retail price controls on fluid milk will be eliminated in 1993 (USDA Agricultural Counselor, 1992).

### **Cost of Production**

There is very little current data on the cost of producing milk in Mexico. As in the United States, there is substantial variability regionally, as well as, among production systems in Mexico. The only available estimates are for confined operations in northern Mexico. Table 3 contains estimates provided by the Association Ganadera Nacional



**Table 2. Mexico Producer and Consumer Fluid Milk Prices, by State, October 1992.**

State	Average Producer Price	Consumer Price
	\$/cwt	\$/gallon
Aguascalientes	12.16	2.04
Baja California	12.56	1.86
Baja California Sur	11.35	n.a.
Campeche	11.16	n.a.
Coahuila	12.56	1.86
Colima	10.94	2.10
Chiapas	9.89	n.a.
Chihuahua	9.77	1.92
Distrito Federal (Mexico City)	13.37	1.98
Durango	14.18	1.80
Estado de Mexico	10.54	2.04
Guanajuato	12.16	2.04
Guerrero	12.56	1.98
Hidalgo	10.82	2.04
Jalisco	11.35	1.98
Michoacan	10.13	1.50
Morelos	10.12	1.92
Nayarit	9.73	2.04
Nuevo Leon	12.96	1.92
Oaxaca	10.54	n.a.
Puebla	10.47	1.92
Queretaro	12.16	2.04
Quintana Roo	12.16	n.a.
San Luis Potosi	10.33	2.04
Sinaloa	13.26	1.98
Sonora	11.35	2.04
Tabasco	11.75	n.a.
Tamaulipas	10.33	1.98
Tlaxcala	11.35	1.98
Veracruz	10.33	1.92
Yucatan	11.35	n.a.
Zacatecas	12.56	1.86

Source: USDA Agricultural Attache Report, December 15, 1992, page 10.

n.a. = not available

**Table 3. Estimated Costs of Producing Milk in Northern Mexico, Based on a 120 Cow Operation With a 11,309 Lb Herd Average, June 1991.**

	Dollars/cwt	Percent of Total Cost
Variable costs		
Feed	9.43	70.6
Labor	1.38	10.3
Other	1.07	8.0
Total variable costs	11.88	88.9
Fixed costs	.08	0.6
Depreciation	1.12	8.4
Returns to Capital	.29	2.2
<b>TOTAL ECONOMIC COSTS</b>	<b>13.36</b>	<b>100.0</b>

Source: Asociacion Ganadera Nacional Productores de Leche, Mexico.

Productores de Leche and are meant to reflect the costs for a 120 cow dairy with about a 11,309 pounds per year herd average. It indicates total costs of \$13.30 per cwt, 88.9 percent of which are variable. Feed costs represent 70.6 percent of total costs, higher than in the United States, reflecting import controls on feed.

A second set of estimates were made by Guerrero comparing the costs of producing milk in northern Mexico and southern California (Table 4). The \$15.62 per cwt cost in northern Mexico for a 250 cow herd is substantially higher than its southern California counterpart. One interesting point worth considering is that on the whole, the costs do not differ substantially other than those for hay, labor, herd replacement, and interest costs. It is also worth noting that labor costs are higher on a per cwt basis in Mexico than in California. This result may be explained by the lower output per cow in Mexico and substantial use of laborers to milk the cows by hand rather than using more modern milking machines.

### **Factors Influencing Production**

There are several factors that are seen as having a substantial future influence on milk production in Mexico, especially in combination with a NAFTA. Some of these include:

- Land use legislation
- Labor cost and availability
- New production inputs
- Subsidies
- Infrastructure improvements



**Table 4. Comparative Cost of Dairy Production in Northern Mexico and Southern California, 1991.**

Feed Costs	Northern Mexico	Southern California
Feed Costs:		
Hay	\$2.91	\$2.03
Grain and other	<u>4.31</u>	<u>4.18</u>
Total feed	7.22	6.21
Labor (plus fringe)	2.01	1.18
Herd Replacement	2.32	0.86
Other Expenses:		
Milk hauling	0.21	0.31
State and assn.	0.12	0.21
Vet, breeding, etc.	0.33	0.23
Supplies	0.22	0.24
Repairs and Maintenance	0.01	0.34
Utilities	0.02	0.25
Occupancy cost	0.41	0.41
Depreciation	0.19	0.19
Interest	2.25	0.71
Miscellaneous	0.25	0.25
Taxes	<u>0.06</u>	<u>0.00</u>
Total	4.07	3.14
Total Cost	15.62	11.39

Source: Costs of production calculated by Guerrero et al., (1991) in "California Agriculture".

- Processing sector and plant capacity

### **Land Use Legislation**

Potentially the most significant factor affecting Mexican agriculture and specifically, the dairy sector is the process of Mexican land reform which is allowing the agricultural sector to move away from traditional, subsistence farming towards larger-scale, commercial farming. Commercial farms in Mexico utilize more purchased inputs and better marketing methods than the *ejidos*, their subsistence counterparts. *Ejidors*, which account for 50 percent of the land area of the entire country, consist primarily of low quality land, averaging from 2 to 10 acres each (Williams and Rosson). The Salinas administration obtained historic land reform legislation that allows *ejidatarios* (*ejido* farmers) to sell or rent their land which was prohibited under the previous land tenure system.

*Ejidatarios* can now respond to a decline in the profitability of crop production relative to animal production by converting crop acreage to pasture -- which was formerly prohibited by Mexican land laws. In addition, U.S. investors may now legally set up agricultural operations in Mexico. Private Mexican farming operations may now legally expand production through buying or renting *ejido* land. However, livestock operators still cannot raise more feed than they need for their own animals (Engels and Segarra).

### **Labor Cost and Availability**

The low cost and availability of labor in Mexico is often cited as a major factor that could help support growth in labor-intensive Mexican industries like agriculture. For this

to hold true, the Mexican agricultural sector will have to keep pace with non-agricultural wages. Substantially higher agricultural wage rates could result from NAFTA as more foreign investment is made in manufacturing facilities.

However, it must be kept in mind that Mexican labor is in plentiful supply with a rapidly expanding population. Even though the labor cost per hour is low and there is a plentiful labor supply, the unit labor cost of producing milk in Mexico may be higher because of the lower output per cow and the lack of mechanization. Yet, with increased productivity and mechanization, the potential clearly exists for lower labor costs per unit of output.

### **New Production Inputs**

A NAFTA would improve the availability of critical agricultural inputs to Mexican farmers, such as new and used farm equipment, spare parts, improved seeds and breeding stock, feeds and additives for animal nutrition, and technical consulting (Williams and Rosson).

Many confined system producers are improving breeding stock, in part, by imports from the United States. No import permits are required and there are no ad valorem tariffs on bull semen or purebred breeding dairy cattle. Table 5 documents U.S. exports of dairy breeding cattle to Mexico as well as the value of all breeding semen. Exports of breeding female dairy cattle increased dramatically during the mid-1980s as a result of the dairy buyout program and then leveled off at about 23,000 head per year. Dairy heifer exports to Mexico have been cited as a primary reason for the increase in U.S. replacement heifer prices over the past few years (Figure 6). USDA trade statistics do

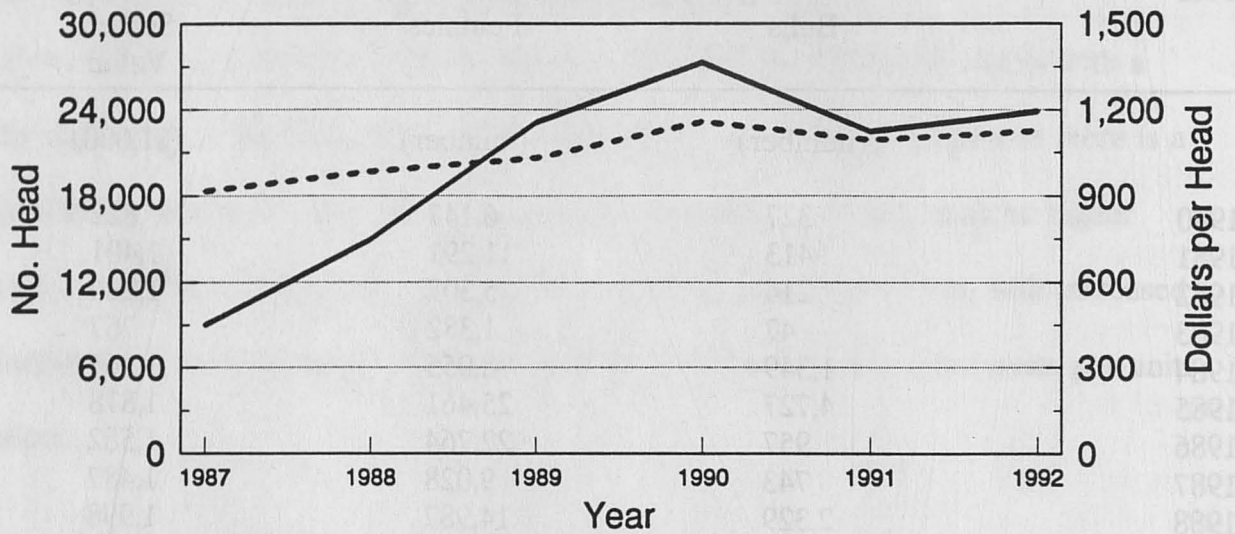


**Table 5. U.S. Exports to Mexico of Dairy Breeding Animals and Breeding Semen, 1980 to 1992.**

Year	Breeding Bulls	Breeding Females	Breeding Semen Value
	(number)	(number)	(\$1,000)
1980	327	6,147	822
1981	413	11,291	1,401
1982	214	5,307	1,226
1983	47	1,382	767
1984	1,349	8,055	1,261
1985	4,727	25,461	1,878
1986	957	22,764	1,582
1987	743	9,028	1,487
1988	2,329	14,987	1,998
1989	3,331	23,154	2,633
1990	2,515	27,317	3,409
1991	14,555	22,524	3,741
1992	5,165	23,898	4,223

Source: U.S. Dairy, Livestock, and Poultry Trade, USDA, FAS, Circular Series: FDLP various issues.

Figure 6. Female Dairy Breeding Animal Exports to Mexico and U.S. Average Replacement Heifer Price, 1987 to 1992.



Breeding Female Exports U.S. Replacement Heifer Price

Source: U.S. Dairy, Livestock and Trade, USDA, FAS and Agricultural Prices, USDA, NASS

not distinguish between dairy bull and beef bull semen exports. However, the increase in total semen exports does indicate that considerable effort is being made to improve the genetic base of the Mexican cattle industry.

### **Subsidies**

Most producer subsidies have been abolished, but some inputs, such as seed, fertilizer, crop insurance and credit, are still subsidized for low income producers.

### **Infrastructure Improvements**

The infrastructure in Mexico and the road systems in particular are thought to be key elements in the growth of the Mexican dairy industry. Improvements will have to be made in the transportation system to enable milk to flow from surplus to deficit regions. In addition, substantial investments would be required to modernized Mexico's dairy industry, which would mean conversion to larger scale confinement operations.

### **Processing Sector and Plant Capacity**

There has not been much research on the Mexican dairy products processing sector. This may be due, in part, to the high degree of government involvement that existed before the recent privatization trends. For example, the number of government-owned enterprises has been reduced from 1,100 in 1982 to 350 in 1990, through mergers, liquidations, and sales (World Bank).

A relatively small number of companies are involved in the processing of dairy products, with a few large companies characteristically dominating output (Bredahl, Burst, and Warnken). For example, in 1979, over 70 percent of all fluid milk was



processed by five companies (Presidencia, p. 143). Currently, the major fluid milk processors are Grupo Alpura, Grupo LALA, Guilsa, Nestle, and Boreal. Boreal is a former government-run cooperative that was recently privatized (Hallberg, et al.,).

In 1988, there were 2,800 processing plants in Mexico with all but 250 being very small cheese and butter manufacturers (McClain and Harris). There were about 50 pasteurizing plants with the remaining 200 plants a mixture of powder plants, evaporated milk producers, yogurt plants, rehydrators, etc (McClain and Harris). Table 6 indicates the number and location of Mexican milk pasteurization plants and their percent utilization of capacity in 1986 and 1989. The percentage utilization of the capacity dropped significantly from 1986 to 1989. As pointed out in McClain and Harris, most of the larger plants are located in states having close proximity to the U.S. border. These plants are obviously in a position to either receive more milk from local production or import U.S. milk to utilize a larger share of the plant capacity.

A large share of the raw milk produced in Mexico is not chilled or is not delivered to processors chilled due to the absence of refrigerated transportation. Water is frequently added to fluid milk by both producers and transporters to extend volume. Processors commonly substitute vegetable fats for butter fats (referred to as "filling") in manufactured dairy products and in fluid milk (Schulthies and Schwart). Filling is permitted in Mexico. Up to 80 percent of the milkfat can be replaced with cheaper vegetable fat in some products as long as they are labeled accordingly (Rodriquez).

**Table 6. Mexico Milk Pasteurization Plant Capacity and Utilization, by State.**

State	City	Plant Capacity Thousand Liters	Percent Utilization	
			1986	1989
Aguascalientes	Aguascalientes	280	85.7	62.9
Baja California	Ensenada	50	50.0	46.0
Baja California	Mexicali	90	73.3	55.6
Baja California	Mexicali	45	26.7	44.4
Baja California	Mexicali	75	76.0	37.3
Baja California	Tijuana	35	60.0	51.4
Baja California	Tijuana	280	75.0	65.4
Chihuahua	Chihuahua	120	77.5	53.3
Chihuahua	Juarez	70	88.6	71.4
Chihuahua	Juarez	300	0.0	76.7
Coahuila	Saltillo	75	64.0	40.0
Coahuila	Torreón	500	92.0	60.0
Chihuahua	Juarez	320	73.4	62.5
Distrito Federal	Distrito Federal	1,300	91.5	60.8
Distrito Federal	Distrito Federal	800	76.2	43.8
Durango	Durango	120	37.5	37.5
Durango	Lerdo	120	37.5	58.3
Guanajuato	Celaya	70	64.3	44.3
Guanajuato	Leon	80	62.5	45.0
Guerrero	Acapulco	120	66.7	69.2
Jalisco	Guadalajara	360	59.7	48.6
Jalisco	Guadalajara	360	80.0	55.8
Jalisco	Guadalajara	65	76.9	55.4
Michoacan	Tangancicuaro	20	0.0	80.0
Nuevo Leon	Monterrey	100	78.0	55.0
Nuevo Leon	Monterrey	100	85.0	65.0
Queretaro	Queretaro	35	74.3	114.3
San Luis Potosi	San Luis Potosi	25	36.0	44.0
San Luis Potosi	San Luis Potosi	60	71.7	43.3
Sinaloa	Culiacan	120	26.2	33.3
Sinaloa	Mazatlan	50	68.0	56.0
Sonora	Hermosillo	75	68.0	48.0
Sonora	Hermosillo	30	70.0	53.3
Sonora	Obregon	75	92.0	62.7
Tamaulipas	Mante	20	70.0	50.0
Tamaulipas	Matamoros	50	76.0	84.0
Tamaulipas	Reynosa	100	17.0	12.0
Tamaulipas	Tampico	35	85.7	51.4
Tamaulipas	Tampico	40	85.0	52.5
Tamaulipas	Tampico	50	92.0	50.0
Tamaulipas	Victoria	50	90.0	56.0
Veracruz	Veracruz	40	0.0	75.0
<b>Total</b>		<b>6,710</b>	<b>71.9</b>	<b>56.0</b>

Source: Canacintra.

Milk safety regulations are as stringent or even more so than comparable U.S. codes with the difference being that U.S. regulations are enforced while those in Mexico typically are not (McClain and Harris).

### **Production of Dairy Products**

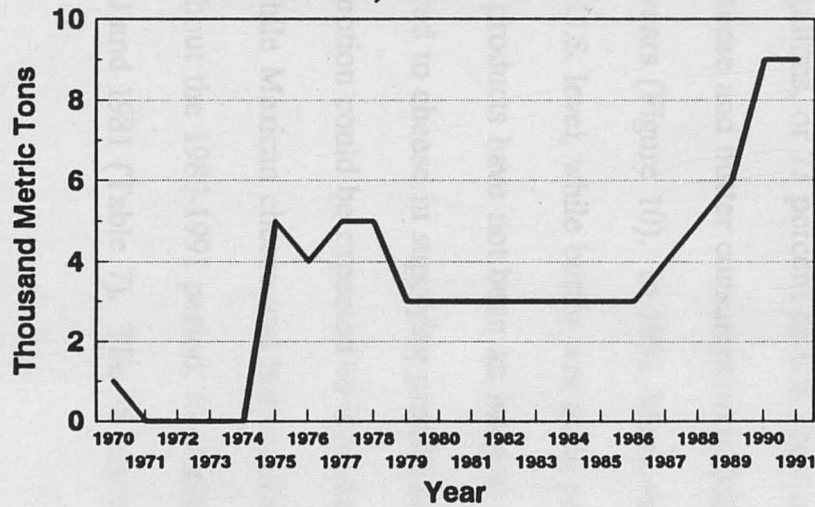
The annual production of nonfat dry milk, cheese, and butter in Mexico are presented in Figures 7-9. Nonfat dry milk production jumped from 3,000 metric tons in the early 1980s to 9,000 metric tons in 1991 (Figure 7). The average retail price for nonfat dry milk in Mexico City during September 1992 was \$2.10 per lb. Production of cheese and butter in Mexico slowly increased from 1970 to the early 1980s before increasing sharply in the late 1980s (Figures 8 and 9). During September 1992 the average Mexico City retail prices for cheddar cheese was \$3.67 per pound and for butter it was \$1.07 per pound.

### **Prospects for Increased Milk Production**

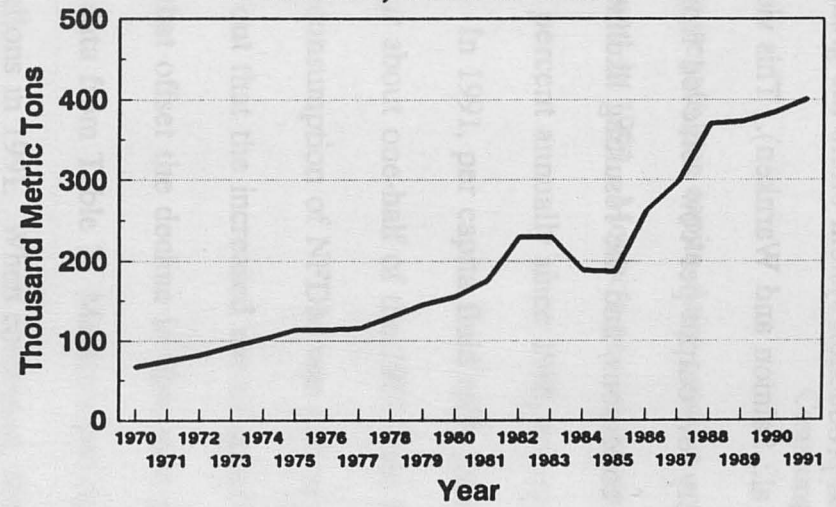
A large proportion of current growth in milk production can be attributed to the movement away from traditional land-extensive types of dairy production systems to higher yielding, confined feeding systems (Bredahl, Burst, and Warnken). The trend toward confined feeding systems appears likely to continue. Substantial investments will need to be made in infrastructure conversion to confinement feeding systems to happen in the Mexican dairy industry.



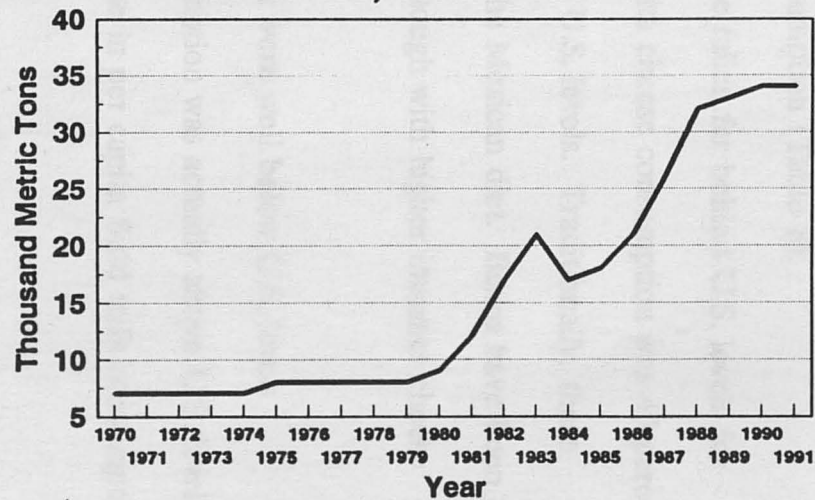
**Figure 7. Total Production of Nonfat Dry Milk in Mexico, 1970 to 1991.**



**Figure 8. Total Production of Cheese in Mexico, 1970 to 1991.**



**Figure 9. Total Production of Butter in Mexico, 1970 to 1991.**



Source: Gudmunds and Webb, PS&D View, USDA

There are those who feel that the dual purpose production system offers the greatest potential for Mexico's dairy industry (Hallberg, et al.; Salmon and Warnken). This view appears to give inadequate consideration to the very low output per cow achieved from these dairy-beef animals, the unfavorable climatic conditions, and the resulting likelihood that productivity will not improve.

production in Mexico...  
 the early 1950s...  
 for dry milk...  
 cheese and butter...  
 increasing sharply in the late 1950s...  
 average Mexico City...

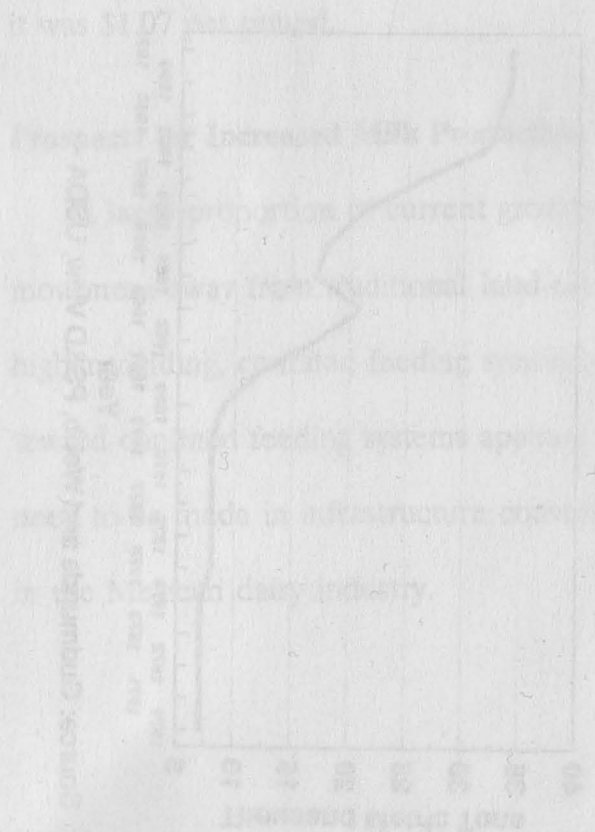


Figure 8. Total Production of Cheese



Figure 9. Total Production of Wheater D.M. Milk

### Chapter 3: Consumption Patterns

Aggregate per capita dairy product consumption in Mexico was 46.4 percent of the U.S. level in 1991. Mexico's per capita consumption, however, has been growing at just over 2 percent annually since 1988, compared with a 0.2 percent decline in the United States. In 1991, per capita fluid milk consumption in Mexico was 47 percent of the U.S. level, or about one-half of the 1981 level (Table 7). For the same year, Mexican per capita consumption of NFDM was almost three times the U.S. level (Table 7). Hallberg points out that the increased use of imported NFDM for reconstituted milk has somewhat offset the decline in fluid milk production that occurred in the mid-1980s. Using data from Table 7, Mexico's per capita NFDM fluid equivalent consumption is 6.87 gallons in 1991. When combined, Mexico's fluid milk and equivalent consumption is 19.34 gallons, or 73 percent of U.S. fluid milk consumption (Table 8).

Cheese and butter consumption in Mexico have fallen far behind U.S. levels for many years (Figure 10). In 1991, Mexico's per capita cheese consumption was 40 percent of the U.S. level, while butter was at 20 percent of U.S. levels. Traditionally, these butter products have not been an integral part of the Mexican diet. Beans have been preferred to cheese in supplying protein needs, although with higher incomes cheese consumption could be expected to increase..

While Mexican cheese and butter consumption were well below U.S. levels throughout the 1980-1991 period, fluid milk consumption was actually above U.S. levels in 1980 and 1981 (Table 7). The 58 percent decline in per capita fluid milk consumption



**Table 1. Per Capita Dairy Product Consumption, Mexico and U.S., 1980-1991.**

Year	Fluid Milk			NFDM			Cheese			Butter		
	Mexico	U.S.	Mexico as percent of U.S.	Mexico	U.S.	Mexico as percent of U.S.	Mexico	U.S.	Mexico as percent of U.S.	Mexico	U.S.	Mexico as percent of U.S.
	----- (gallons) -----			----- (pounds) -----			----- (pounds) -----			----- (pounds) -----		
1980	29.83	26.47	112.67	3.30	3.30	100.00	5.06	17.60	28.75	0.22	4.40	5.00
1981	26.23	25.81	101.64	3.30	2.86	115.38	5.50	18.26	30.12	0.44	4.18	10.53
1982	23.27	25.10	92.74	3.96	3.08	128.57	7.04	20.02	35.16	0.44	4.62	9.52
1983	21.82	25.04	87.13	3.96	3.08	128.57	7.04	20.68	34.04	0.88	5.06	17.39
1984	16.25	28.19	57.64	4.40	2.86	153.85	5.50	21.56	25.51	0.66	5.06	13.04
1985	14.13	27.66	51.10	4.40	2.64	166.67	5.50	22.66	24.27	0.88	4.84	18.18
1986	15.15	27.63	54.78	4.18	2.86	146.15	7.26	23.10	31.43	0.66	4.62	14.29
1987	15.69	27.71	56.63	4.40	2.86	153.85	8.14	24.20	33.64	0.88	4.62	19.05
1988	11.73	27.42	42.77	5.50	2.86	192.31	9.68	23.76	40.74	0.88	4.40	20.00
1989	11.76	26.73	43.97	6.38	2.20	290.00	9.68	23.76	40.74	0.88	4.18	21.05
1990	12.18	26.60	45.78	6.60	2.64	250.00	9.90	24.64	40.18	0.88	4.40	20.00
1991	12.47	26.60	46.87	5.72	1.98	288.89	10.34	26.18	39.50	0.88	4.40	20.00

Data: Gudmunds and Webb, PS&D View, USDA

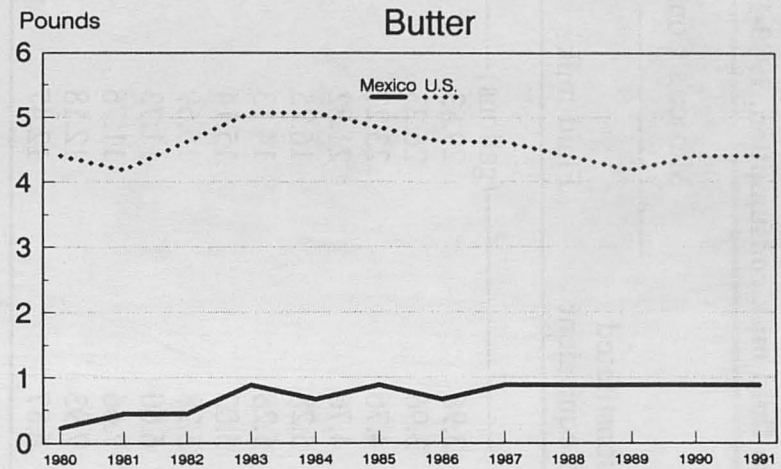
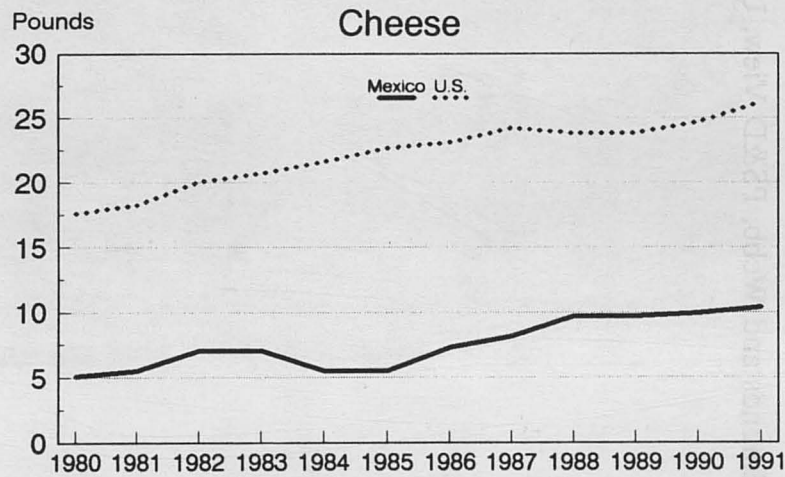
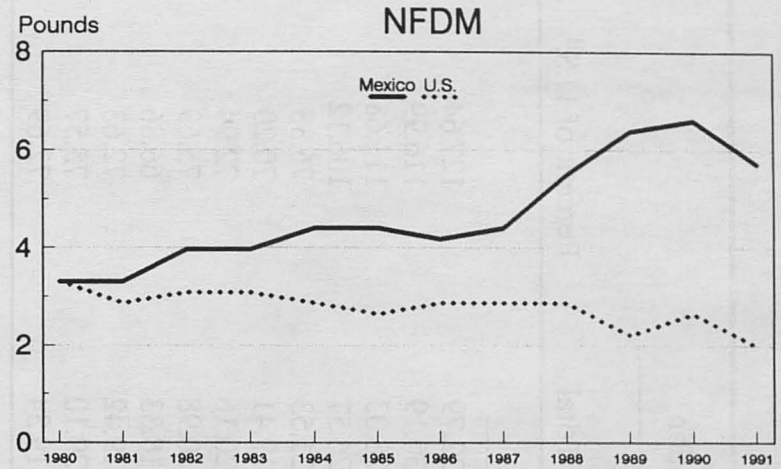
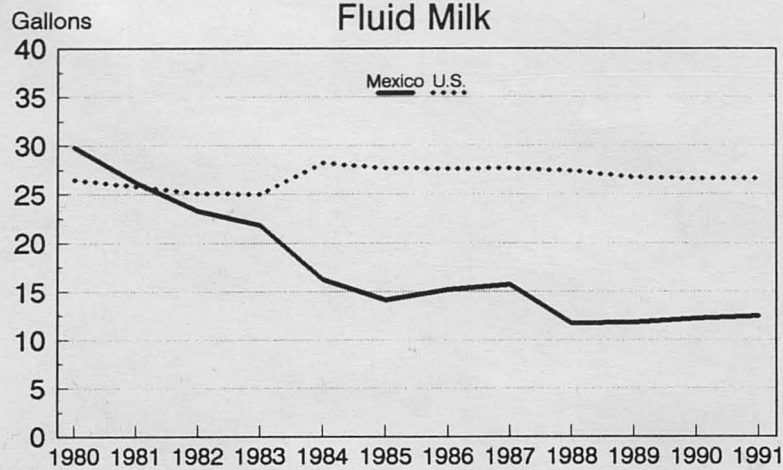
**Table 8. Comparison of Mexico's per capita fluid milk and equivalent consumption to U.S. per capita fluid milk consumption, 1980-1991.**

Year	Reconstituted Fluid equivalent	Mexico's Consumption		Percent of U.S. <sup>1</sup>
		Fluid milk	Total	
		----- (gallons)-----		
1980	3.96	29.83	32.79	127.64
1981	3.96	26.23	30.19	116.99
1982	4.76	23.27	28.03	111.68
1983	4.76	21.82	26.57	106.12
1984	5.28	16.25	21.53	76.38
1985	5.28	14.13	19.41	70.20
1986	5.02	15.14	20.16	72.94
1987	5.28	15.69	20.98	75.69
1988	6.60	11.73	18.33	66.86
1989	7.66	11.76	19.42	72.63
1990	7.93	12.18	20.10	75.57
1991	6.87	12.47	19.34	72.69

<sup>1</sup>Compared to data from Table 1.

Source: Gudmunds and Webb, PS&D View, USDA

# Per Capita Dairy Consumption, Mexico and U.S., 1980-91



Data: Gudmunds and Webb, PS&D View, USDA



from 1980-1991 coincides with a period of economic difficulty in Mexico. Nominal per capita incomes dropped an average of 6.5 percent per year from 1981 to 1988 due to declining oil prices and the related debt crisis that began in the early 1980's. Recovery occurred during the early 1990's and clearly the potential exists for increased consumption of dairy products. This potential exists primarily due to the expected increases in Mexico's population, the anticipated recovery of per capita incomes, and changing government policies. Each of these factors is discussed in the following sections.

### **Population**

The demand for dairy products in Mexico could exceed domestic supplies due to population growth, whether or not per capita consumption increases. Table 9 and Figure 11 indicate growth in the Mexican population from roughly 69.6 million in 1980 to 89.8 million in 1991, a 25 percent increase. Also shown are projections which estimate Mexico's population to be nearly 129 million by the year 2010 assuming the current annual growth rate of 2.2 percent continues. If demand expansion does occur through population increases, questions exist regarding whether these consumption increases will be met by domestic milk production or an increase in imports of NFDM and possibly fluid milk.

### **Population Age Distribution**

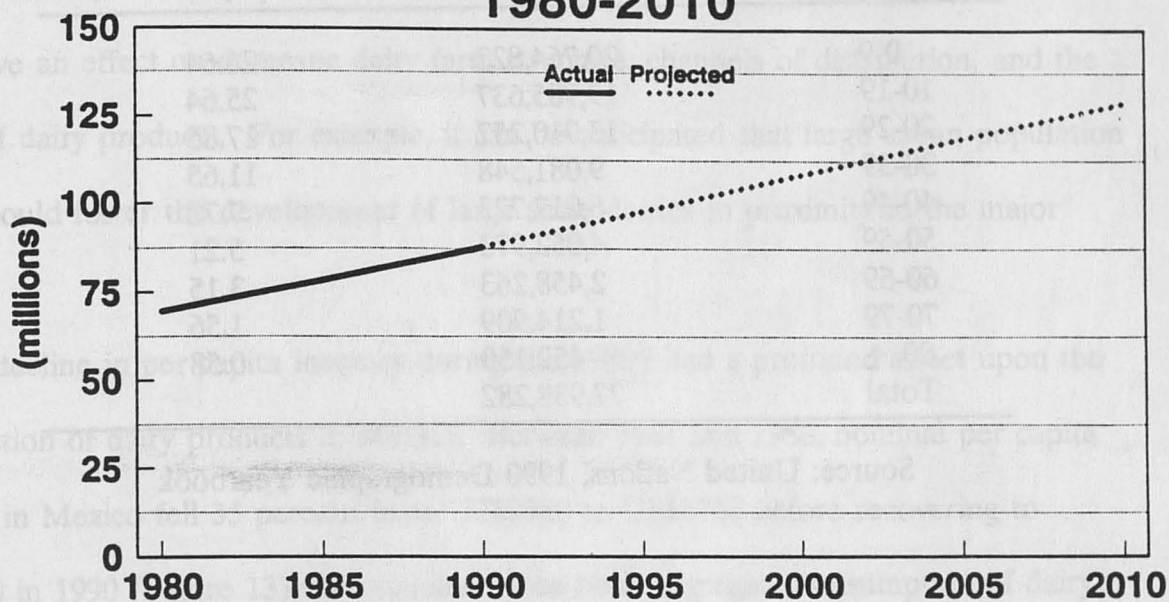
Another key population statistic is that of Mexico's age distribution. From Table 10 and Figure 12, more than 50 percent of the population in Mexico is currently below 20

**Table 9. Actual Mexican Population and Projections, 1980-2010.**

Year	Population (1,000)
1980	69,609
1981	71,398
1982	73,167
1983	74,910
1984	76,669
1985	78,453
1986	80,270
1987	82,122
1988	84,008
1989	85,925
1990	87,870
1991	89,847
1992	91,859
1993	93,900
1994	95,964
1995	98,047
2000	108,535
2005	118,866
2010	128,916

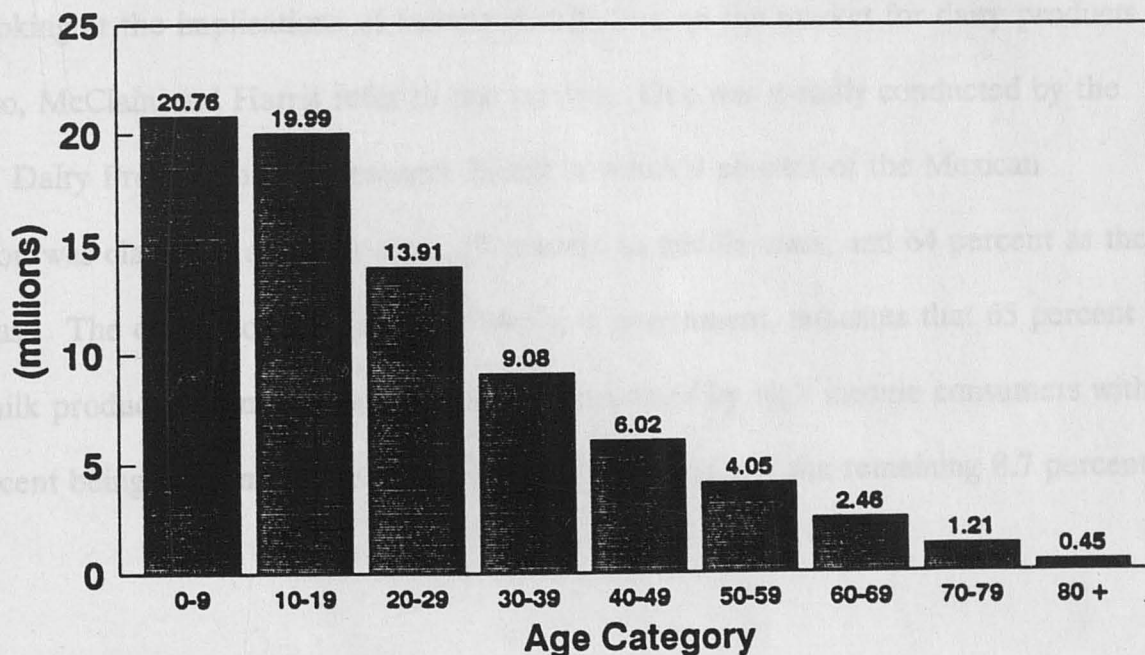
Source: Urban and Trueblood

**Figure 11. Mexican population  
Actual and Projected  
1980-2010**



Source: Urban and Trueblood

**Figure 12. Mexican population by age, 1985**



Source: United Nations 1990 Demographic Yearbook



**Table 10. Mexican Population by Age, 1985.**

Age	Population	Percent
0-9	20,764,822	26.64
10-19	19,985,637	25.64
20-29	13,910,257	17.85
30-39	9,081,548	11.65
40-49	6,017,723	7.72
50-59	4,052,973	5.21
60-69	2,458,263	3.15
70-79	1,214,909	1.56
80 +	452,150	0.58
Total	77,938,282	

Source: United Nations, 1990 Demographic Yearbook

## Geographic Population Distribution

Mexico's population is largely urban, with almost 50 percent living in the 12 largest cities (Table 11). If the population continues this rural to urban shift, it would most likely have an effect on domestic dairy farm structure, channels of distribution, and the import of dairy products. For example, it can be anticipated that large urban population centers could foster the development of large scale dairies in proximity to the major markets.

The decline in per capita incomes during the 1980's had a profound affect upon the consumption of dairy products in Mexico. Between 1981 and 1988, nominal per capita incomes in Mexico fell 35 percent from US\$2880 to US\$1760 before recovering to US\$2490 in 1990 (Figure 13). During that same time, aggregate consumption of dairy products fell by nearly one-half. The increases seen in per capita income in 1989 and 1990 are expected to continue into the 1990's, improving the prospects for an increase in demand for dairy products, especially for specialty items such as ice cream and yogurt.

In looking at the implications of income distribution on the market for dairy products in Mexico, McClain and Harris refer to two surveys. One was a study conducted by the National Dairy Promotion and Research Board in which 9 percent of the Mexican population was classified as upper class, 27 percent as middle class, and 64 percent as the lower class. The other, conducted by the Mexican government, indicates that 65 percent of the milk produced domestically in Mexico is consumed by high income consumers with 27.3 percent being consumed by middle income consumers and the remaining 8.7 percent

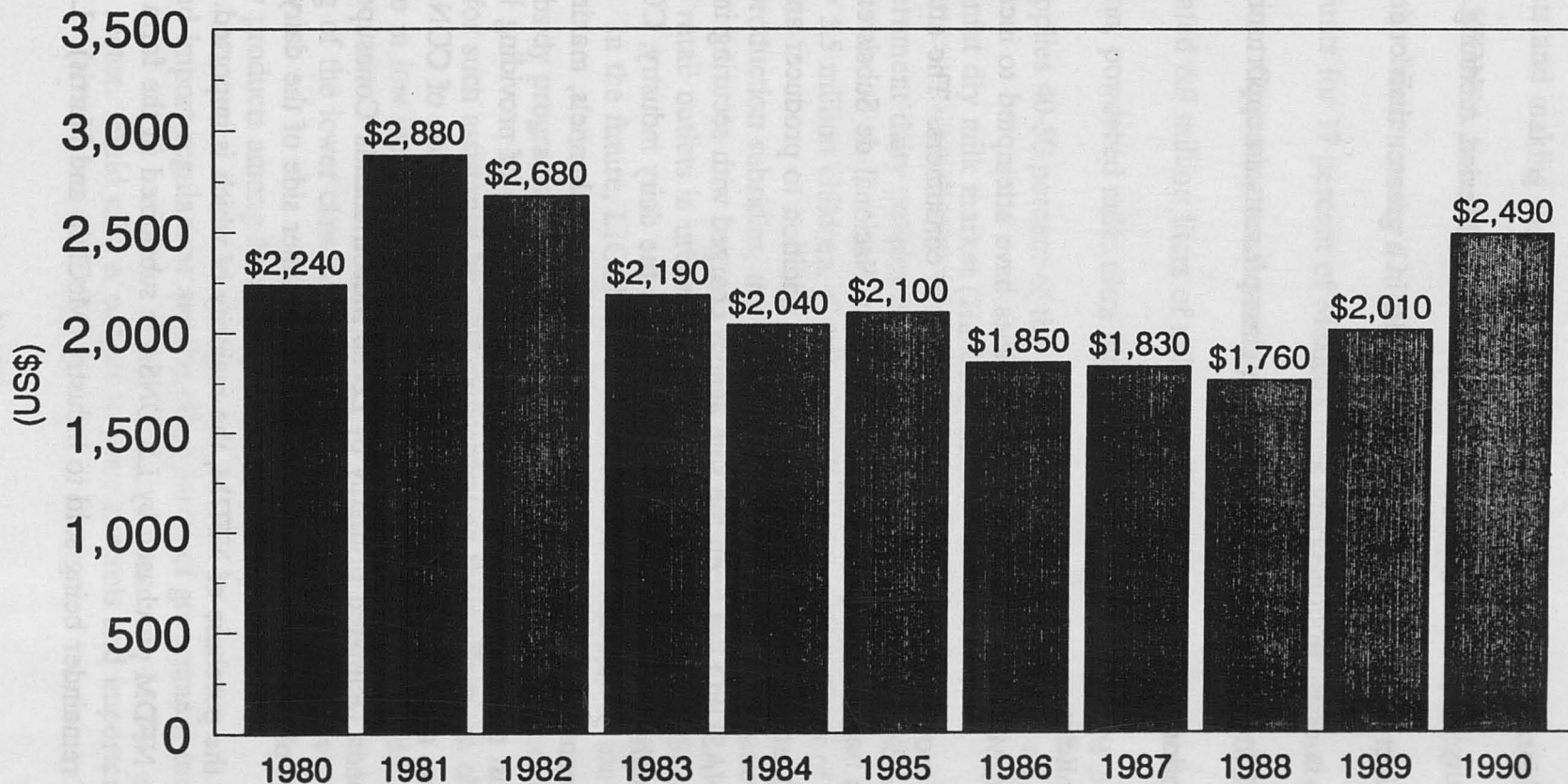
**Table 11. Population of Mexico's 12 Largest Cities, 1990.**

City	Population (1,000)
Mexico City	21,284
Guadalajara	3,259
Monterrey	2,992
Puebla	1,189
Leon	929
Torreon	790
Culiacan	789
Juarez	689
Merida	676
Acapulco	637
Mexicali	597
Tijuana	567
Total	34,398

Source: United Nations, 1990 Demographic Yearbook



Figure 13. Mexico's per capita GNP, 1980-1990



Source: USDA, ERS, World Agricultural Trends and Indicators

by low income consumers. Despite differing class definitions, these surveys point to two important considerations.

- Many dairy products appear to be luxury items in Mexico, meaning that a one percent increase in disposable income results in a greater than one percent increase in consumption.
- Potential for growth in Mexico's middle class presents an opportunity for greater consumption of dairy products.

### **Government Policies**

In the past, Mexican government dairy policies have attempted to increase farmers' incomes while providing dairy products at low cost to consumers. The attainment of these goals has been the responsibility of Compañia Nacional de Subsistencias Populares (CONASUPO), an agency of the government. In addition to producer and consumer subsidies, CONASUPO has been the sole agency charged with securing imports of NFDM. Through its broad range of involvement in the dairy industry, CONASUPO has been able to manipulate Mexico's formal dairy marketing channels, making it possible to provide low cost products to consumers. The responsibility of providing low cost dairy products to low- and middle-income consumers is a key function of CONASUPO. This function has been facilitated primarily by Leche Industrializada Conasupo (LICONSA).

LICONSA plays an important role on the consumer side of the dairy market by administering the purchase of NFDM, the majority of which is imported. Seventy percent of the NFDM purchased by LICONSA is subsidized in the form of reconstituted milk with the remainder being sold to industry (McClain and Harris). LICONSA

supplies milk to low- and middle-income families by rehydrating imported nonfat dry milk in its own plants and making the product available at subsidized prices through its own retail stores. LICONSA has announced a goal of supplying the milk needs of 12 million people, mainly children under 12, by 1994.

LICONSA accounts for 17 percent of Mexico's milk market, 70 percent of which is distributed to the poor. Operating retail stores primarily in urban areas, LICONSA distributed an estimated 6.9 million liters of milk products daily in 1990. These products comprised rehydration, powdered milk, ultra high treatment milk, and regular pasteurized milk. LICONSA supplies 40-50 percent of the pasteurized milk market and an estimated 30 percent of the nonfat dry milk market (Hallberg, et.al.).

After 1990, government dairy policies began to change, although LICONSA still serves approximately 5.5 million children, distributing about 6.0 million liters of milk per day. Discontinued production subsidies, the selling of processing and distribution centers and the reduction of retail outlets in urban areas has greatly altered LICONSA's activity in the dairy industry. In the future, LICONSA is scheduled to focus entirely on low income consumer subsidy programs. The announced goal is to reach 80 percent of the population targeted for such assistance by 1994, concentrating their efforts on children under 12 years of age in low income families earning less than US\$8.45 per day. LICONSA's targeting of the lower class suggest the potential for growth in per capita consumption of dairy products among Mexico's poor.

Price controls and import regulations are the other forms of government involvement in the Mexican dairy sector. Fluid milk is subject to price controls and importers are



encouraged to sell imported dairy products at prices equal to or less than the control prices. Price control enforcement is the responsibility of the Secretary of Commerce, with violators subject to penalties. Cheese is subject to import controls with permits unavailable for fresh cheeses but minimal controls on hard cheeses. Price controls were lifted on butter in 1991, resulting in increased butter imports. Butter fat imports have increased as well, primarily because of its use in cheese production in conjunction with NFDM.

### **Prospects For Increased Consumption**

Expected population growth, income gains, and government policy changes present prospects for increased import demand. Mexico's population of 90 million is almost one-third the size of the U.S. market, and growing at a rate of 2.2 percent annually. The distribution of Mexico's population indicates that the majority of the population is below 20 years of age and lives in an urban area. This presents a potential growth situation for dairy products due to the dietary needs of the young and market concentration in the cities. Consumption among this group should increase, especially when considering that LICONSA has begun to concentrate its efforts solely this group.

NAFTA is expected to have a positive impact on per capita income levels in Mexico. As the world's largest importer of NFDM, Mexico presents a significant source of import potential for the U.S. dairy industry when incomes begin to rise. Rising incomes would likely expand the market created by middle income consumers.

Due to government price controls on pasteurized milk, supermarkets in Mexico have begun importing dairy products that do not have price restrictions. For example, many

stores import canned, powdered, and sweetened condensed milk. U.S. yogurt, ice cream, and butter are also being imported, due in part to their popularity among Mexico's middle and upper classes. The higher priced imported products have gained market share, a fact attributed to quality. However, imports are still a very small share of a very large market. Problems within the Mexican dairy sector, such as low returns, have been blamed for domestic producers and processors failing to address quality problems. This, coupled with the liberalization of dairy import laws in Mexico will create avenues for the import and sale of higher quality U.S. dairy products.

While dairy products stand to benefit from expected increases in consumer incomes, higher quality, and relaxed regulation on imports, fluid milk has numerous obstacles to overcome. Like cheese, butter, and other specialty dairy products, fluid milk imports have increased in Northern Mexico due to relaxed import restrictions and higher quality. The problem is that more southern destinations present the problems of stiffer price controls, transportation difficulties, and inadequate cold storage facilities. Geographic location, however, gives the United States some advantage in obtaining market share in Mexico for dairy products, particularly for fluid milk, ice cream, and other highly perishable products. A large resource base, improved technology, and high quality products would seem as giving the United States a comparative advantage in the higher income niche of the Mexican market.

## Chapter 4: DAIRY IMPORTS IN MEXICO

During the 1980's, Mexico emerged as a major importer of dairy products. In fact, Mexico became the world's largest market for milk powder. Production shortfalls coupled with consumption increases, as described previously, were largely responsible. This section examines recent trends in Mexican dairy product imports, the role of the United States, Mexican trade policies, and proposed NAFTA provisions affecting the dairy sector, and finally projects U.S. export market potential in Mexico. Because Mexican dairy exports are small, the analysis will concentrate on imports.

### **Trends Mexican Dairy Product Imports**

The shortfalls in production of milk in Mexico led to increasing imports of fluid milk and other dairy products during the 1980's. As shown in Table 12, Mexican imports of fluid milk rose from 198,414 cwt in 1984 to 881,839 cwt in 1992 and are projected to top 1 million cwt in 1993. Because of its proximity to the United States and relative ease of shipping, most Mexican fluid milk imports are from the United States.

Nonfat dry milk (NFDM) imports in Mexico (Table 13) have fluctuated widely during the last decade, but remain near early 1980 levels. Nonfat dry milk imports peaked in 1990 at 6,349,249 cwt, while U.S. exports were greatest in 1989 at 2,154,884 cwt and were valued at over \$100 million. The U.S. share of Mexican NFDM imports has ranged from practically zero in 1981 to almost 60 percent in 1983, but typically U.S.



**Table 12. Mexican Fluid Milk Imports and U.S. Exports, 1984-1993**

Year	Mexican Imports	U.S. Exports to Mexico	Value of U.S. Exports	U.S. Share of Mexican Imports <sup>3</sup>
	(cwt)	(cwt)	(\$1,000)	(percent)
1984	198414	146765	4114	74.2
1985	198414	225193	5143	113.6
1986	220462	183602	4722	83.6
1987	66136	78258	2055	118.2
1988	198414	222673	4459	112.6
1989	440920	573260	14616	129.9
1990	485012	489003	13443	100.8
1991	705474	711087	16742	101.0
1992 <sup>1</sup>	881839	1047864	24138	118.8
1993 <sup>2</sup>	1102301	-	-	-

- Notes:
1. Figures for 1992 are preliminary estimates.
  2. Figures for 1993 are forecasts.
  3. Due to data discrepancies, U.S. exports are reported to exceed total Mexican imports in some years.

Source: Gudmunds and Webb, USDA/FAS, and USDA/FATUS

#### Sources of Mexican Imports

Although the United States has a traditional advantage in supplying fluid milk to Mexico, stiff competition from other sources, mostly European, has opened the Mexican market for some dairy products. Table 16 lists Mexican dairy imports by origin

**Table 13. Mexican Nonfat Dry Milk Imports and U.S. Share, 1980-1993**

Year	Mexican Imports	U.S. Exports to Mexico <sup>1</sup>	Value of U.S. Exports	U.S. Share of Mexican Imports
	(cwt)	(cwt)	(\$1,000)	(percent)
1980	3880097	639378	17191	16.5
1981	3284856	6041	217	0.2
1982	2138462	189463	10304	8.9
1983	2641109	1577457	70246	59.7
1984	2204598	693347	24037	31.5
1985	3196671	739401	21485	23.1
1986	3549405	1285061	43088	36.2
1987	3306899	1358298	48046	41.1
1988	4409201	1830435	103760	41.5
1989	5291040	2154884	68811	40.7
1990	6349249	97643	5498	1.5
1991	1058209	509748	36849	48.2
1992 <sup>1</sup>	3527362	927915	70424	26.3
1993 <sup>2</sup>	3306900	-	-	-

- Notes:
1. Figures for 1992 are preliminary estimates.
  2. Figures for 1993 are forecasts.

Source: Gudmunds and Webb, USDA/FAS, and USDA/FATUS

exports have comprised 30 - 50 percent of Mexican nonfat dry milk imports. This nonfat dry milk is used for mainly in cheese production and in reconstituting milk (Hallberg, et al.).

Mexican butter imports, shown in Table 14, have also fluctuated somewhat, but have increased in the 1990's compared to the late 1980's. In 1988, butter imports were 44,092 cwt., while in 1991, they had increased to 154,321 cwt. Mexico is projected to import approximately 132,277 cwt of butter in 1993. The United States is the principal shipper of butter to Mexico. Anhydrous milkfat, also known as dehydrated butyric fat or butter oil, remains an important part of U.S. butter exports to Mexico. The butterfat is a necessary input in cheese production using nonfat dry milk (USDA/FAS) and is also used in reconstituting milk.

Mexican cheese imports (Table 15) showed strong growth during the last decade, increasing from 44,092 cwt. in 1980 to 440,920 cwt. in 1992, and are projected to be approximately 551,145 cwt. in 1993. U.S. cheese exports to Mexico grew during the early 1980's, from 5,776 cwt in 1980 to 214,441 cwt in 1987, but then fell in the late 1980's, to 13,668 cwt in 1989. The United States generally contributed 20 - 40 percent of Mexican imports. Most of the imported cheese is hard cheese from European countries, which is preferred by upper income consumers due to its presumed higher quality (USDA/FAS).

### **Sources of Mexican Imports**

Although the United States has a locational advantage in exporting dairy products to Mexico, stiff competition from several other countries, mostly European, exists in the Mexican market for some dairy products. Table 16 lists Mexican dairy imports by major



**Table 14. Mexican Butter Imports and U.S. Exports, 1983-1993**

Year	Mexican Imports (cwt)	U.S. Exports to Mexico (cwt)	Value of U.S. Exports (\$1,000)	U.S. Share of Mexican Imports <sup>3</sup> (percent)
1983	132277	13580	1113	10.6
1984	66136	41558	3694	63.6
1985	264550	241029	21594	90.9
1986	88185	82848	7371	94.3
1987	66136	66799	3503	101.5
1988	44092	9921	581	22.7
1989	66136	139816	10877	212.1
1990	22044	102492	9183	463.6
1991	154321	154300	10822	99.9
1992 <sup>1</sup>	132277	181946	14939	137.9
1993 <sup>2</sup>	132277	-	-	-

- Notes:
1. Figures for 1992 are preliminary estimates.
  2. Figures for 1993 are forecasts.
  3. Due to data discrepancies, U.S. exports are reported to exceed Mexican imports in some years.

Source: Gudmunds and Webb, USDA/FAS, and USDA/FATUS

**Table 15. Mexican Cheese Imports and U.S. Share, 1980-1993**

Year	Mexican Imports (cwt)	U.S. Exports to Mexico (cwt)	Value of U.S. Exports (\$1,000)	U.S. Share of Mexican Imports <sup>3</sup> (percent)
1980	44092	5776	672	13.1
1981	44092	9414	1088	21.4
1982	22044	6173	690	28.0
1983	132277	88588	3816	67.0
1984	66136	28594	1607	43.2
1985	220462	87258	43698	39.6
1986	132277	133643	7021	101.5
1987	198414	214441	11241	108.0
1988	22044	49801	7084	226.4
1989	44092	13668	1358	31.0
1990	264550	40300	4482	15.2
1991	330691	71209	7972	21.5
1992 <sup>1</sup>	440920	116558	13662	26.4
1993 <sup>2</sup>	551148	-	-	-

- Notes:
1. Figures for 1992 are preliminary estimates.
  2. Figures for 1993 are forecasts.
  3. Due to data discrepancies, U.S. exports are reported to exceed Mexican imports in some years.

Source: Gudmunds and Webb, USDA/FAS, and USDA/FATUS

**Table 16. Mexican Dairy Imports by Major Source, 1991\***

Country	Fluid Milk	Nonfat Dry Milk	Butter	Dehydrated Butyric Fat	Cheese	Yogurt	Dairy Cattle
United States	1095312	561756	1586	286860	68697	118629	37079
Canada	-	97706	-	-	-	-	12189
Germany	-	341361	-	-	-	-	-
Ireland	-	98370	-	-	-	-	-
Netherlands	-	-	-	85406	42152	-	-
United Kingdom	-	-	-	-	37147	-	-
Denmark	-	-	616	-	-	-	-
Belgium	-	-	-	154563	-	-	-
France	-	-	-	53041	-	-	-
New Zealand	-	-	169	180779	14284	-	-
Australia	-	-	-	-	16733	-	-
Uruguay	-	-	-	-	62324	-	-
Others	8376	27490	1455	63207	54409	2250	-

Notes: \* Total imports.

Source: USDA/FAS.



source for 1991. The United States is the primary exporter of fluid milk and yogurt, contributing over 99 percent and 98 percent of the totals, respectively. Nonfat dry milk imports came primarily from the United States (49.8 percent), Germany (30.3 percent), Ireland (8.7 percent), and Canada (8.7 percent). Of 1991 butter imports, 41.5 percent came from the United States, 16.1 percent from Denmark, and 4.4 percent from New Zealand. The United States also faced competition in the import market for dehydrated butyric fat, which is used primarily in reconstituting milk, where the United States provided 34.8 percent of Mexican imports, but New Zealand provided 21.9 percent, Belgium 18.8 percent, the Netherlands 10.4 percent, and France 6.4 percent of Mexican dehydrated butyric fat imports in 1991. The United States was also the largest exporter of cheese to Mexico with 23.2 percent of its imports, but was followed closely by Uruguay (21.1 percent), the Netherlands (14.3 percent), and the United Kingdom (12.6 percent). Dairy cattle imports in Mexico in 1991 also came primarily from the United States and Canada, sending 37,079 and 12,189 head, respectively, but an unknown quantity of the dairy bulls included in these figures were imported for slaughter.

### **Trade Policies**

Any government policy which affects production or consumption will also affect trade. Because these policies have been described in previous sections, this section will be limited to a description of policies which directly affect trade policies.

Prior to 1986, the Mexican dairy sector was like most of the rest of the Mexican economy, characterized by high tariffs, prevalent nontariff barriers, and extensive government involvement in import purchases. Since Mexico's entrance into the GATT

and beginnings of a more open economy, these trade barriers have been lowered. A quasi-government organization, CONASUPO (Compania Nacional de Subsistencias Populares), continues to be the sole importer of NFDM and also controls imports of dehydrated butyric fat (McClain and Harris). In early 1992, CONASUPO began negotiating direct purchases with individual bids instead of using public tenders as it had previously (USDA/FAS). These NFDM purchases may be held as stocks and in turn are sold to Mexican dairy product producers.

Current trade barriers for Mexican imports of U.S. dairy products are shown in Table 17. Also, in July 1992, Mexico's Secretariat of Health published a new import manual giving changes in food import regulations in order to simplify the products clearance process. Mexican dairy cattle health regulations generally agree with those in the United States. The only dairy products presently requiring an import license are milk powder, evaporated milk, and some types of cheese. Duties on milk products also have been reduced. Present levels range from zero on milk powder to 10 percent on fluid milk, evaporated milk, and condensed milk, to 20 percent on yogurt, buttermilk, butter, cheese, and ice cream (USDA/FAS).

U.S. trade policies also affect Mexican dairy imports. Table 18 displays U.S. government concessional dairy sales to Mexico by commodity and program for 1985-1988 and the value of these sales. U.S. dairy exports under Public Law 480, commonly known as PL-480, all fall within the Title II category, which indicates that the exports are donations intended for emergency food relief for nutritionally underdeveloped nations.

**Table 17. Mexican Dairy Trade Barriers, October 1992**

Product	Import Permit Required	Ad valorem Tariff (%)
Milk powder	yes	0
Fluid milk and cream	no	10
Yogurt, buttermilk	no	20
Butter and butyric fat	no	20
Cheese	varies by type	20
Ice cream	no	20
Evaporated milk	yes	10
Condensed milk	no	10

Source: USDA/FAS

Table 17. Mexican Dairy Trade Barriers, October 1992



**Table 18. Quantity and Value of U.S. Government Concession Dairy Exports to Mexico, 1985-1988.**

Commodity	Section 416		PL480		Total	
	Quantity	Value	Quantity	Value	Quantity	Value
Anhydrous milk fat	(cwt)	(\$1,000)	(cwt)	(\$1,000)	(cwt)	(\$1,000)
	370417	33679	-	-	370417	33679
1985	354720	17060	-	-	354720	17060
1986	115477	5610	-	-	115477	5610
1987						
Butter						
1985	1587	85	-	-	1587	85
1986	838	45	-	-	838	45
1987	1323	60	-	-	1323	60
Cheese						
1985	190610	9007	-	-	190610	9007
1986	181483	9233	-	-	181483	9233
1987	170239	8834	-	-	170239	8834
Fresh milk cream						
1986	10185	297	-	-	10185	297
Nonfat dry milk						
1985	1245048	33686	5093	25	1250140	33711
1986	603531	17660	2249	11	605780	17671
1987	350752	11405	10362	51	36113	11456
1988	0	0	53991	268	53991	268

Source: USDA/FAS

The Section 416 program was enacted under Section 416 of the Agricultural Act of 1949 and reauthorized for dairy product donations under the Omnibus Budget Reconciliation Act of 1982. This program, similar to PL-480 Title II, provides donations of surplus commodities owned by the CCC.

Another U.S. export program is the Dairy Export Incentive Program (DEIP), which acts as a direct export subsidy by providing exporters of U.S. dairy products with cash bonuses which enable them to meet prevailing world prices for targeted countries. These target countries are primarily those which the U.S. feels would import from countries that unfairly subsidize their exports. U.S. exporters sell to Mexico, for example, at the world price and then are paid a cash bonus to bring their revenue up to costs. The program is administered by the CCC. In 1992, Mexico was eligible for 881,840 cwt. of NFDM under the DEIP, all of which was exported under the program with a total cash bonus value of \$31.7 million. Relative to NFDM prices in the U.S., this subsidy represented a 66 percent effective reduction in price. For 1993, Mexican imports of up to 551,150 cwt of milk powder are eligible for bonuses.

The CCC also sells dairy products directly from its reserves. In 1991, the CCC sold 418,874 cwt of NFDM to Mexico at a value of \$34 million, and in 1992, the CCC sold Mexico 330,690 cwt of NFDM for \$26 million.

Another U.S. program which influences Mexican dairy product imports is the General Sales Manager export credit guarantee program (GSM-102), which does not provide a direct subsidy for exports but allows Mexico to secure credit more easily by guaranteeing payment if Mexico is unable to pay. In fiscal year 1991, Mexico was

granted credit guarantees of \$115.1 million for NFDM imports, all of which were used. For fiscal year 1993, Mexico was allocated \$5 million in credit guarantees for fluid or dry milk, none of which have been used to date.

## **Proposed NAFTA Provisions**

### **Mexican Policies**

Under a North American Free Trade Agreement, Mexico will convert its import license for milk powder to a tariff-rate-quota (TRQ) to be phased out over fifteen years. For the United States, the first 881,840 cwt. of skim and whole milk powder will enter the Mexican market duty free. Imports over the quota level will be assessed a tariff of no less than 139 percent of value initially. However, this tariff will gradually decrease 24 percent during the first six years and be phased out over the remaining nine years. Also, the quota level will expand 3 percent compounded annually for fifteen years.

Concerning cheese imports from the United States, Mexico will immediately convert its import licensing regime to a tariff of 20 percent to be reduced to zero over a ten year period, except for fresh cheese which will be assessed a 40 percent tariff to be phased out over ten years. All other dairy products will have the current tariff levels frozen and phased out gradually over a ten year period.

### **U.S. Policies**

The United States will establish a TRQ of 9,303 cwt for imports of milk powder from Mexico. The TRQ will grow at a 3 percent compounded annual rate over ten years. Imports within the quota would enter the United States duty free, while over



quota imports would be assessed a duty of 78 - 83 percent of value, depending on the type of milk powder. The over quota duty would be phased-out over ten years.

Rules of origin will be implemented as permanent legislation to ensure that Mexico does not become an export platform for non-NAFTA countries. Dairy products originating outside Mexico must be transformed significantly before receiving preferential duty treatment under NAFTA. Non-NAFTA milk may not be used to make cream, cheese, yogurt, ice cream, or milk-based drinks. However, infant formula preparations, butter substitute, and calf milk replacer feed may contain up to 10 percent non-NAFTA milk by weight. Mixes and doughs may contain up to 25 percent non-NAFTA milk butterfat. All dairy inputs for chocolate crumb, mixtures of animal and vegetable fats and oils, and sugar confections without cocoa may contain all non-NAFTA products.

## **Chapter 5: ISSUES RAISED BY NAFTA**

The preceding analyses of production, consumption, and trade patterns, combined with U.S. dairy industry institutions, raises several issues affecting the relationship between the U.S. and Mexican dairy industries. We do not purport to have the answers to these issues although, in some instances, our conclusions differ from those drawn by other analysts. Of course, the bases for these differences are discussed. Our discussion of these issues, and the possible conclusions and policy alternatives, is designed to indicate the complexity of the issues and the range of possible outcomes and implications for U.S. dairy policy and the dairy industry in both the United States and Mexico. This chapter, like the rest of the report, does not make any recommendations, which is viewed to be the role of policymakers acting within the policy process of the respective countries.

### **Investment in the Mexico and Southwestern U.S. Dairy Industry**

The U.S. dairy industry is diverse, with herds of about 50 cows being common in the Midwest to over 2,000 cows in the West and Southwest. Technologically, U.S. dairy farms are highly mechanized and are required to have mechanical cooling systems, most of which are bulk tanks. Mexico's industry is even more diverse, ranging from only a few predominantly dual purpose animals to large commercial herds that closely approximate those located in the Western and Southwestern United States. This greater diversity extends to the technology utilized in milk production. Hand milking, long since vanished from U.S. milk production, is relatively common in Mexico. In some areas, it is not

unusual to see milk cans waiting to be picked up along the road. However, the large-scale commercial operations can be as modern as in the United States.

If Mexico's dairy industry is to increase production sufficiently to come anywhere near satisfying its fluid milk needs, large investments will be required in Mexico's dairy industry. However, Warren (p. 35-2) concludes "NAFTA is expected to result in virtually no U.S. investment in the dairy product sector in Mexico in the short and long term."

He also concludes that the impact on U.S. dairy investment is expected to be "minor."

There are a number of reasons to question this conclusion:

- It ignores studies indicating that the cost of milk production in Mexico may approximate that of the United States (Hallberg). This particularly appears to be the case on the larger confinement feedlot operations.
- It ignores changes in Mexico's policies regarding investment by foreigners in Mexican business. Recent changes to Article 27 of the Mexican Constitution provide for the lease, sale, and/or consolidation of ejidos into larger, more productive units. Additionally, Mexico now allows foreign entities to own up to 100 percent interest in agricultural processing operations, after screening by the Mexican Foreign Investment Commission. Further, the liberalization of feed grain imports should make dairy production more competitive due to lower feed costs.
- It ignores the capital and management flows that have occurred regionally within the U.S. dairy industry and from other countries such as Denmark and Holland to the U.S. industry. For example, increased milk production capacity in both Texas and New Mexico, has been augmented by flows of capital and management,



particularly from California and Denmark. Comparable capital flows have occurred and are occurring from California to Idaho. With economic stability and income growth in Mexico's economy resulting, in part from NAFTA, investment in dairy would appear to have as much profit potential as in other agricultural enterprises.

- The capital flows required for a modern milk production system (dairy farm) are substantial. For example, an AFPC representative dairy farm with 2,000 cows located near El Paso, Texas has assets valued at over \$7 million, \$4 million of which is in the dairy herd.

### **Consequences for the U.S. Dairy Industry**

Investment and growth in Mexico's dairy industry may be viewed as competitive and disadvantageous to the U.S. dairy industry. However, there are many benefits to the U.S. industry, the most significant of which to U.S. dairy farmers is the sale of replacement heifers. As indicated previously, it is widely believed that some of the contemporary strength in U.S. dairy heifer prices results from increased demand from Mexico. If Mexico is to rapidly modernize and expand its commercial dairy sector, continued growth in the demand for dairy heifers from both the United States and Canada can be anticipated.

Growth in Mexico's economy can foster increased demand for milk and its products. Currently, for much of Mexico's lower class (two-thirds of Mexico's population), the only milk available is reconstituted powdered milk. Improved income levels and expanded availability of fresh milk at competitive prices can be important incentives for increased

demand for fresh dairy products. Fostering Mexico's demand for fresh dairy products can not only be expected to increase imports from the United States but will also expand the demand for dairy heifers.

Moreover, there is much milk production, processing, and distribution-related-equipment and supplies that could be exported to Mexico's expanding dairy industry. For example, U.S. dairy suppliers have a long history of exporting semen to Mexico as a means of improving the genetic base for future milk production. Likewise, demand for modern milking equipment, transportation equipment, refrigeration units, and processing equipment can all be expected to grow.

### **Marketing Order Issues**

Many complex federal milk marketing order and cooperative issues are raised by the NAFTA agreement. Federal milk marketing orders blanket the border with Mexico from Texas to California, which has comparable state regulations. These orders regulate the prices handlers (processors) pay for milk on the basis of the dairy products made from the milk referred to as classified pricing. The proceeds from sales to processors are pooled and paid producers as an average or blend price. Several issues arise with regard to milk exported to Mexico.

- **Pricing Raw Milk Sold as Raw Milk in Mexico.** Should raw milk exported to Mexico be priced on the basis of use under the order? One theory holds that milk sold or exported to Mexico cannot be priced under Federal orders since doing so would be a barrier to trade and a violation of the NAFTA agreement.

This theory can be questioned because Federal orders are a U.S. domestic price

and income support program which, arguably, is protected under NAFTA.

Moreover, if milk exported to Mexico is not priced under Federal orders, what is to prevent that milk from re-entering the United States as a packaged product, assuming the Mexican processing plant otherwise meets U.S. health and sanitation standards? If unregulated U.S. milk re-enters the United States it could create disorderly market conditions in U.S. federal orders. Of course, the same disorderly conditions could be incurred if Mexican produced milk were sold to a fluid processing plant in Mexico at less than the Federal order price, and then sold in packaged form in the United States.

From a conceptual perspective, orders regulate the price of milk paid by processors (handlers) regulated under the order. Regulating the price of raw milk sales by handlers in Mexico would require that the use of that milk be audited, as it is for milk sold by all regulated plants in the United States. Likewise, regulating raw milk sales by U.S. producers in Mexico would require that plants in Mexico be regulated in terms of the prices they could pay. Farms milking 2,000 cows or more, which exist in both New Mexico and California are clearly in a position to sell milk directly to plants in Mexico. While regulation of prices paid by Mexican milk plants may be beyond the scope of orders, it might be possible to regulate the price at which producers could sell -- with appropriate order modification.

- **Pooling Proceeds from Raw Milk Sales in Mexico.** Under the Federal order system the proceeds from sales of milk are pooled to give rise to a single uniform



blend price paid to all producers in a Federal order market.<sup>2</sup> Regardless of how milk is priced in sales to Mexico, should all producers share the benefit of those sales? For example, if a cooperative makes a sale of raw milk to Mexico at or above the Class I (fluid use) price, should the benefit of that sale be shared by all producers including those who are not members of the cooperative? If the sale were made to a U.S. regulated handler, who bottled the milk, the proceeds would be pooled at the Class I price. Any premium over the Class I price would be retained and/or distributed by the cooperative to its members. Should the same principle be applied to the sale of milk to a Mexican processor? If so, what impact does this pooling procedure have on the incentive to sell raw milk in Mexico?

- **Pricing Raw Milk Sold as Packaged Products in Mexico.** Considerable quantities of packaged milk products are being sold in Mexico, although the quantities are private information. How the raw milk, used to make those products, is priced has considerable impact on its competitiveness in Mexico. In addition, if U.S. raw milk entering Mexico is priced at a low level relative to the United States the potential exists for the resulting products re-entering the United States and becoming a disruptive factor in U.S. Federal order markets. If the same raw milk sold in Mexico were priced under the order as if it were sold in the United States,

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<sup>2</sup>This is admittedly an oversimplification since cooperatives are not required to pay their producers the blend price.

it would have no price advantage and, therefore, would not be expected to be a disruptive factor on re-entry into the United States.

There is another reason to be concerned about the pricing of raw milk exported to Mexico. Specifically, if the price of raw milk (or cream) exported to Mexico is not regulated, some U.S. packaged products sold in Mexico (particularly fluid products) could be placed in a noncompetitive position in Mexican markets. Thus value added markets could be lost to bulk product (raw milk) sales. The point is, that maintaining a level playing field suggests the need for consideration of a consistent policy between the pricing and pooling of milk sold in processed and packaged form.

### **Cooperative Issues**

Several cooperative issues relating to milk pricing, pooling, marketing, membership, and member relations have been implied in the above discussion of Federal milk orders. Since cooperatives have substantial impact on Federal order policies and provisions, they are in a unique position to influence the outcome of the Federal order pricing and pooling issues. Moreover, cooperatives have flexibility within the Federal order system to both charge premiums over Federal order class prices and pay producers more or less than the Federal order blend price. Cooperative and Federal order strategy, therefore, becomes interrelated requiring careful analysis and planning.

Outside the Federal order arena, there are at least three other important internal cooperative policy issues with regard to Mexico:

- **Direct Sales by Cooperative Members.** Should cooperative members be allowed to sell milk to Mexico on their own account? Typically, a cooperative member is obligated to ship all of his/her milk to the cooperative. However, as indicated previously, several Texas, New Mexico, Arizona, and California producers are large enough to sell tankers of milk to Mexico on their own account. There may, in fact, be substantial financial incentive for a producer to sell milk directly to Mexico, even though they are cooperative members.
- **Mexican Membership in U.S. Cooperative.** Questions will inevitably arise regarding whether dairy farmers can become members of U.S. cooperatives. Such membership may be particularly advantageous for Mexican dairy farms located near the border because of potential flow of milk products (packaged and raw) across the border.
- **Joint Ventures/Mergers Between U.S. and Mexican Cooperatives.** The concept of multinational cooperatives in grain arose in the late 1970s.<sup>3</sup> It died when U.S. grain cooperatives began to lose export market position, in part because they were not multinational. NAFTA creates a compelling reason for cooperatives to include a multinational dimension in their strategic planning activities. With freer

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<sup>3</sup>Ronald D. Knutson, Michael Cook, and Thomas L. Sporleder. *International Cooperative Coordination in World Grain Trade*, Texas Agricultural Market Research and Development Center of Texas A&M University and the Cooperatives Program of Economics, Statistics and Cooperatives Service of USDA, College Station, Texas, Spring 1978, 54 pp.; and Ronald D. Knutson, Michael Cook, and Thomas L. Sporleder. *Assessment of International Cooperative Coordination in World Grain Trade*, Texas Agricultural Market Research and Development Center, Texas A&M University and the Cooperatives Program of Economics, Statistics and Cooperatives Service of USDA, College Station, Texas, 1980, 73 pp.



trade it will be important to both Mexican and American farmers that they consider coordinating their cooperative activities to help stabilize their markets.

### **Export Subsidy Policy**

Historically, exports of dairy products have been sporadic, occurring only when the large surpluses developed in the United States or when shortages appeared in the rest of the world. The 1990 Food Security Act changed this policy with the establishment of the Dairy Export Incentive Program (DEIP). This program was intended to offer subsidies to exporters of U.S. dairy products to help them compete with other subsidizing nations such as the European Economic Community.

Under DEIP, payments are made by the Commodity Credit Corporation (CCC) on a bid basis either in-kind, in cash, or through certificates redeemable for commodities. The payment rates (subsidies) primarily reflect the products exported, the world market prices, and the prices competitors are offering. DEIP subsidies theoretically are provided only on sales that would not normally be made and must not displace commercial sales.

DEIP sales were slow to get started and did not accelerate until 1992. For example, in 1991, 139,800 metric tons of NFDM (about 3 billion pounds skim milk equivalent), and 40,800 metric tons of butter were authorized for export bonus, 37,000 in export sales were made, mostly to Algeria.

In 1992, DEIP export authorizations increased to 150,800 metric tons of milk powder, 41,800 tons of butter, and 4,700 tons of Cheddar cheese. Table 19 indicates the quantities of DEIP products that were contracted for export to Mexico in 1992 relative to total DEIP exports to all countries. Until the Mexican economy rebounds with

**Table 19. DEIP Contracts for Export to All Countries and to Mexico 1992.**

Product	Total Contracted	Contracted to Mexico
-- metric tons--		
Nonfat dry milk	113,141	38,912
Dry whole milk	15,737	0
Butter	2,685	0
Butter oil	20,731	0
Cheddar cheese	2,892	0
Mozzarella cheese	300	0

Source: Dairy Situation, January 1993, p.17.

substantial income growth, there would appear to be continued potential for comparably large DEIP export sales to Mexico.

As indicated in the previous chapter, Mexico has relied heavily on subsidized imports of nonfat dry milk to fill its consumer needs since its milk production dropped sharply in the 1980s. While these imports have been targeted to fill the consumption needs of the poor who could not otherwise afford to buy fresh milk, subsidized imports of this type inevitably reduce the demand for fresh milk. The effect is to lower the producer price for milk in Mexico, which tends to discourage fresh milk production. For U.S. milk producers, subsidized imports of nonfat dry milk are a mixed blessing. While, on the one hand, the demand for U.S. nonfat dry milk is increased (excess supplies removed from the domestic market), on the other hand, exports of fresh milk (either in packaged or raw form) are reduced. In addition, the price received for fresh milk exported to Mexico is reduced.

Such tradeoffs need to be considered by the U.S. and Mexico policymakers in establishing their domestic and international dairy policies.



## References

- Bredahl, M. E., A. Burst, and P. Warnken. "Growth and Structure of the Mexican Cattle Industry." University of Missouri-Columbia, International Series 7, Special Report 317, January 1985.
- Engels, C. and E. Segarra. "Government Intervention in the Mexican Livestock Sector." Final Report, September 28, 1989.
- Gudmunds, Karl, and Alan Webb, "PS&D View '91" electronic database, U.S. Dept. of Agri., Econ. Res. Serv., November 1991.
- Hallberg, Milton C., James R. Cranney, Stephen M. Smith, and Constanza M. Valdes. *The Mexican Dairy Economy and Potentials of Liberalized Trade For the U.S. Dairy Industry*. Agricultural Economics and Rural Sociology Department, A.E. & R.S. No. 236, The Pennsylvania State University, July 1992.
- McClain, Emily A., and Harold M. Harris, Jr. *A U.S.-Mexico Free Trade Agreement: Potential Impacts and Implications For the U.S. Dairy Industry*. American Farm Bureau Research Foundation, 1992.
- Presidencia de la Republica Coordinacion General de Programas para Productos Basicos, et al. "Serie Productos Basicos 1. Alimentos, Analisis y Expectativas." Mexico, D.F., January 1981.
- Rosson, C. Parr, III, Gary W. Williams, Carl Anderson, Ernie Davis, Charles Hall, Ronald D. Knutson, Robert Schwart, Edward G. Smith, and Mark Waller. *The North American Free Trade Agreement., Background, Legislative Process, and Provisions for Agricultural Trade*, Texas Agricultural Experiment Station, Texas Agricultural Extension Service, Department of Agricultural Economics, Texas A&M University, Agricultural and Food Policy Center Working Paper 92-9, September 1992.
- Salmon, D. G. and P. F. Warnken. "Economics of Milk Production in Mexico's Humid Tropics." University of Missouri-Columbia, International Series 5, Special Report 286, October 1982.
- United Nations, Department of International Economic and Social Affairs, Statistical Office. *1990 Demographic Yearbook*. New York, 1992.
- Urban, Fancis, and Michael Trueblood. "World Population by Country and Region, 1950-2050", USDA, ERS, ATAD, Staff Report No. AGES 9024, April, 1990.

U.S. Dept. of Agri., Foreign Agri. Serv. (USDA/FAS), "Dairy Annual Report," Mexico City Mexico, AGR no. MX2225, October 15, 1992.

USDA, ERS, *World Agricultural Trends and Indicators*, various issues.

U.S. Dept. of Agri. *Foreign Agricultural Trade of the United States (USDA/FATUS)*, Calendar Year Supplement, Econ. Res. Serv., various issues.

World Bank. "World Development Report 1991: The Challenge of Development." Oxford University Press, 1991.



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