

The Demand for and Marketing Environment  
of Milk and Dairy Products

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Trends in dairy product consumption have a major bearing on the policies of dairy firms. Fast growing, new industries provide opportunities for entry and growth while opportunities for firms in rapidly contracting industries are very limited. The growth rates of most industries fall between these two extremes. The dairy industry is in the middle of these two growth rate extremes because it is a mature industry with a relatively stable demand.

The utilization of the U.S. milk supply in 1960 and 1976 has the following profile:

Table 1. Utilization of U.S. Milk Supply, 1960 and 1976

U.S. Milk Production	1960 123.1 Bil. Lbs. percent	1976 120.4 Bil. Lbs. percent
Utilization:		
Fluid Products	46	43
Butter	26	17
Cheese (Including Cottage)	13	26
Ice Cream Products	8	10
Other	7	4

The total proportion used for fluid purposes and frozen dairy products has remained relatively constant during the past 16 years. A considerable increase has taken place in milk used for cheese manufacturing, while a much smaller portion is now used in butter production. The substitution of margarine for butter and a record cheese consumption of 159 pounds per capita this past year account for much of this shift.

The long run increase in the volume of dairy products sold has been sustained primarily by an increasing population. The increased consumption of many low fat dairy products also has been important. During the 1940's and 1950's, a movement of people from farms to urban areas caused an increase in demand for dairy products. During this time, farm families also were an important segment of the market. As late as 1950, farm families accounted for 10 percent of all dairy products consumed in the U.S. This compares with 5 percent in 1960 and only 2 percent in 1970. The migration from farm to urban areas has been largely completed, and this factor is no longer important.

As indicated above, some dairy products (primarily those with relatively high solids-not-fat and low fat content) have increased in per capita consumption. However, the per capita consumption of milk in all dairy products has decreased during the past 25 years.

The traditional measure for consumption has been the milk fat equivalent series which is basically just another name for butterfat. On a milk fat equivalent basis, per capita consumption has decreased from 740 lbs. in 1950 to 548 pounds in 1976, a 26 percent decrease (Table 2). The market place has witnessed an extensive substitution for butterfat, which makes the milk equivalent basis questionable as a good measure of milk consumption.

An alternative to the milk equivalent basis is the consumption of milk solids not fat. In 1976, per capita consumption of solids not fat was 39 pounds, a decrease of 10 percent from 1950. With consumer interest focusing on the nutrition-calories relationship, perhaps the milk solids not fat is a more meaningful measure.

Table 2. The Demand for Milk and Dairy Products  
United States, 1950-76<sup>1/</sup>

Year	Milk		Margarine	
	Equivalent	Milk Solids		
	Fat	Milk- Solids-		
	Solids	Fat not-		
Basis		fat		
	Pounds	Pounds	Pounds	
1950	740	29.3	43.6	6.1
1955	706	27.2	44.5	8.2
1960	653	24.5	43.4	9.4
1965	620	22.9	42.6	9.9
1966	604	22.3	42.4	10.5
1967	581	21.4	41.6	10.5
1968	577	21.2	41.8	10.8
1969	569	20.9	41.7	10.8
1970	561	20.6	41.1	11.0
1971	558	20.4	41.2	11.1
1972	560	20.6	40.5	11.3
1973	556	20.4	42.2	11.3
1974	542	20.0	38.2	11.6
1975	545	20.1	37.9	12.0
1976	548	20.2	39.1	12.0

<sup>1/</sup> Includes available data for Alaska and Hawaii beginning 1960.

The Effects of Population on the Demand for Dairy Products

Although per capita consumption of dairy products has declined during the past 25 years, the population in this country has increased by 63 million people (Table 3). With this population growth, the aggregate commercial demand for milk has remained quite strong (Table 4). Thus, in the 1950 to 1976 period, while per capital consumption declined by more than 25 percent, the total market increased by 22 percent.

Table 3. Growth in U.S. Population, Selected Years, 1950-76

<u>Year</u>	<u>U.S. Population</u>	<u>Pct. Change</u>
1950	151,325,798	
1960	179,323,175	+18.5
1970	203,165,699	+13.3
1976	214,659,000	+ 5.6

Table 4. Civilian Disappearance of Milk from Commercial Sources

<u>Year</u>	<u>Total Commercial Milk Market</u> (Billion lbs.)
1950	95.0
1955	98.7
1960	105.3
1965	108.0
1970	103.5
1976	116.3

The question then is whether the population growth during the next 10 years will offset any further declines in per capita consumption. Changes in U.S. population depend on the birth and death rates and on net immigration. The death rate is fairly constant, having stabilized at less than one percent and net immigration is steady, adding about 400,000 people a year to the nation. One of the key variables is the birth rate, i.e., the birth rate per 1,000 population. In the 1960's, the birth rate began a decline that has continued through the early 1970's. From a post war high of 27 births per 1,000 population, the U.S. rate had declined to 18 by 1970 and is currently estimated to be 14.8. Not only has the rate decreased, but the absolute number of births has also declined from 3.7 million in 1970 to 3.15 million in 1975.

U.S. Bureau of Census figures indicate that a birth rate in the range of 17 to 18 is comparable to the extremely low rates recorded in Depression years.

The impact of a slowdown in population growth is not uniform. The size and relative weights of various age groups change at different rates. For example, those born between 1970 and 1975 will be in elementary school in the 1975 to 1980 period and in college between 1988 and 1993. This implies an ebbing in markets for their special needs in food, clothing, recreation, and education.

Changes in population affect the milk market in two ways. One is the total number of people available to consume milk and dairy products. The other is the changing age distribution of the population. With a stagnant birth rate, the proportion of our population that is young declines, and that is the backbone of the milk market, while older age groups that contribute less to dairy consumption represent a larger proportion of the population.

The relationship between milk consumption and age has been probed in many studies. The American Dairy Association sponsored a nationwide study in 1962 which gave the results shown in Table 5.

Table 5. Daily Average Ounces of Fluid Milk Used as a Beverage by Age Group, U.S.\*

<u>Age</u>	<u>Ounces of Fluid Milk</u>
6 and Under	22.3
7-12	23.1
13-19	20.8
20-24	12.1
25-34	7.6
35-54	6.0
55 and Over	5.3

\*Milk Beverage Consumption Patterns, American Dairy Association, 1962, p. 15.

The data on fluid milk in this study include whole, skim, low fat, chocolate milk and drink, and buttermilk. It is clear that fluid milk consumption is at its peak among those aged 12 and under. Consumption declines slightly during the teenage years and then drops steadily with increasing age. Males consume more milk than females, and this is especially apparent in the teenage group. From the consumption data, it is obvious that a changing age distribution can have major impacts on the milk market.

Table 6. Percent of U.S. and Northeast Population in Various Age Brackets: 1970, 1975, and 1976<sup>1/</sup>

Age Group	1970		1975		1976	
	U.S.	N.E.	U.S.	N.E.	U.S.	N.E.
			- % -			
0-4	8.4	8.2	7.5	6.7	7.1	6.4
5-17	25.9	24.8	23.7	23.2	23.2	22.7
18-44	35.4	35.1	37.9	37.5	38.6	38.1
45-64	20.6	21.8	20.4	21.8	20.3	21.8
65 and older	9.7	10.1	10.5	10.8	10.8	11.0

<sup>1/</sup> The Northeast category includes the states of Delaware, Maryland and Virginia.

Source: U.S. Department of Commerce, Series P-25, No. 646, issued February 1977.

Several basic observations can be made from the age distribution data as they relate to the milk market, particularly in comparing the 1976 distribution with 1970 (Table 6).

(1) The 0-4 age group has dropped off substantially, and the 5-17 age group has declined somewhat. With high milk consumption in these age groups, this reduction doesn't do much for milk industry morale.

(2) The 18-44 age group increased, reflecting the post World War II baby boom. While this is good for the milk industry today, these people are moving into the older age brackets.

(3) The 45-64 age group has remained stable from 1970 to 1976. This is a reflection of the Depression years and what those years did to the birth rate. The 65 and older age group is growing and now represents more than 10% of our population.

(4) The Northeast has fewer residents under the age of 18 and more over the age of 45 as compared to the U.S. in total.

On the positive side, the large number of children born during the "Baby Boom" is now in the prime child bearing years. Babies born between 1945 and 1955 are now 19-29 years old. In 1970, there were 21 million women between 20 and 35 years of age. By 1975, this will have increased 17 percent to 25 million. If these young families decide to have three children instead of the two they may have planned on, the birth rate and number of births could rise drastically.

It should be noted that age distribution is not the only factor within a given population that determines dairy product consumption. Medical studies have shown that many non-Caucasians have more difficulty digesting fluid milk which indicates that the race composition also should be considered.

#### Marketing

The dairy industry can be divided into six inter-related components, producers, cooperatives, processors, retailers, consumers, and government. As discussed in the supply section, the number of dairy farms has decreased greatly during the past 25 years (602,000 in 1950 and 225,000 today). During that same period average herd size has more than doubled to 50 cows per herd and average production per cow at 10,840 pounds is twice what it was 25 years ago.

As the structure of dairy production has changed from many small firms to fewer and larger ones, the structures of dairy cooperatives, dairy processors and federal market orders have followed a parallel course. Individual

cooperatives were initially organized around isolated local fluid milk markets. However, local handlers moved packaged milk into the markets of other cooperatives, they were faced with overlapping membership. To minimize duplication of efforts in serving dairy farmers' needs, the cooperatives consolidated, merged and joined federated organizations. The number of dairy cooperatives has decreased from more than 2,000 in 1950 to 631 in 1975. They are, however, an important link in the marketing of producer milk, accounting for substantial increases in the farm level share of milk marketings in recent years (Table 7).

Table 7. Number of Dairy Cooperatives and Farm Level Share of Milk Marketed by Dairy Cooperatives, U.S., 1950-1975

Year	Number of Dairy Coops	Farm Level Share of Coop Marketings % of Cash Receipts
1950-51	2,072	53%
1960-61	1,609	61
1964-65	1,346	65
1969-70	971	73
1974-75	631	75

Source: Ingalsbe, Gene, "What's the Cooperative Market Share?" Farmer Cooperatives, USDA, Feb., 1977, p. 4.

Dairy Product Processing - New technology and the subsequent economic forces have been the primary factors in causing a milk processing structure of fewer firms and plants distributing milk and dairy products over larger and larger marketing areas. Minimum size economies dictate that current fluid milk plant capacity should permit processing at least 40,00 quarts per day. Many plants have the capacity to process 100,000 quarts per day and some of the specialized fluid milk plants have the capacity to process and ship 300,000 gallons of milk in a single day. These large capacity plants have resulted in a decrease of fluid milk processing plants from 8,392 in 1948 to 3,920 in 1965 and to



an estimated 1,800 currently.<sup>1/</sup> The technology and economies that caused these structural changes continue which will result in even fewer plant numbers in the future unless concerns for maintaining competition retard this trend.

Fluid processing plants remaining in the industry, particularly in the Northeast, are aggressive, well managed, competitors. In New England, one firm continues to maintain a sizeable market penetration. In upstate New York, 8 firms account for 60 percent of the fluid milk processed and 10 plants in New York City account for most of the milk processed there.

The number of butter plants and pounds of butter produced decreased during the past decade in the U.S. and in the Northeast (Table 8). Butter plant numbers and production will continue to decrease as butter remains a residual product. During this same period, the number of cheese plants also decreased but total production increased by 1/3 in the U.S. and more than doubled in the Northeast.

Table 8. Number of Butter and Cheese Plants and Total Production in the U.S. and Northeast, 1965 and 1975

	U.S.	N.E.	Production	
			U.S.	N.E.
Butter Plants				
1965	1,152	102	1.3 Bil. Lbs.	80 Mil. Lbs.
1975	366	42	980 Mil. Lbs.	65.5 Mil. Lbs.
Cheese Plants				
1965	1,207	171	1.8 Bil. Lbs.	170 Mil. Lbs.
1975	838	112	2.8 Bil. Lbs.	353 Mil. Lbs.

Source: Dairy Products Annual Survey, Crop Reporting Board, USDA, Washington, D. C., selected issues.

<sup>1/</sup> Parker, Russell C., Economic Report on the Dairy Industry, Federal Trade Commission Staff Report, Washington, D.C., 1973.

### Retailers

Approximately 70 percent of all fluid milk products are currently sold through food stores, 10 percent through home delivery and the remainder to wholesale institutional accounts such as restaurants, schools, hospitals and factories. Prior to W.W.II, home delivery of fluid milk accounted for 70 percent of the milk sales.

The marketing of fluid milk through food stores, primarily supermarkets, has resulted in a change of market control from the processor to the supermarket. The supermarkets represent large volume accounts. These accounts frequently require private labeled containers - management of the supermarkets have control over the shelf space for competing brands and the prices paid by customers. Sometimes these prices are set at levels below cost to generate more store traffic. The larger supermarket chains also have sufficient volume to vertically integrate backward into fluid milk processing. Currently, 20 percent of the fluid milk in the U.S. is processed in plants operated by food chains.

### Government

The role of government touches on all aspects of the dairy industry. It includes: health regulations for production and processing, reexamination of legislation permitting the formation of cooperatives, monitoring the competitive environment of dairy processors, minimum resale price controls in some states and the federal market order system.

As bulk and packaged milk moves between markets with greater frequency, health departments are forced to rely on reciprocity agreements to provide adequate inspection services. The size and potential market power of cooperatives are under continued scrutiny by the Department of Justice. The competitive environment within which processors operate has been closely monitored

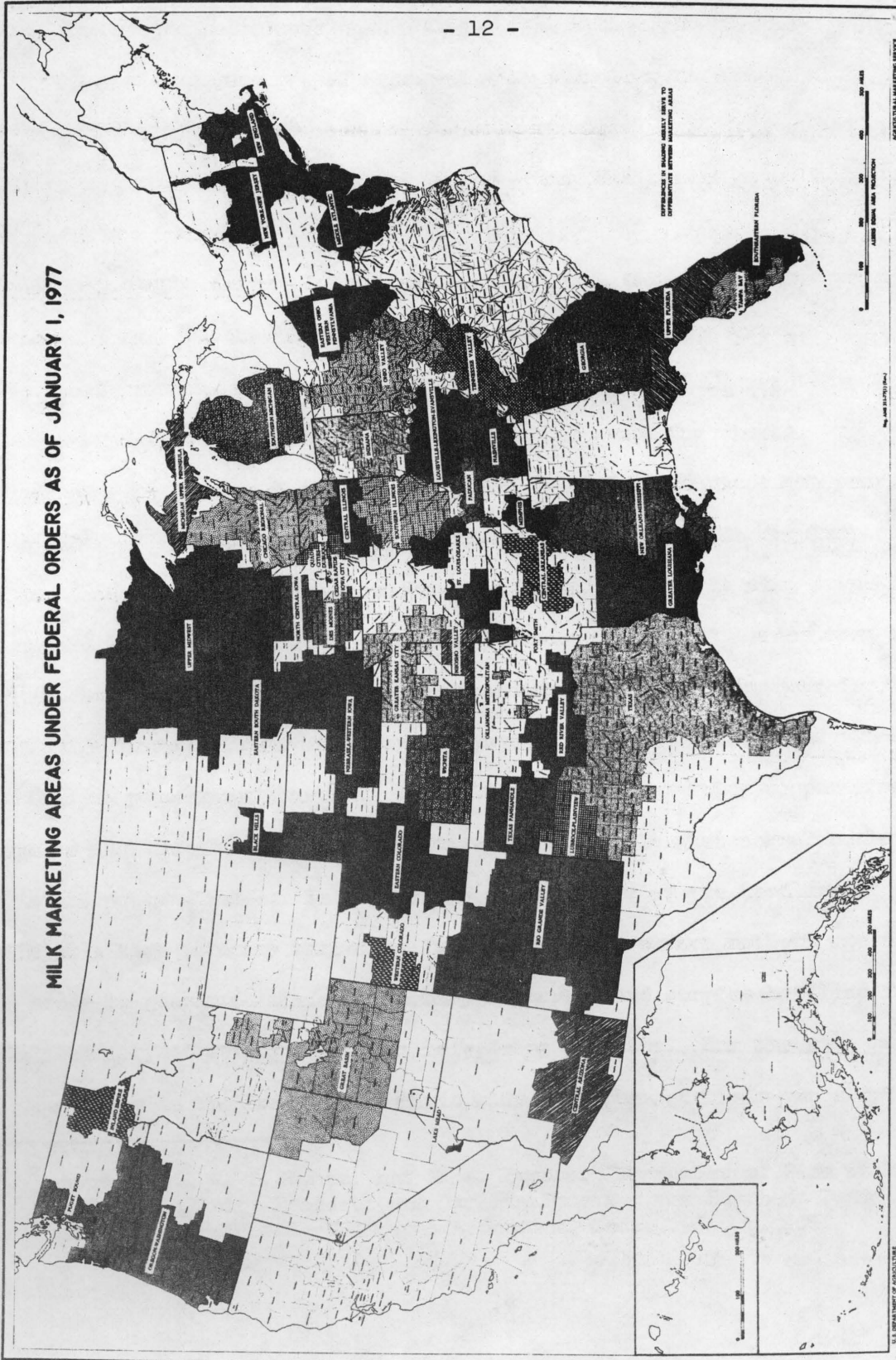
by the Federal Trade Commission. Potential expansion through horizontal mergers by the processor has been restrained through the implementation of merger moratoriums. The result of this policy has been a drop in the market share of the four largest national dairy companies (Borden, Kraftco, Beatrice and Foremost) from 22 percent in 1957 to 19 percent in 1970.

Resale price controls are still enforced in 11 states (Maine, Montana, Nevada, New Jersey, North Dakota, Pennsylvania, South Carolina, South Dakota, Vermont, Virginia and Wyoming). In addition, some states such as New York and Connecticut have local licensing regulations.

Under the Agricultural Adjustment Act of 1933 and later legislation, the Federal government stabilized prices of milk in fluid milk markets through marketing orders. A fundamental guideline for determining the geographic area of a marketing order is to regulate competing processors for the sales of packaged milk. As these marketing areas have expanded, federal orders have consolidated. In 1962, federal orders existed in 83 markets. Currently, only 47 federal market orders exist and further consolidation will take place as markets continue to expand.

Transportation - The movement of raw milk from the farm to the processing plant and then to the ultimate consumer is an important link in the marketing system. The unique characteristics of milk, i.e., perishability and bulkiness increases the importance of this marketing function. As truck costs and labor and fuel costs continue to increase, transportation costs become an even more important segment of the marketing complex. Transportation costs are particularly troublesome in the New York market. The problem evolved from how to account for and price milk with the advent of bulk tank delivery. Farm point pricing was initiated as a solution and the cooperative became directly responsible for costs of hauling its members' milk. Although handlers and cooperatives

MILK MARKETING AREAS UNDER FEDERAL ORDERS AS OF JANUARY 1, 1977



U.S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL MARKETING SERVICE

EXPERIMENTAL IN NATURE; SUBJECTS TO DIFFERENTIALS BETWEEN MARKETING AREAS

were authorized to deduct a charge for this hauling, cooperatives did not put this charge into effect. The philosophy of "free hauling" for producers has been an added burden for the cooperative.

Transportation costs for the movement of milk and dairy products have increased approximately 60 percent since 1969. The present intermarket structure of Federal order minimum class I prices was established 10 years ago. A transportation differential was set at 15 cents per hundredweight per 100 miles. Current long distance hauling costs are approximately 25 cents per hundredweight per 100 miles. The hauling costs associated with shorthaul, small trucks is approximately 40 cents per hundredweight. These costs will vary depending on terrain and distance.

Processing Costs - Consumers purchase fluid milk and dairy products which have been processed. The producer price for milk and dairy products is only one part of the final retail price. To put these costs in perspective, processing costs are presented for fluid milk, butter and cheese.

The farm value accounts for 50 percent of the retail store price for fluid whole milk and the processing costs for 16 percent (Table 9).

Table 9. Estimated Cost Allocations of the Retail Price for Fluid Milk, U.S., 1976<sup>1/</sup>

Marketing Function	Whole Milk, (1/2 Gal.) Sold in Stores Cents
Farm Value	41
Procurement	3
Processing	13
Wholesaling (delivery, selling)	16
Retailing (in store markup)	<u>9</u>
Retail Price	82 cents

<sup>1/</sup> Source - Jacobson, Robert E., "Underlying Economic Forces in the Changing Milk Marketing System," Proceedings for the Conference on Milk Marketing, Washington, D.C., 1976, P.E.

Butter/powder processing costs - Recent studies indicate that butter-powder processing costs vary from 69¢ to \$1.15 per hundredweight of milk processed depending on plant size.<sup>1/</sup> The current make allowance as specified in the government price support allowance for butter-powder is \$1.02 per hundredweight of milk processed or approximately 9¢ per pound for nonfat dried milk and 6¢ per pound for butter

Cheese processing costs - Depending on plant size, budgeted cheese processing costs range from 88¢ to \$1.25 per hundredweight of milk processed.<sup>2/</sup> The current government price support make allowance for cheese is \$1.17 per hundredweight of milk processed or approximately 11 cents per pound for cheese.

Balancing - problems and costs - In various periods throughout the year, Grade A supplies of milk are substantially in excess of fluid milk requirements. This is particularly true through the May-June period, but it is also a weekly occurrence as Friday, Saturday and Sunday producer milk deliveries must be accommodated even while fluid milk processing plants are shut down for the weekend. Also, holidays interrupt the normal flow of market milk. Occasional strikes at processing plants or withholding actions by dairy cooperatives require that surplus handling facilities be available when normal outlets for milk are not available. In general, cooperatives view the handling of surplus milk as a high priority marketing function because market outlets are essential in order to guarantee their membership a market and surplus handling facilities are necessary to strengthen their bargaining position. For the most part, cooperatives in the Northeast individually have pursued their own surplus

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<sup>1/</sup> Connor, M.C., W. T. Boehm, and T. A. Pardue, "Economies of Size in Processing Manufactured Dairy Products and Implications for the Southern Dairy Industry," Southern Journal of Agricultural Economics, Dec., 1976, p. 105.

<sup>2/</sup> Ibid.

handling strategy. In some instances they have adequate capacity to take care of normal situations. Sometimes the cooperatives turn to proprietary handlers who will buy the milk as they need it. Frequently these outlets are costly to supply because of their location, capacity and obsolescence.

The cost of balancing the milk supply varies considerably between regions due to different uses of the excess milk. For example, in 1975, approximately equal amounts of butterfat were used in butter and cheese production in the Middle Atlantic market; twice as much butterfat was used in cheese compared to butter in the New York-New Jersey and Boston markets, and three times as much butterfat was used in butter compared to cheese in the Eastern Ohio-Western Pennsylvania market.

Maximum efficiency in butter and cheese plants usually is realized when operating at or near capacity. However, plants handling the reserve supply for fluid markets seldom realize the efficiency possible from producing at or near capacity. Volume variability is regarded as the most significant factor influencing manufacturing costs.

Many of the manufacturing plants handling the reserve supply for the fluid markets in the Northeast are operated at a loss. Although the dairy cooperatives in Ohio generally have not found fluid processing to be very profitable, the manufacturing facilities have generated profits. Their strategy in part is to sell as much fluid cream and condensed skim as possible at market prices. The remainder is processed into butter/powder and cheese. They have adequate storage facilities to store surplus products produced in the spring for summer and autumn sales. Their plants are not antiquated. Additional monies are invested on a regular basis for storage and upgrading their plants. The goal of management is to have these plants generate a profit equal to one percent of sales.

Some likely future adjustments - Several factors relating to demand and the competitive environment of the dairy industry have been identified. Many of these factors will undergo change during the next decade:

1. Consumption - As our population profile becomes older, the consumption of low fat fluid products, cheeses and other dairy products containing high proportions of non-fat-solids will continue to increase. The per capita consumption of milk fat and total dairy products will continue to decrease but the per capita decrease will be partially negated by the increase in total population.

2. Retailers - Most milk and dairy products will continue to move through food stores. An increasing portion of the product will be sold under private label and additional backward vertical integration by the large supermarket chains will take place.

3. Processors - The total number of processors will continue to decrease. Those processors remaining will be very aggressive, well managed firms. Local health and legal restrictions will be reduced, permitting greater movement of bulk and packaged milk within the Northeast.

High labor and utility costs will force several of the processors located in New York City to move out.

4. Federal milk marketing orders - In the near term, differences in prices and pooling requirements between neighboring orders will diminish. For example, a recently issued recommended decision would eliminate the 40 cent Class I price difference between the New York-New Jersey and the Middle Atlantic order.

Over the long run, federal orders will continue to consolidate. By 1985, only about 15 orders will remain with perhaps only one in the Northeast.

5. Dairy cooperatives - The dairy cooperatives will continue to be an important segment in the milk marketing channel. The number of dairy cooperatives



will continue to decrease but the size of the remaining cooperatives will be larger. Eventually, we may have only 8 or 10 dairy cooperatives in the country with only one in the Northeast. The milk prices negotiated by these coops will approximate the prevailing class prices except for costs associated with providing services to the market.