Dairy

Background for 1990 Farm Legislation

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Introduction

Federal dairy programs play an important role in the pricing and marketing of milk and dairy products. Most Federal regulation evolved from legislation enacted in the 1930's and 1940's. The Agricultural Act of 1949 established the permanent program of dairy price supports and is still part of the law. The Agricultural Marketing Agreement Act of 1937 provided for classified pricing and revenue pooling in fluid milk markets under Federal milk marketing orders.

While there have been significant changes in provisions of Federal milk marketing orders, the basic structure of the dairy price support and import control programs remained nearly the same from 1949 to 1981. Since 1981, major departures from traditional dairy price support policy have occurred, including the severing of price supports from parity, the addition of voluntary supply-management provisions to the dairy price support program, and implementation of a flexible dairy price support mechanism.

Much of the 1982, 1983, and 1985 dairy program legislation evolved from an attempt to address the problems of excess milk supplies and large Government purchases and costs resulting primarily from the high level of minimum price support with midyear adjustments from 1977 to 1980. The higher prices--coupled with reduced risk and uncertainty, lack of alternative uses for farm resources, increased productivity in the dairy sector, and relatively low feed prices--resulted in over 10 percent more milk by 1983 than consumers were willing to buy at the supported prices. A challenge for the 1990's will be to avoid the temptation of using the dairy price support and Federal milk marketing order programs as income-enhancing mechanisms. As history has shown, this would hold and attract even more resources into the dairy industry.

Structure of the Dairy Industry

Dairy products account for about 13 percent of total cash receipts from all farm commodities. In 1988, cash receipts from dairy products totaled $17.7 billion, ranking second only to cattle and calves with $36.3 billion. Soybeans and corn followed dairy products in cash receipts, with $12.4 and $10.1 billion, respectively.

Milk, which is bulky, highly perishable, and subject to bacterial and other contamination, must be produced and handled under sanitary conditions and marketed quickly, either for drinking or for manufacture into storable dairy products. Price is the fundamental coordinator of activities in milk production, assembly, processing, and distribution. Prices--even though influenced by Government programs--allocate raw milk supplies among competing demands and provide production and marketing signals to dairy farmers and processing and marketing firms.

The ability of market prices to efficiently coordinate economic activities depends in part on the inherent characteristics of milk and its products. Government involvement attempts to overcome certain market deficiencies created by these characteristics. These factors are not unique to milk; but, in combination, they create unique conditions and problems. These characteristics include:

- Extreme perishability of the raw product, with a high potential for transmitting diseases, requiring rapid product movement, refrigeration, and heat treatment;
- Highly inelastic demand--low quantity response to price changes;
- Bulkiness due to its high water content (87 percent);
- Production through a continuous biological process, creating (among other effects) a need for skilled workers every day;
- Unsynchronized seasonality of production and demand;
- Biological lags in output (about 36 months from the time a cow is bred until the heifer enters the milking herd); and
- Joint assembly and hauling of milk for most dairy farmers.

Milk Production

Although milk is produced and processed in every State, over half of total 1988 U.S. milk production came from Wisconsin, California, New York, Minnesota, and Pennsylvania (fig. 1). Over two-thirds of the total milk supply was produced in 10 States. Large drylot dairy farms with 1,000-2,000 cows are common in

Florida and the Southwest (southern and central California, Arizona, and New Mexico), but dairy operations of this type are rare elsewhere (app. table 1).

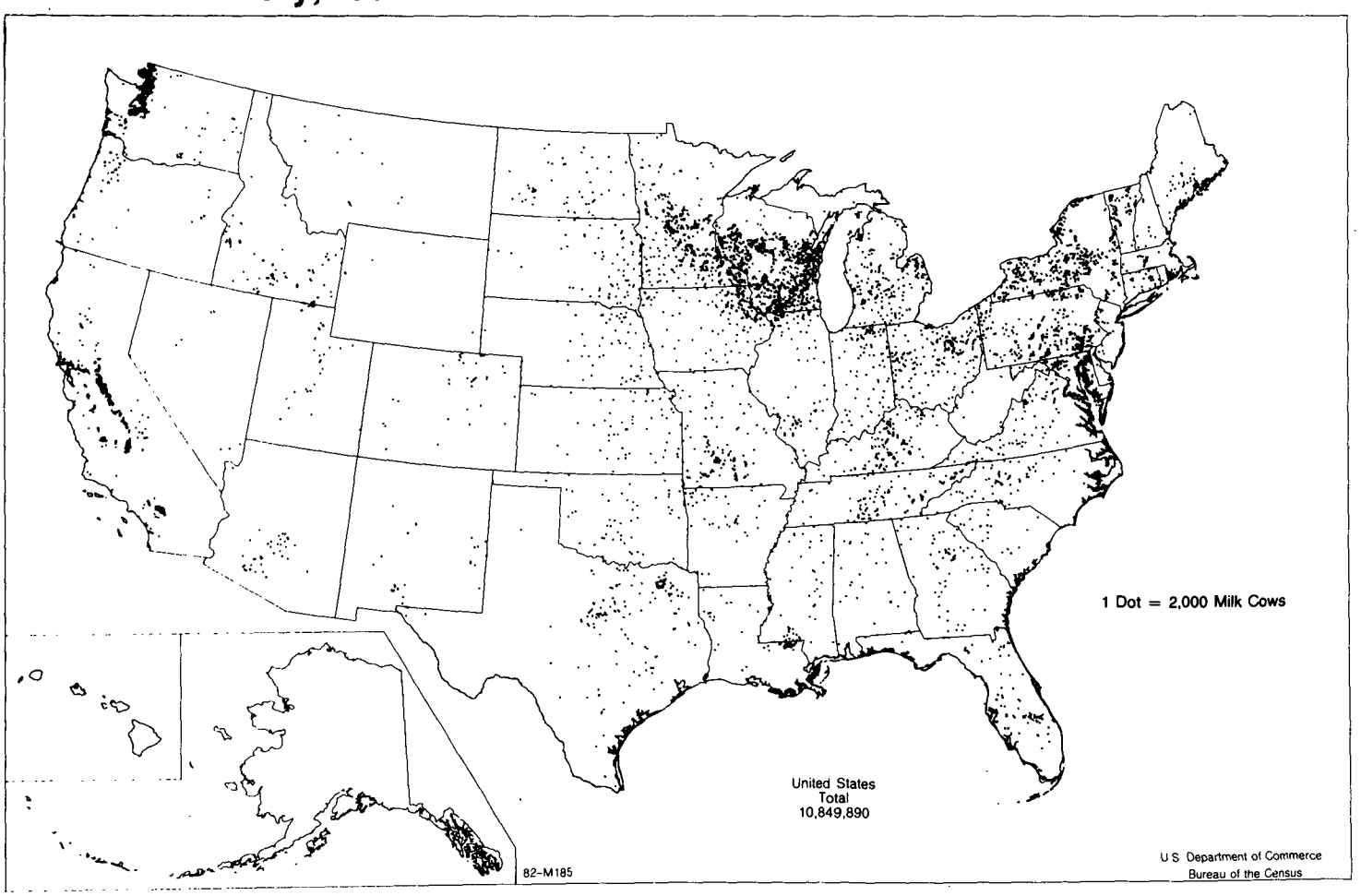
Structure

The number of farms with milk cows declined from 2.8 million in 1955 to about 205,000 in 1989 (table 1). The number of milk cows declined from 21 million in 1955 to 11.1 million in 1975, and 10.1 million in 1989. A 144-percent increase in milk production per cow enabled production to more than keep pace with commercial needs over the 1955-89 period.

Along with the aggregate structural changes, regional shifts in milk production from the more traditional dairy areas of the Upper Midwest and Northeast to the West and Southwest have been observed. The shift began about three decades ago and has

Figure 1

Milk cow inventory, 1982



1982 CENSUS OF AGRICULTURE

Table 1--Dairy industry changes, 1955-89

Item	1955	1975	1989	Change per year 1955-75	Change per year 1975-89
		Thousand		Percent 1/	
Cows	21,044	11,139	10,127	-3.1	-0.7
Farms with milk cows	2,763	444	2/205	-8.7	-5.4
		Number			
Average cows per farm	8	25	49	5.9	4.9
		Pounds			
Milk per cow (annual)	5,842	10,360	14,244	2.9	2.3
		Million pounds			
Total milk production	122,945	115,398	145,252	-.3	1.7

1/ Compound annual rate.
2/ Commercial dairy farms (farms with 10 or more milk cows) are estimated at around 160,000 in 1989 with an average of around 65 cows per farm.

Source: U.S. Dept. Agr.

accelerated in the last 20 years. Wisconsin is still far ahead as the number one milk producing State, but California is closing the gap. Population is shifting from the "frostbelt" to the "sunbelt" and may explain part of the milk production shifts. However, other factors, such as a milder climate requiring less overhead in buildings, better control of hay and forage quality, and specialization in strictly milking and managing cows, may be important factors. In addition, the large drylot operations of 1,000 cows or more seem to show economies of specialization allowing more intensive use of facilities and thereby reducing overhead costs.

The size distribution of dairy farms has changed over the last three decades (table 2). In 1959, 86 percent of the farms with milk cows had fewer than 20 cows. By 1987, only 33 percent fell in this category and they had only 3 percent of the milk cows. In contrast, only 7,172 farms (0.4 percent) had 100 or more cows in 1959, but in 1987, about 10 percent of the herds were in this category and had 42 percent of the milk cows. The average herd

size on all farms with milk cows was 50 in 1987. The average herd size on farms with 5 or more cows was 63 (app. table 1).

If only herds with 5 or more milk cows are considered as commercial dairy farms, 57 percent of the commercial dairy farms had between 5 and 50 milk cows and had 26 percent of the total commercial dairy cow herd in 1987. In contrast, commercial dairy herds with 200 or more milk cows represented about 3 percent of the total commercial herds, but had 24 percent of the commercial dairy cows.

In the Southwest (Arizona and California), 28 percent of the commercial herds had 500 or more cows and accounted for 64 percent of the total cows in commercial dairy herds (app. table 1). In contrast, only 3 percent of the cows in herds with 5 or more cows were in commercial herds of 200 or more cows in the Lake States (Minnesota and Wisconsin), while 82 percent were in the 20-99 category.

Herd size reflects only the size of the dairy enterprise, not the size of the whole farm operation. In the Southwest, for example, most farms specialize only in milking cows. Most feed (both forage and concentrate) is purchased, with much of the forage in the region produced under irrigation on specialized hay-producing farms. In other regions, where herds are smaller, a larger proportion of the feed is grown on the farm and other farm enterprises are important to the overall farm operation. Some

Table 2--Farms reporting milk cows and number of cows, by herd size, selected years 1/

Herd size (cows)	1959	1964	1969	1974	1978	1982	1987
Farms reporting milk cows (number):							
1-19	1,706,395	947,236	402,022	224,277	167,840	166,078	65,678
Percent	85.9	77.2	64.1	55.5	50.3	41.8	32.5
20-49	242,733	228,911	171,996	118,706	101,195	88,548	67,622
Percent	12.2	18.7	27.4	29.4	30.4	31.9	33.5
50-99	30,018	40,549	42,426	46,266	48,138	53,334	48,310
Percent	1.5	3.3	6.7	11.5	14.4	19.2	23.9
100 plus	7,172	9,622	11,059	14,505	16,312	19,650	20,335
Percent	.4	.8	1.8	3.6	4.9	4.1	10.1
Total	1,986,318	1,226,318	627,503	403,754	333,485	277,610	201,945
Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Milk cow numbers (1,000 cows):							
1-19	NA	4,489	2,165	1,072	735	538	347
Percent		28.7	17.6	10.1	7.1	5.0	3.4
20-49	2/ 13,831	6,832	5,315	3,793	3,300	2,949	2,301
Percent	2/ 82.2	43.6	43.2	35.6	31.9	27.2	22.9
50-99	1,785	2,571	2,700	2,973	3,121	3,474	3,169
Percent	10.6	16.4	22.0	27.9	30.1	32.0	31.5
100 plus	1,208	1,768	2,112	2,817	3,199	3,875	4,254
Percent	7.2	11.3	17.2	26.4	30.9	35.8	42.2
Total	16,824	15,660	12,292	10,655	10,355	10,836	10,071
Percent	100.0	100.0	100.0	100.0	100.0	100.0	100.0

NA = Not available.
1/ Does not include Alaska and Hawaii. 2/ Herd size 1-49.
Source: Derived from published U.S. Census of Agriculture data.

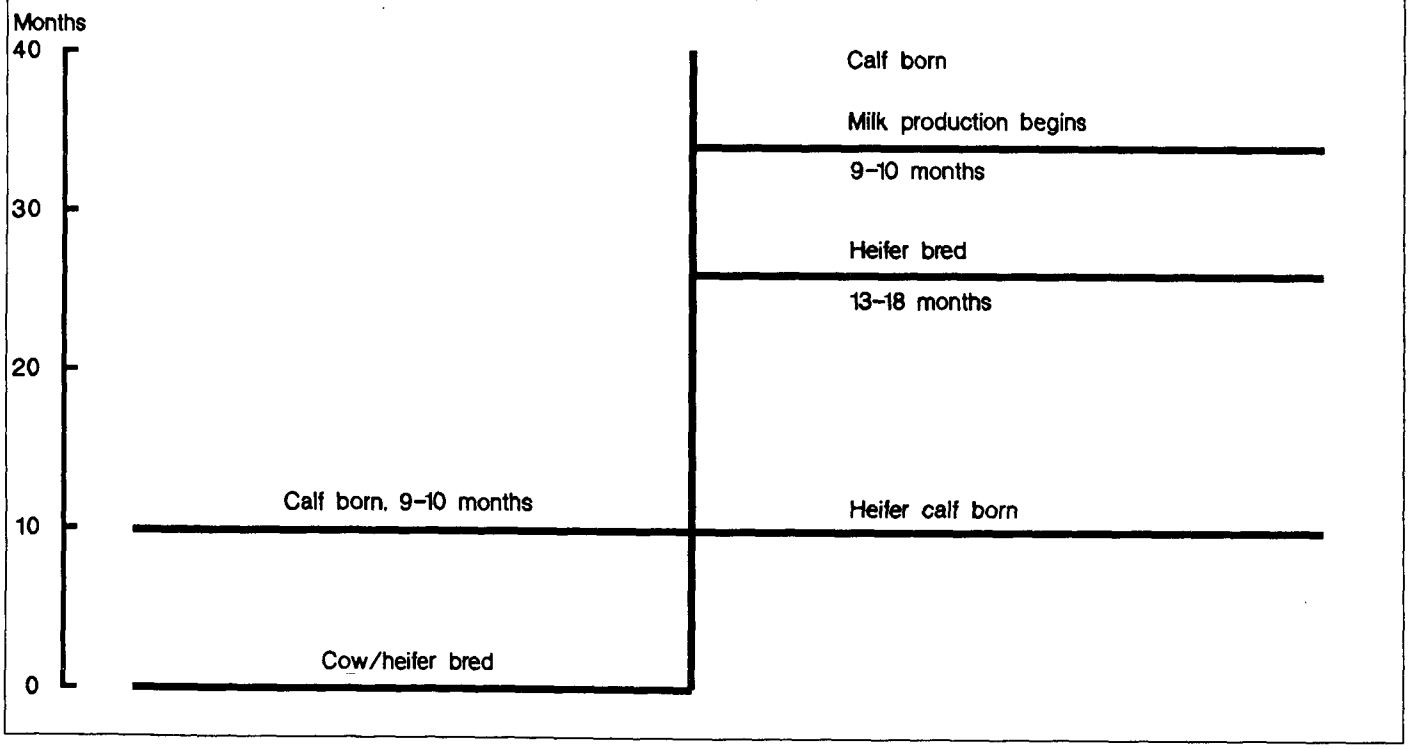
dairy farmers in these regions expand herd size and specialize the dairy enterprise by shifting from grain to forage production and purchasing more of their concentrates.

Supply Adjustment

Major expansion of the milk supply is a long-term process, mainly because of biology. It takes an average of 27 months from birth until a heifer enters the milking herd (fig. 2). Contraction of milk supply is also a relatively slow process, impeded by the heavy fixed investment in specialized facilities and lack of alternative farm opportunities and off-farm employment for dairy farmers in some major dairy areas such as Wisconsin and the Northeast. Changes in feeding and culling rates can alter milk production to only a limited extent. These production lags make milk supply relatively unresponsive to price changes over periods of less than a year.

The milk supply is more responsive to price changes in the long run. Most of the inputs--feed concentrates, labor, and equipment--can be acquired in greater volume for dairy production at modestly higher prices. High-quality forage appears to be an exception and a limiting factor for expanding milk production in some areas.

Figure 2
Dairy sector biological lags



In the long run, a 10-percent change in farm milk price would change milk production about 5 percent in the same direction. The adjustment seems to be spread over a 4-year period, with very little change occurring during the year of the price change. During periods of milk price increases, U.S. milk production can be expected to increase 6 percent for every 10-percent increase in farm-level milk prices. However, when milk prices are decreasing, U.S. milk production can be expected to decrease only 4 percent for every 10-percent decrease in the farm milk price. Considerable regional variation exists, ranging from a change of 3 percent in the Southwest to 7 percent in the Southeast assuming a 10-percent change in price. The traditional dairy regions of the Northeast and Upper Midwest are close to the national average.

Two major implications for U.S. dairy price support policy are that: (1) most of the supply adjustment occurs in the first and second year after a price change, not in the year of the change; and (2) with decreasing prices, it takes more time to achieve a supply/demand balance.

Revenues, Costs, and Returns

Dairy enterprise returns above cash expenses and replacement costs are estimated to be $0.98 per cwt of milk in 1989 compared with $0.87 in 1988 and $1.56 in 1986 (app. table 3). Total cash expenses are estimated at $11.84 per cwt in 1989, compared with $10.92 in 1988 and $10.29 in 1986. Feed costs, normally about 50 percent of cash expenses, increased to $6.55 per cwt in 1989 (55 percent of cash expenses), compared with $5.89 in 1988 and $5.06 in 1986. The relatively high feed costs in 1988 and 1989 are primarily the result of the 1988 drought.

Returns consist of all current cash receipts generated from producing and marketing both milk and secondary products. Gains or losses occurring from asset appreciation or reduction are not included. Cash receipts are a function of both price (which may be heavily influenced by Government programs) and production per cow. Receipts from secondary products typically include items such as the sale of breeding or culled livestock.

Cash expenses consist of both variable expenditures (those incurred only when production takes place in a given year) and fixed expenditures (items including taxes, insurance, overhead, interest, rent, and leasing costs for which the operator or landlord would be responsible whether or not production occurs). Replacement costs represent an imputed charge sufficient to maintain average machinery, equipment, and purchased breeding livestock investment and production capacity through time. The replacement charges are based on current prices of these capital assets.

Cash expenses are influenced by Government programs and policies. For example, the feed grain program affects the cost of dairy feeds. The availability of water at an affordable price affects the cost of forage in some regions, especially in irrigated

western regions. Conservation and disaster relief programs also affect the dairy farmer. Agricultural credit policy can affect interest rates as well as availability of credit for entry into dairying or expansion of an existing operation. Federal and State tax policy can also affect entry, expansion, or renovation decisions. Decisions of nonfarm investors are especially influenced by tax policy. Also, macroeconomic policy decisions, as they affect interest rates and agricultural trade, are becoming increasingly important to the well-being of dairy farmers and to agriculture in general.

A recurring problem of dairy programs is that benefits are often capitalized into asset values, especially cattle. An example of relatively high net returns, associated with the capitalization of program benefits into asset values, is the rise in replacement dairy cow prices to over $1,000 in 1979 from under $700 in 1978 and even lower prices in prior years (table 3). The difference between dairy cow prices and slaughter cow prices increased from $233 in 1978 to $443 in 1979.

This difference reached a peak of nearly $700 in 1981, and then declined in the mid-1980's as the supply of replacements expanded coupled with dairy farmers facing lower immediate and anticipated returns. Both dairy cow prices and slaughter cow prices increased again in the late 1980's.

Some entering dairy farmers, and those who expanded their dairy operations substantially during the late 1970's period of relatively high dairy cow prices, probably faced financial difficulty as the industry came closer to a workable supply-demand balance. This capitalization phenomenon also causes problems in costs and returns analyses and in attempts to assess industry well-being.

Another factor in the persistence of excess milk supplies in the 1980's was the apparent increase in dairy productivity and the willingness of U.S. dairy farmers to produce more milk in spite of lower real (adjusted for inflation) prices (fig. 3). One effect of this phenomenon is that it has made the U.S. dairy industry more competitive in world markets. A key question for the 1990's is whether these milk supply shifts will continue. The drought of 1988 and wet weather conditions in parts of the country in early 1989 both adversely affected forage quality and milk production per cow. However, given normal weather conditions and the likely emergence of new technology such as bovine somatotropin (bST), the trends initiated in the 1980's are likely to continue.

Emerging Production Issues

A major emerging issue related to milk production is the use of bovine somatotropin (bST). bST is a naturally occurring protein in dairy cattle which has been linked to milk production. Recombinant DNA technology has made the production of a synthetic bST possible at reasonable cost. Herd trials have shown that

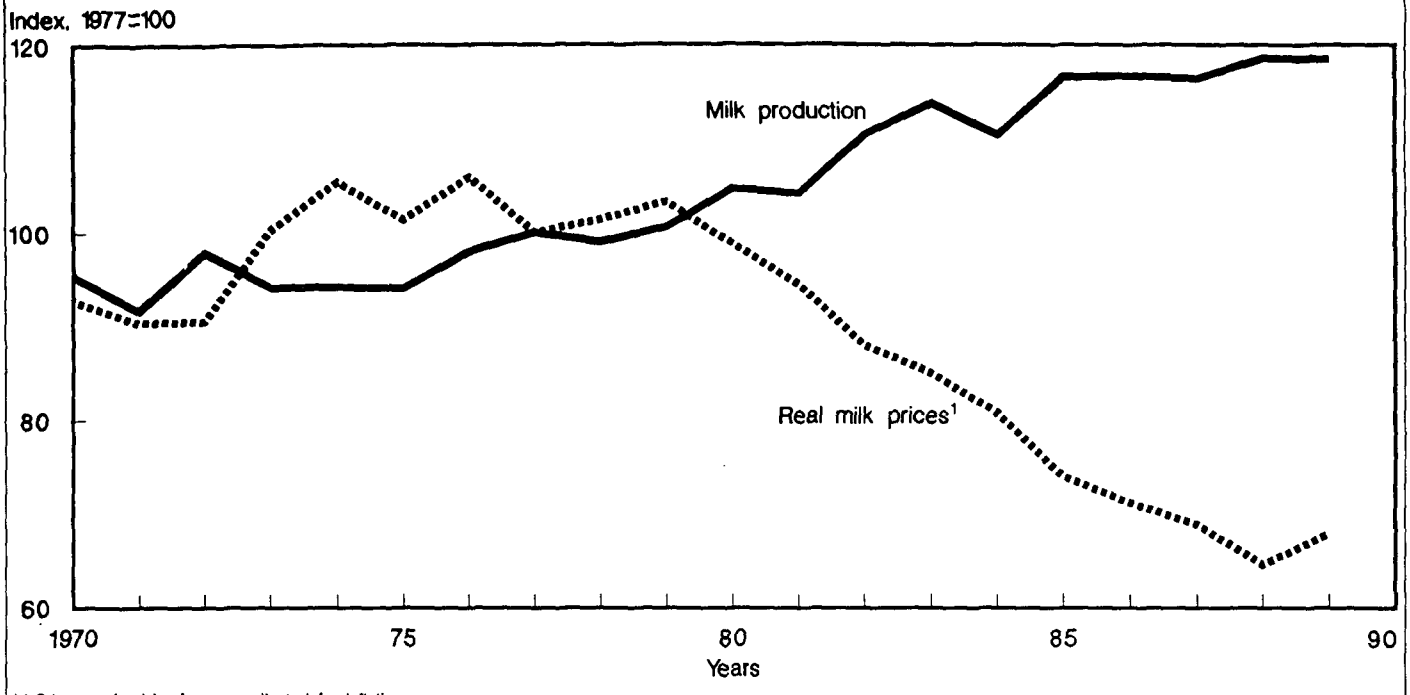
Table 3--Dairy cow and slaughter cow prices, 1970-89

Year	Dairy cow prices 1/	Slaughter cow prices 2/	Difference between prices of dairy & slaughter cows
		Dollars per head	
1970	332	256	76
1971	358	259	99
1972	397	303	94
1973	496	394	102
1974	500	307	193
1975	412	253	159
1976	476	304	172
1977	504	304	200
1978	674	441	233
1979	1,044	601	443
1980	1,195	549	646
1981	1,201	503	698
1982	1,100	480	620
1983	1,020	472	548
1984	895	478	417
1985	861	460	401
1986	821	446	375
1987	917	538	379
1988	986	567	419
1989	1,027	589	438

1/ Price per head received by farmers. Agricultural Prices. U.S. Dept. Agr., National Agricultural Statistics Service, various issues.

2/ Hundredweight price of utility cows at Omaha times 12 cwt per cow. Livestock, Meat and Wool Market News: Weekly Summary and Statistics. U.S. Dept. Agr., Agricultural Marketing Service, various issues.

Figure 3
During the 1980's, farmers continued producing more milk even as real prices declined



1/ Price received by farmers, adjusted for inflation.
Source: Dairy Situation and Outlook, DS-414, U.S. Dept. Agr., Econ. Res. Serv., Apr. 1988.

injections of bST increase milk production. The increased milk production is not without costs; additional nutrients and more management expertise are required to obtain the most benefits from bST. Studies suggest that even with additional feed and management costs, dairy farmers can obtain more milk at less cost per cwt using the product.

bST is the latest in a series of output-enhancing and cost-reducing technologies in the dairy industry. The bulk tank, improved parlor designs, automatic feeding systems, artificial insemination, DHIA (dairy herd improvement associations), embryo transfers, and 3X (three times per day) milking have all contributed to increased production and reduced milk production costs. The major difference in the case of bST is its biotechnological origin, and its appearance at a time when the industry had just come out of a lengthy debate concerning surplus milk production.

As of January 1990, bST was not yet commercially available. The Food and Drug Administration (FDA) must certify the safety and efficacy of the product prior to commercial release. Safety of milk and meat consumption by humans as well as safety of bST use on cows, in the environment, and in bST manufacturing must be assured. As of this time, only the safety of meat and milk consumption from bST-treated cows has been determined. Completed review of the product is likely in the early 1990's.

There is much debate as to the need for a product such as bST. Some farmers, consumer groups, dairy cooperatives, and State legislators have taken stands opposing bST. National policymakers have also expressed some concerns. Economic analyses of the effects of the product are, by necessity, speculative. Analyses over time suggest that the impacts on the industry will be more modest than early studies suggested. As the latest in a long series of technological advances in the industry, bST reinforces, but does not fundamentally change, long-term trends in the dairy industry.

Demand for Dairy Products

Milk demand is comprised of the purchases of many products, primarily fluid milk, cheese, butter, and nonfat dry milk. In periods when the industry is near a supply-demand balance, about half of the milk supply is used in fluid milk products and the remainder in manufactured dairy products. The roles of the various dairy products in the diet differ as to trends in their use. Thus, the demand for raw milk depends on both the product mix at a given time and the demand characteristics of individual products.

Changes in Commercial Use

Per capita commercial use of all dairy products has shown little change since 1970 (app. table 5). This is in contrast to the downward trend of more than 1 percent per year during the 1960's. Total commercial disappearance in 1988 was 26 percent greater than in 1970, primarily due to increased population. Per capita fluid milk sales have decreased by an average of 2.7 pounds (about 1 percent) per year, reflecting an annual 6.5-pound average drop in whole milk use partially offset by a 3.8-pound increase in sales of lowfat milk.

The downtrend in fluid milk sales was accelerated during the 1970's and 1980's by changes in the age distribution of the population. The population bulge resulting from the post-World War II baby boom has moved beyond the peak milk-consuming ages to the lowest consuming age bracket. Consumers began shifting from whole milk to lowfat milk in the early 1960's. In 1970, lowfat milk accounted for 19 percent of fluid milk sales and by 1988 it reached 53 percent. The past erosion of the fluid milk market has been fairly steady despite declining relative milk prices. However, demographic shifts indicate that the rate of decline in use per person might slacken.

Growth in commercial cheese use has been very important to the dairy industry over the past 25 years. Cheese production has used more than a fourth of the market supply of milk in recent years, compared with less than an eighth in 1960. Per capita consumption of American cheese grew about a fourth of a pound each year during 1970-88, while consumption of other varieties rose about half a pound per year. Over half the growth in sales of other cheese varieties (about a third of the total growth) came from mozzarella, used in making pizza. Most of the

expansion in cheese sales has been in natural forms; per capita sales of processed cheese items have risen only slightly.

Among the attributes of cheese that appear to be aligned with changing life-styles are convenience in use, the range of flavors and textures, storability, and affordability. Increased consumption of food away from home, such as pizza and salads, has also increased cheese sales. Acceptable alternative cheeses have been developed for consumers concerned about the high fat or salt content of some traditional varieties.

Demand for butter appears to have stabilized since the early 1970's after declining for decades. Changes in use over the past two decades seem to have been related mostly to changes in butter prices relative to margarine. Per capita sales will most likely be fairly stable at slowly declining relative prices. Both butter and cream demands are potentially vulnerable to concerns raised by recent dietary studies.

Progressive replacement of butter by margarine has apparently ended. Since 1974, market shares of butter and margarine have fluctuated but have shown little trend. Civilian per capita butter consumption appears to have stabilized at about 4.5 pounds and margarine at about 10.5 pounds. Butter sales, however, are still sensitive to relative prices of the two products.

Commercial use of nonfat dry milk has decreased. Per capita sales in 1988 were less than half those of 1970. Sharp declines were registered for almost every significant end use.

While nonfat dry milk sales have declined, production and use of whey products--particularly whey protein concentrates--have expanded. Increased cheese production and environmental regulations that limit whey disposal have combined to enable whey protein concentrates to fill the role (formerly held by nonfat dry milk) of an inexpensive source of very high quality protein. Increased demand for whey products has only a minor impact on overall milk demand since it primarily involves recovery of milk components not currently used.

Since 1970, per capita use of ice cream has remained unchanged, while per capita sales of ice milk and sherbet have slipped slightly. Use of mellorine (frozen dessert made with vegetable oil) has decreased substantially.

The Dairy and Tobacco Adjustment Act of 1983 authorized a dairy product promotion and research program. It is designed to strengthen the dairy industry's position in the marketplace and to maintain and expand domestic and foreign markets and uses for U.S. fluid milk and dairy products. The program is funded by an assessment of 15 cents per cwt on all commercially marketed milk. Collections under the program for 1988 totaled approximately $215 million.

Consumption Response to Changes in Prices and Incomes

Dairy product sales respond relatively little to price changes, at least in the short run. A 10-percent decline in retail prices will increase sales of fluid milk by only about 2 percent. Butter and cheese sales would increase the most, perhaps 7-8 percent, with other products falling in between. Total commercial use would be expected to rise about 3 percent if retail prices fell 10 percent.

This low level of shortrun demand response to price changes (price inelasticity) has several ramifications. First, small variations in milk output will result in substantial price movements as long as prices are determined by the market. Second, total consumer expenditures for dairy products vary directly and almost proportionately with price level. For example, a 10-percent increase in retail prices will result in a decrease in consumption of 3 percent and an increase in consumer expenditures of about 7 percent. Third, the small consumer responses to price are difficult to observe because they can easily be veiled by demographic changes, changes in consumer preferences, and other factors. According to economic theory, consumers are more responsive to prices in the long run than in the short run.

Some dairy products are affected more by incomes and general economic conditions than others, although the effects are relatively small in all cases. In general, fluid milk sales are not changed significantly by income changes. Butter consumption and cheese consumption are both positively related to income, but the effect is small. Sales of both of these products in recent years have varied with the state of the economy.

Substitute Products

Substitute dairy products have significantly affected demand for butter and, to a lesser extent, cheese. Margarine had taken most of the table spread market by the early 1970's. More recently, imitation cheese (cheese made with vegetable fat and casein) had absorbed part of the growth in the cheese market. Census of Manufactures data indicate that cheese substitutes (products substituting for natural and processed cheese) totaled 449.4 million pounds in 1987, compared with 227.1 million pounds in 1982. This was about 8 percent of total cheese production in 1987 and 5 percent in 1982.

Other substitute products have had only slight effects on dairy product demand. Whipped toppings and coffee whiteners have significant markets but cream sales have grown slightly since the introduction of these substitutes. Sales of products such as filled and imitation milk, vegetable fat frozen desserts, and filled evaporated milk have fallen after some initial success.

Processing

The dairy processing industry has undergone marked change in recent decades, with substantial gains in efficiency and reductions in real costs. Changes in the industry in recent decades include: fewer but larger plants, increased importance of producer cooperatives, and regional shifts precipitated by population shifts and shifts in milk production in excess of fluid sales. The number of plants producing cottage cheese and butter dropped over 90 percent from 1950 to 1988. Hard cheese and ice cream plants declined by approximately three-fourths and nonfat dry milk plants by over 80 percent (table 4). In 1988, average output per plant was over 15 times the 1950 level for butter and cheese, about 7 times for nonfat dry milk and ice cream, and 18 times for cottage cheese. Automation and technological advances, such as continuous churns, have increased economies of size in processing. However, changes in assembly and distribution costs were probably of equal importance.

Dairy producer cooperatives have become an important part of the manufactured dairy products sector. Between 1973 and 1987, cooperatives' share of total production rose from 35 to 45 percent for cheese and from 85 to 91 percent for dry products, while increasing from 60 to 83 percent for butter. Cooperatives' share of fluid products and cottage cheese stabilized at about 14 percent and 13 percent, respectively, while their share of ice cream was about 8 percent in 1987 (app. table 6).

Important factors underlying the increased role of cooperatives include the transfer of the fluid milk procurement and daily and seasonal balancing functions to cooperatives, a perceived need for cooperatives to assure members of an outlet for all their milk, a desire to control more of the value added to milk, and the tendency of large traditional dairy corporations to specialize in dairy merchandising and to diversify into other

Table 4--Number of dairy product manufacturing plants, selected years

Product	1950	1970	1980	1983	1988
			Number		
Hard cheese	2,158	963	737	696	573
Butter	3,060	622	258	222	165
Nonfat dry milk (human food)	459	219	113	101	76
Hard ice cream	3,269	1,628	949	862	765
Cottage cheese curd	1,900	593	269	240	185

Source: Dairy Products, Annual Summary. U.S. Dept. Agr., National Agricultural Statistics Service, various issues.

products. As indicated above, cooperative integration into fluid and soft manufactured products has been considerably more modest.

Supermarket chains have also increased their manufacturing capacity, with fluid milk processing increasing from 3 percent of total sales in 1964 to almost 18 percent in 1980. Their share of relatively modern capacity is considerably higher, but food chain involvement in fluid milk processing seems to have declined somewhat since 1980 as a result of a few chains selling off bottling plants.

The dairy industry moved from a relatively well-balanced supply-demand situation in 1978, when dairy product removals by the Commodity Credit Corporation (CCC) were 2.3 percent of total milk marketings, to a point where over 12 percent of U.S. milk marketings were purchased by CCC in 1983. From 1984 through 1989, the average was 6.8 percent (app. table 7). In the process of generating excess milk supplies, both the milk production and processing sectors attracted additional fixed resources which increased capacity. In the mid-1980's, a financial and structural adjustment was necessary, especially in the milk production and manufactured dairy products industries, to achieve an overall supply-demand balance.

Structural adjustment especially affected the manufactured dairy products industry. Excess capacity developed because fluid milk consumption remained relatively stable while total milk marketings increased from 119 billion pounds in 1978 to nearly 143 billion pounds in 1989. The effect has varied across regions since the buildup of milk supplies was not geographically uniform. The Southeast, Corn Belt, and Plains regions increased production relatively little compared with the major milk production States of New York, Pennsylvania, Wisconsin, and California. Milk production generally shifted toward the West and Southwest, especially California.

Limited plant capacity curtailed expansion of milk production in California during the early 1980's. However, even though large quantities of California butter, nonfat dry milk powder, and cheese were sold to the CCC, a high proportion of cheese consumed in California was imported from out-of-State, especially from Wisconsin. The California dairy industry has since moved to increase its cheese manufacturing capacity. In turn, California milk production increased 43 percent from 1980 to 1989, while U.S. milk production increased 12 percent over this same period.

Milk production shifts and aggregate levels cause some adjustment problems for the fluid milk processing industry in some regions, but the manufactured dairy products industry is generally affected the most. This is because fluid milk product sales are fairly stable, accounting for about half of overall milk supplies. Therefore, reductions/increases in milk production will result in drops/jumps of twice that proportion in milk supplies available for processing into manufactured dairy products.

Trends in World Dairy Trade

International trade of agricultural commodities is under continual debate. But the current round of multilateral trade negotiations under the auspices of the GATT (General Agreement on Tariffs and Trade) has made agricultural trade a high-priority issue.

Every major developed dairy-producing nation operates government programs regulating its domestic dairy industry. Many subsidize part or all of domestic production, imports are commonly restricted, and exports are frequently subsidized. There have been significant strides taken in some major producing countries to address dairy industry problems in the last several years, mostly to reduce the burdens of excess milk supplies and the associated costs to government of handling the excess. The implementation of production quotas in the European Community (EC-12) in 1984 and legislation authorizing the milk diversion program and the dairy termination program in the United States are examples of alternative approaches for attacking the excess supply issue. In addition to the voluntary supply management programs, the United States implemented a flexible dairy price support mechanism.

Dairy trade is small relative to total world milk production. World milk production in 1988 was approximately 430 million metric tons, an estimate that covers about 90 percent of world production. From 1985 to 1988, world production grew by just over 3 percent. If intra-EC trade is excluded, about 5 percent of world production (milk equivalent) is traded, a world market slightly greater than 40 percent of 1988 U.S. milk production.

High dairy price supports in many countries tended to stimulate production to the extent that subsidized exports were required to maintain domestic dairy programs. The subsidized sale of butter by the EC to the Soviet Union is one example. The implementation of production quotas in the EC in 1984, which did not lower price supports, dramatically reduced the world's largest dairy product surpluses.

From 1985 to 1988, exports of the three major manufactured dairy products--butter, cheeses, and nonfat dry milk (NFDM)--were made primarily by countries with high dairy price support: the EC, other Western European nations, Canada, and the United States (table 5). An interesting feature of the data is that although surpluses of dairy products have been reduced in the European Community, it is still the major exporting area for the three major manufactured dairy products. U.S. participation in international markets, based on export shares, has fallen as butter and NFDM exports have declined.

As a result of export subsidies, international prices for manufactured dairy products were below what they would have been

Table 5--Average exports and market shares for butter, cheese, and nonfat dry milk, 1984-88

Item	Butter			Cheese			Nonfat dry milk		
	1984-85	1986-87	1988	1984-85	1986-87	1988	1984-85	1986-87	1988
	1,000 metric tons								
Average annual exports 1/	853	902	1,050	858	811	830	1,186	1,144	1,206
	Percent								
Shares: 1/									
EC 2/	45	51	57	48	45	46	26	29	51
Other Western Europe	5	4	3	20	19	18	5	4	2
United States	8	4	2	3	3	2	31	35	16
Canada	*	*	0	1	1	1	6	5	5
New Zealand	25	25	23	7	8	13	20	16	15
Australia	2	9	5	11	12	9	6	7	6
Total	88	93	90	90	88	88	94	96	96

*=Less than 0.5 percent.

1/ Excluding intra-EC trade.

2/ EC-10 in 1984-85, expanded to EC-12 in 1986 with inclusion of Portugal and Spain.

Source: World Dairy Situation. Circular Series FD 2-89. U.S. Dept. Agr., Foreign Agricultural Service, Nov. 1989.

in the absence of such subsidies. As surplus products available for exports have declined, international prices have strengthened considerably (table 6). The announced government purchase prices by the CCC in 1988 for butter, $2,900 per metric ton, and cheese, $2,540 per metric ton, were closer to international prices than in previous years. The U.S. price of $1,600 per metric ton for NFDM was actually below the international price which resulted in the commercial export of NFDM without government assistance.

Restrictive import quotas have been used by the United States to prevent lower cost and subsidized dairy products from undercutting U.S. dairy price supports. The import quotas on manufactured dairy products, which have essentially been fixed since the Tokyo round of GATT, limit imports to about 2.5 billion pounds milk equivalent, just under 2 percent of U.S. milk production in 1989. Under restrictive import quotas, consumers pay more for all dairy products than they would under lesser restrictions. The dairy product quotas, authorized by Section 22 of the Agricultural Adjustment Act of 1933, as amended, may be implemented, adjusted, or eliminated only by the President, usually based on the findings and recommendations of the International Trade Commission (ITC).

Imports of butter, NFDM, and American-type and processing cheeses compete directly with domestically produced products and displace

Table 6--International prices for butter, cheese, and nonfat dry milk, f.o.b. Northern Europe and selected world ports

Period	Butter	Cheese	NFDM
	U.S. dollars per metric ton		
1985:			
Spring	950-1,050	1,100-1,250	600-680
Fall	1,000-1,050	1,150-1,275	600-650
1986:			
Spring	1,050-1,150	1,100-1,200	680-720
Fall	800-1,100	1,000-1,100	680-720
1987:			
Spring	750-1,100	900-1,200	760-840
Fall	900-1,150	1,000-1,300	890-1,150
1988:			
Spring	1,150-1,350	1,250-1,500	1,150-1,550
Fall	1,350-1,500	1,800-2,050	1,750-2,050
1989:			
Spring	1,650-1,900	1,750-1,950	1,750-2,000
Fall	1,800-2,000	2,000-2,150	1,750-1,900

Source: World Dairy Situation. Circular Series FD2-89. U.S. Dept. Agr., Foreign Agricultural Service. Nov. 1989.

them roughly pound-for-pound. Specialty cheese, the bulk of U.S. dairy product imports, compete less directly with domestically produced cheeses. It is unlikely that restricting imports of some specialty cheeses would result in increased sales of similar domestically produced cheeses of the same magnitudes.

Imports of casein are problematic. For some food products, there is direct substitution of imported casein for domestically produced dairy products such as nonfat dry milk. Restricting casein imports which enter nonfood uses--for example, glue and paint production--would not contribute to an increase in demand for U.S. domestic dairy products because there is no casein production in the United States and other dairy products are not good substitutes for casein in industrial uses.

Policy actions by major developed dairy-producing nations affect the international dairy trade more than any "market" determinations. The small size of international trade relative to the domestic dairy industries of these countries contributes to the dependence. The environment generated by the current multilateral trade negotiations has in turn led to a situation where the debate on U.S. domestic dairy policy and programs will include both domestic and international issues more than ever before.

International Trade Outlook

The current situation in international dairy markets owes much to the policy actions of two of the major developed dairy-producing areas: the European Community (EC-12) and the United States. The implementation of production quotas in the EC-12 and the implementation of voluntary supply management programs and a flexible dairy support mechanism in the United States led to reduced stocks in both areas. As stockpiles decreased, international prices strengthened to the extent that the United States was able to export dairy products, particularly nonfat dry milk, on a commercial basis (with no Government subsidy).

The rather sudden availability of an international market for U.S. dairy products added a certain amount of volatility to the domestic industry. With a continuation of program provisions implemented under the 1985 Act, the United States would periodically have commercial export opportunities. Those opportunities would depend to a large extent on the maintenance of export "discipline" on the part of the EC-12. Even if domestic supply shifts in the United States were to ease, the international prices for dairy products would provide a realistic floor under domestic U.S. prices.

History of Dairy Programs

The U.S. dairy industry, while subjected to more Government participation or regulation than most other domestic agricultural industries, is less regulated than the dairy industries in many other developed countries. The price support program authorized by the Agricultural Act of 1949 and the Federal milk marketing order program authorized by the Agricultural Marketing Agreement Act of 1937 are the principal domestic dairy programs. With relatively high support prices compared with world prices, and because exports are subsidized by many countries, import quotas are imposed to keep imports of dairy products from overwhelming the dairy price support program. Federal policy has also fostered the growth of dairy cooperatives to promote the balance of market power between dairy farmers and those who buy from them.

The Dairy Price Support Program

The dairy price support program supports the milk price received by farmers through purchases of butter, nonfat dry milk, and American cheese. Purchase prices for the products are set at levels designed to enable manufacturers to pay farmers the announced support price for milk in surplus production periods.

In the Agricultural Act of 1949 and subsequent amendments to that act, Congress specified three major guidelines for the operation of the price support program. First, it provided for minimum and maximum levels at which farm milk prices were to be supported based on parity price guidelines. For many years, the minimum support price was 75 percent and the maximum was 90 percent of

parity. (Legislation in 1981 departed from the parity concept for the first time and parity has not been used as a basis for establishing dairy price supports since then.)

Second, the program authorizes the Secretary of Agriculture to determine the specific price support level within the minimum and maximum prices specified in the legislation. The objective of the support program is to support the price of milk at a level that will assure an adequate supply of "...milk to meet current needs, reflect changes in the cost of production, and assure a level of farm income adequate to maintain productive capacity sufficient to meet anticipated future needs."

Third, the legislation specified that the price of milk would be supported through purchases of milk and milk products. Since milk is a bulky, perishable product, the Government cannot reasonably buy raw milk. Therefore, the U.S. Department of Agriculture, through the CCC, purchases all the butter, nonfat dry milk, and cheese offered by processors at announced prices. These products are widely produced and take about two-thirds of the milk used in manufactured dairy products. The prices received by individual dairy farmers depend upon many factors other than the support level, including plant location, product manufactured, quantity of milk delivered, local competition, and plant operating efficiency.

The purchase prices announced by the CCC for butter, nonfat dry milk, and cheese include "manufacturing (make) allowances" or margins to cover the costs of processing milk into these products. These margins are administratively set at a level which should allow processors to pay, on average, dairy farmers at least the announced support price for Grade B milk. Prices to farmers for manufacturing grade milk are free to move above the support level if supply and demand conditions warrant. This occurred in the short-supply portion of the marketing season of most years until 1980 and, at times, even during the flush season.

In 1989, manufacturing grade milk prices ran substantially above the support level. They were below the support level, however, during much of the early and mid-1980's. The short-supply season usually occurs in October and November when milk production reaches a seasonal low point and fluid product demand is seasonally highest. The flush season normally occurs in May and June when milk production reaches its seasonal peak and fluid milk product sales are declining seasonally.

The Food and Agriculture Act of 1977 provided that, for the 2 marketing years beginning October 1977, the Secretary would adjust the support price of milk semiannually after the beginning of the marketing year to reflect any estimated change in the parity index during the semiannual period. These provisions were extended in 1979 for 2 more years.

Before 1977, support prices were set annually for the upcoming marketing year. However, support prices during the mid-1970's