Chapter 2

Overview of the Dairy Industry

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The dairy industry is large, dynamic, and driven by a number of forces. Dairy products account for about 13 percent of total cash receipts from all farm commodities. In 1989, cash receipts from dairy products totaled $19.3 billion; only cattle and calves brought greater returns. Although milk is produced and processed in every State, two-thirds of the total 1989 milk supply was produced in 10 States (l). At least half of the total 1989 U.S. milk production came from Wisconsin, California, New York, Minnesota, and Pennsylvania.

A central feature of the dairy industry is the relatively constant 1.5 to 2.0 percent annual increase in output per cow (see figure 2-l). Exceptions have occurred only after major weather disruptions (leading to sharp increases in feed prices in the early 1970s and in 1989) and with changes in government policy (namely, the 1983-84 milk diversion program). This chapter describes the supply, demand, and regulatory forces driving the industry and the resulting policy issues for the 1990s.

FORCES DRIVING THE INDUSTRY

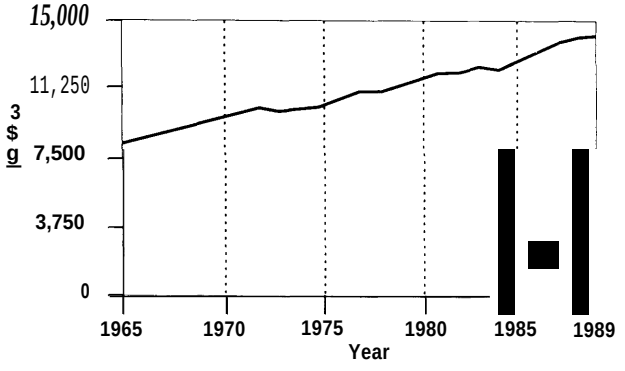
Technological Change

Increases in milk output per cow have not come automatically; they reflect the continuous adoption by farmers of artificial insemination, Dairy Herd Improvement Association (DHIA) recordkeeping, three-times-a-day milking, automated feeding, forage testing, and other technologies that periodically enter the market as products of public- and private-sector research and development. Productivity has also risen because of constant improvement in the quality of management, which in turn partially reflects improved packaging of technology to increase output per cow.

With milk consumption per capita growing less rapidly than output per cow, there has been a gradual national trend toward reduced cow numbers (see figure 2-2). This trend was interrupted in the early 1980s by government policy that supported the price of milk at 80 percent of parity in the face of declining feed prices.

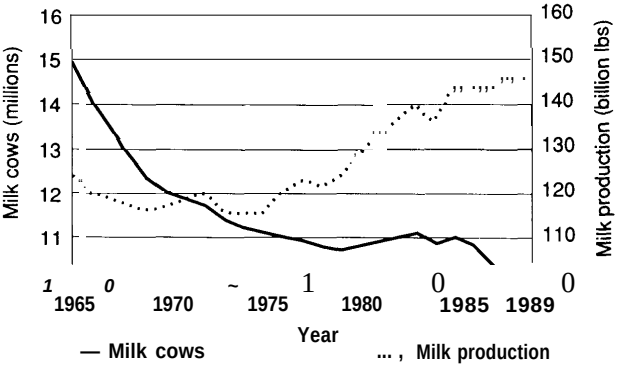
The U.S. Department of Agriculture (USDA), in reporting production statistics, divides the United States into 10 farm-production regions (see figure 2-3). Changes in output per cow have not been uniform nationally (see figure 2-4). For example, USDA's Pacific region had a milk output per cow of 18,389 pounds in 1988, whereas the U.S. average was 29 percent lower (14,213 pounds). The Pacific region's output per cow is 51 percent higher than that of the Appalachian region. While climatic conditions contribute to some of these differences, the main factors seem to be progressiveness, philosophy, and quality of management—factors that also are believed most directly to impact the adoption of

Figure 2-l—Annual Milk Output Per Cow, 1965-89



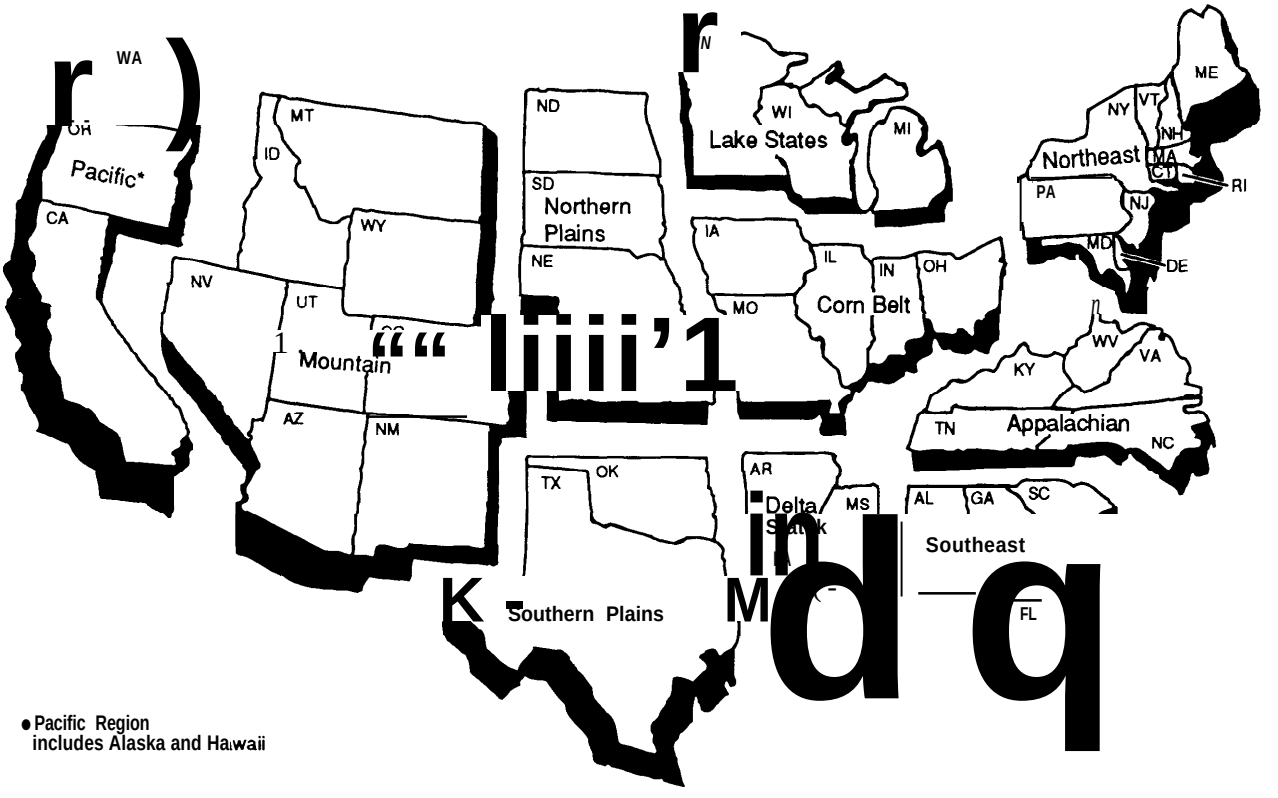
SOURCE: U.S. Department of Agriculture, Economic Research Service, *Dairy Situation and Outlook Report,* various years, 1965-1990.

Figure 2-2—Average Number of Milk Cows on Farms and Total-Milk Production, 1980-89



SOURCE: U.S. Department of Agriculture, Economic Research Service, *Dairy Situation and Outlook Report,* various years, 1965-1990.

Figure 2-3—USDA Farm Production Regions



SOURCE: U.S. Department of Agriculture, Economic Research Service, 1990.

technologies. These factors in turn are related to the availability of extension education services, consultants, and the infrastructure of input and technology suppliers. Success in technology adoption will be one of the major factors determining future milk production patterns. Other major factors impacting these patterns include dairy policies, environmental policies, water availability, population pressures, climate, and resource availability.

Economies of Size

Larger dairy farms, as a general rule, experience lower per-unit production costs. Studies currently in progress suggest that in traditional milk production regions, such as the Upper Midwest and the Northeast, economies of size (reduced per-unit production costs associated with increased farm size) have led to the establishment of several larger size dairy operations. And current research suggests that these dairy operations have the potential to realize even larger economies of size.

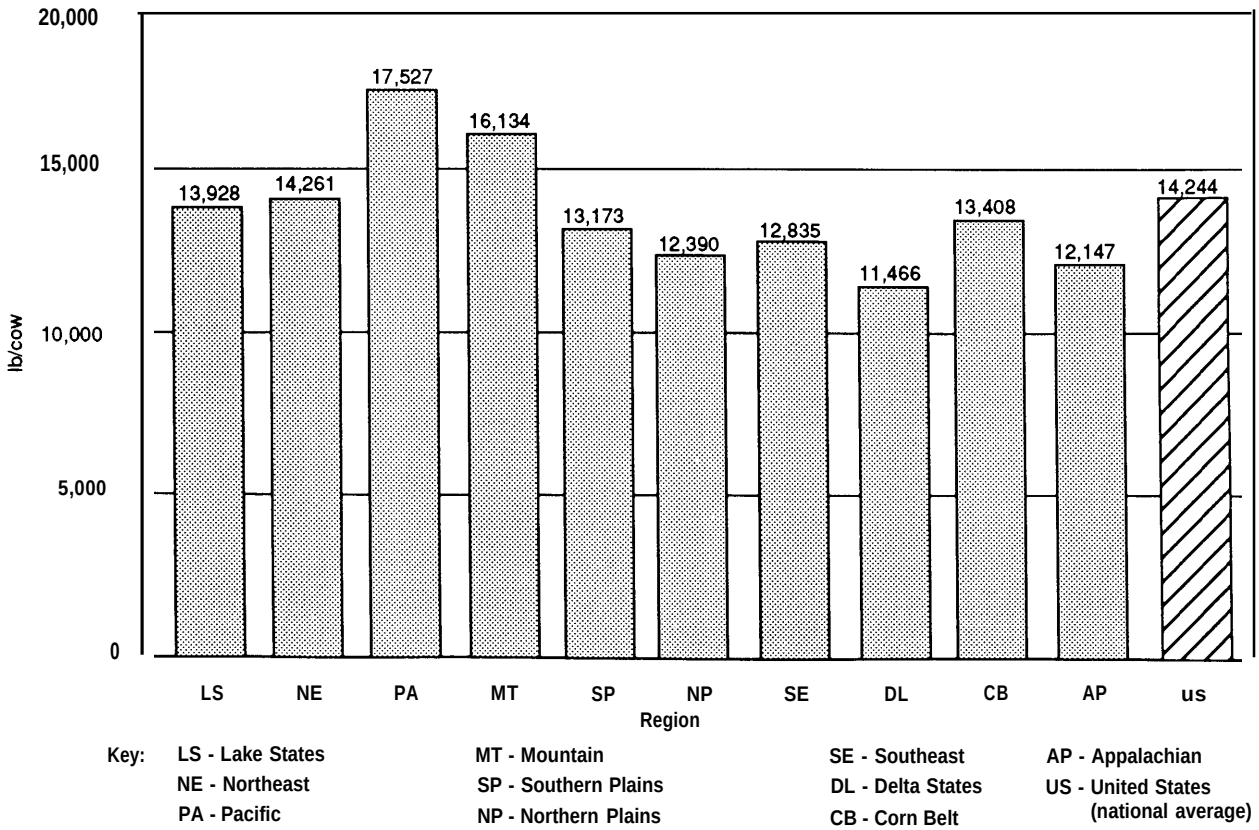
Regional differences in dairy herd size are associated with different economies of size (see figure 2-5). The Pacific coast and Florida lead the Nation with herd sizes typically in the 500- to 1,500-cow range and enjoy the lowest production costs per unit output. In traditional milk production regions of the Upper Midwest and Northeast, dairies are typically in the 50-to 150-cow range, and production costs are relatively high.

Costs of Production

Substantial regional differences in costs of producing milk reflect regional differences in output per cow as well as in herd size[1] (see figure 2-6). The Economic Research Service/USDA has estimated the cash costs and total economic costs of production since 1974. Cash costs depend primarily on the share

[1]The USDA cost of production regions do not include the same States as the production regions indicated in figure 2-3. With minor exceptions, the Upper Midwest cost of production region is equivalent to the Lake States production region.

Figure 2-4—Milk Output Per Cow by Region, 1989



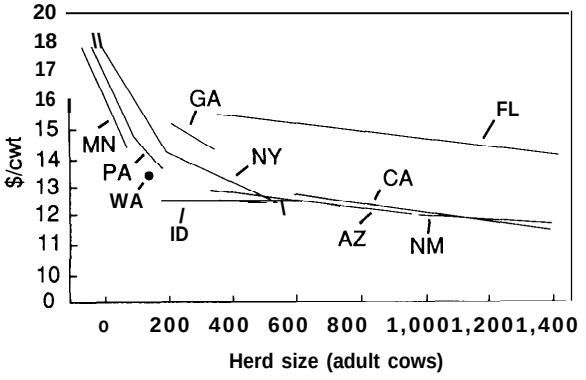
SOURCE: U.S. Department of Agriculture, Economic Research Service, 1990.

of inputs purchased and milk output per cow.[2] For example, in the Southeast, where dairies purchase most of their feed inputs (about 50 percent of production costs) and where average output per cow is low (12,604 pounds, see figure 2-4), the cash cost averaged $11.63 per hundredweight (cwt) (see figure 2-6). Dairies in the Pacific region also purchase a high percentage of their inputs but have the highest output per cow (17,527 pounds), thus yielding a moderate cash cost of $9.07 per cwt. Regions that grow much of their feed have the lowest cash costs.

The level of cash costs is significant from a policy perspective. Farmers who are not covering cash costs have strong economic incentives to shut down their operations. They are either building debt or eroding equity on virtually a daily basis. Not surprisingly, farmers in high-cash-cost regions likely

[2]Cash costs reflect the minimum break-even prices needed to produce in the short run. Subtracting cash costs from the gross value of production leaves net cash available before replacement of depreciable assets. It excludes income taxes and principal payments.

Figure 2-5—Milk Production Costs Related to Herd Size, for 10 States, 1985



SOURCE: Office of Technology Assessment, 1991.

are the first to complain about milk prices being too low.

Total economic costs include all fixed and cash costs of production.[3] Fixed costs are highest in regions that grow a large percentage of their feed, have substantial investments in housing and feed storage (silos), and/or are expanding rapidly (meaning high depreciation costs). Thus, while the Upper Midwest and Northeast regions have among the lowest cash costs, they have relatively high total economic costs due to their large housing and feed-storage investments.

Total economic costs are meaningful from a policy perspective because they influence the long-run economic viability of a region. If these as well as cash costs are not offset by high milk prices, farmers will have no incentive to invest. This is the case in the Upper Midwest and Corn Belt regions where the dairy industry is in relative economic stagnation and even decline.

Dairy Receipts

Dairies obtain most of their receipts from milk (about 90 percent) and from the sale of cows (no more than 10 percent). The price of milk is determined nationally and regionally by the interaction of government policy, consumer demand, and the supply of milk. Government dairy programs include the Federal and State milk marketing order programs and the Federal dairy price support program.

The milk marketing order programs regulate the price of milk eligible for fluid consumption: processors are required to pay minimum class prices based on how the milk is used. The lowest prices are for Class III uses (milk used to manufacture butter, cheese, and nonfat dry milk). Milk used for soft products (ice cream and yogurt) receives a slightly higher Class II minimum price, and milk used for fluid consumption receives a substantially higher Class I minimum price. Dairy producers receive the average (blend) of the three class prices weighted by the share of milk used in each class. Class II and III minimum prices are fixed at the average of the market prices paid by manufacturers in Wisconsin and Minnesota. Class I prices are determined by the Minnesota-Wisconsin prices plus a differential that increases with increasing distance from Eau Claire, WI. Thus, Federal milk marketing order Class I (fluid use) prices increase from the Upper Midwest to the South and East.

The Federal Government purchases cheese, butter, and nonfat dry milk in quantities sufficient to maintain market price at a minimum level, established by the Federal price support program. Reductions in the price of milk may occur for several reasons: because the government lowers the price support, because the share of milk used for fluid purposes in a marketing order declines (due to an increase in supply or a fall in demand), or because premiums over minimum order prices (based on supply and demand conditions) paid by processors decline.

This combination of government-administered and market-determined price relationships is important because it has a marked impact on the regional distribution of milk receipts (see figure 2-7). Receipts are highest in the Southeast (14.87 per cwt) and lowest on the Pacific coast (11.13 per cwt). The Upper Midwest has slightly higher milk receipts ($11 .92 per cwt) than the Pacific region.

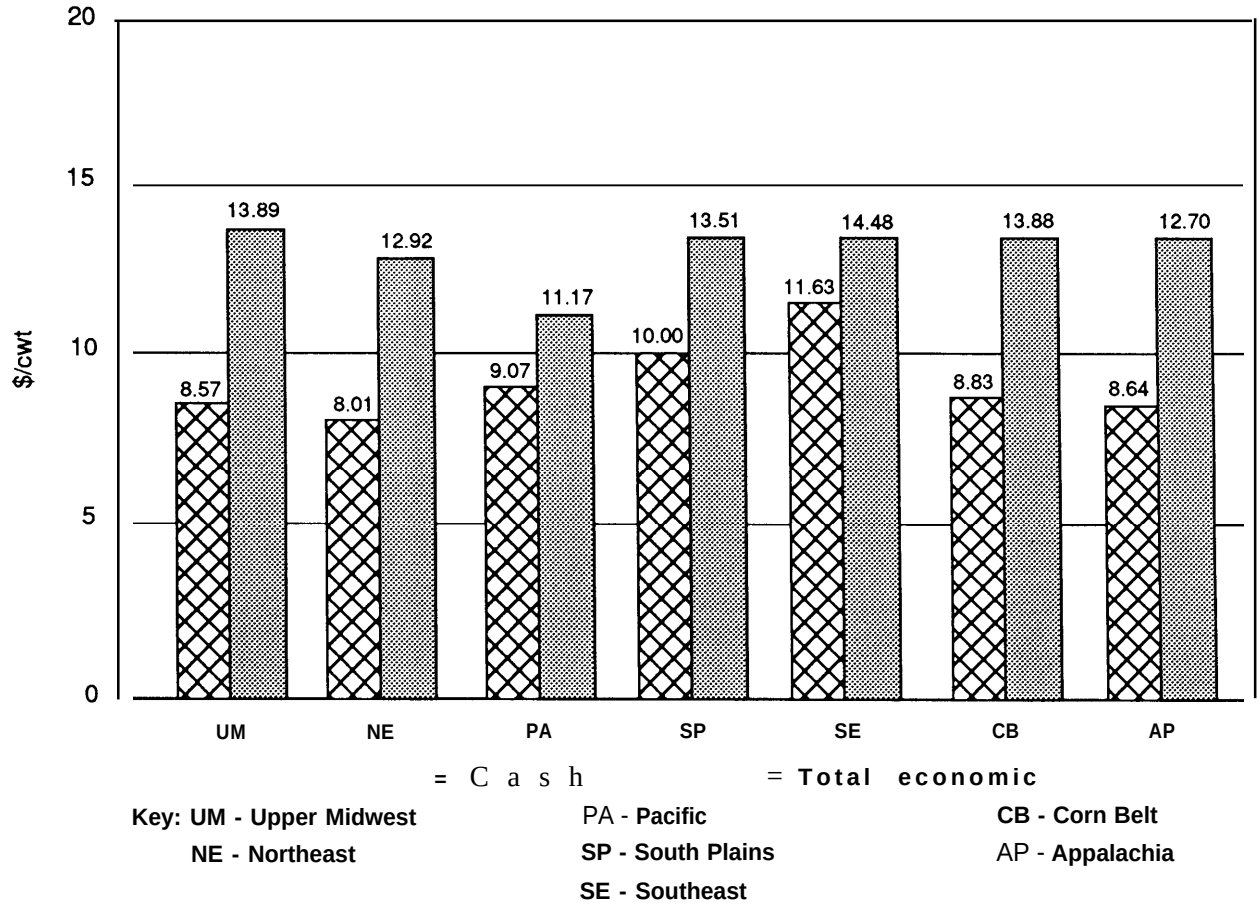
Net Income

Profits vary regionally with receipts and costs. The combination of high costs and low prices in the Upper Midwest in 1988 led to a negative cash income (–$0. 11 per cwt) and an even lower return to management (–$0.62 per cwt) (see figure 2-8).[4] The

[3]Total economic costs do not include a return to management.

[4]Cash income is the difference between gross value of production and cash expenses and capital replacement.

Figure 2-6—Regional Differences in Costs of Producing Milk, 1988



SOURCE: U.S. Department of Agriculture, Economic Research Service, *Economic Indicators of the Farm Sector, 1989.*

Corn Belt also experienced a loss in returns to management (of $0.27 per cwt). The highest return regions were the Southeast and Appalachia. Despite high costs, the Southeast realized higher returns due to favorable treatment under the Federal milk marketing order system. The Pacific region realized a favorable return despite having the lowest receipts. This reflects the overall efficiency of relatively industrialized production on the west coast.

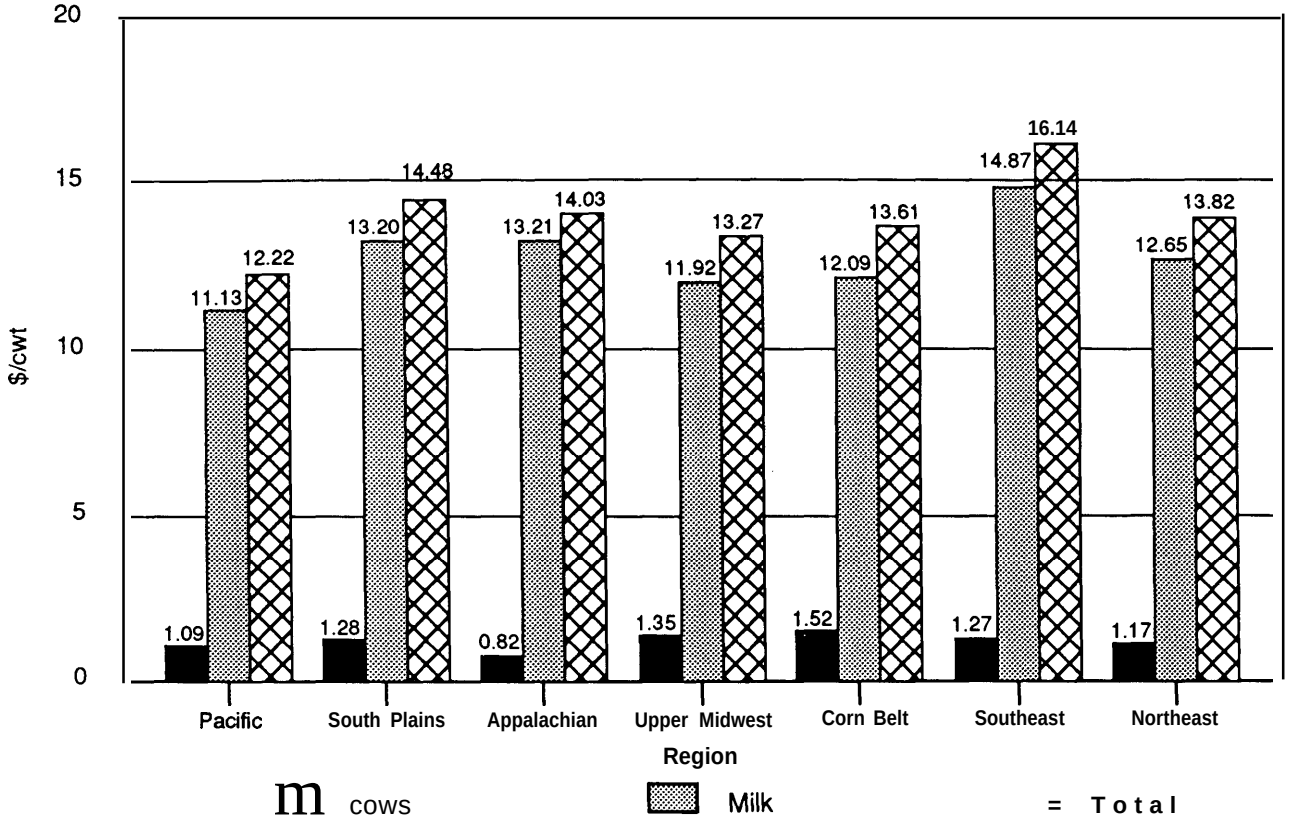
The income situation improved for dairy farms in the traditional milk producing regions in 1989 and 1990 when farm milk prices increased. These farms experienced positive returns in those years. However, in the early months of 1991 prices declined significantly and are expected to fall by 15 to 20 percent for the year compared to 1990. Dairy farms in the traditional milk producing regions are expected to lose equity under these conditions. Farms in the nontraditional areas, such as the Pacific region, are expected to operate much closer to their break-even point.

Regional Production Changes

Sustained regional differences in profit lead to shifts in the geography of production. The largest increases in milk production have been in the West and Southwest, where marketing have risen by nearly 40 percent since 1980 (see figure 2-9). Milk production in the traditional dairy areas of the Lake States and Northeast has increased by 6.5 and 4.0 percent, respectively. The Corn Belt, which consistently has had the lowest net returns, experienced a production increase of only 4.9 percent.

However, no region is homogeneous. During the 1980s, for example, centers of rapidly increasing production developed within regions (i.e., central Texas and southern Georgia). In the late 1980s, persistent production declines occurred in Minne-

Figure 2-7—Regional Differences in Receipts From Dairy Farm Sales, 1988



SOURCE: U.S. Department of Agriculture, Economic Research Service, *Dairy Situation and Outlook Report, 1989.*

sota—traditionally one of the largest dairy States, Because of the higher cost conditions associated with smaller dairies (see figure 2-5), and low profits (see figure 2-8), significant sections of the Lake States may have lost its comparative advantage to other regions. Questions arise as to whether traditional Federal order pricing institutions, which rely on Minnesota and Wisconsin as the base point for pricing milk (the M-W price), are appropriate in today's milk industry. The answers to these questions are complex and merit further study and debate (2, 3).

While the national share of milk production in the Lake States and the Northeast has declined by at least 2 percent since 1980, these two regions still produced almost half of the Nation's milk supply in 1989 (see figures 2-10 and 2-1 1). If these regions are to maintain their role as "dairy States, " major changes in scale of operation, levels of technology adoption, support for dairy research and extension, and, perhaps, dairy policy may be required.

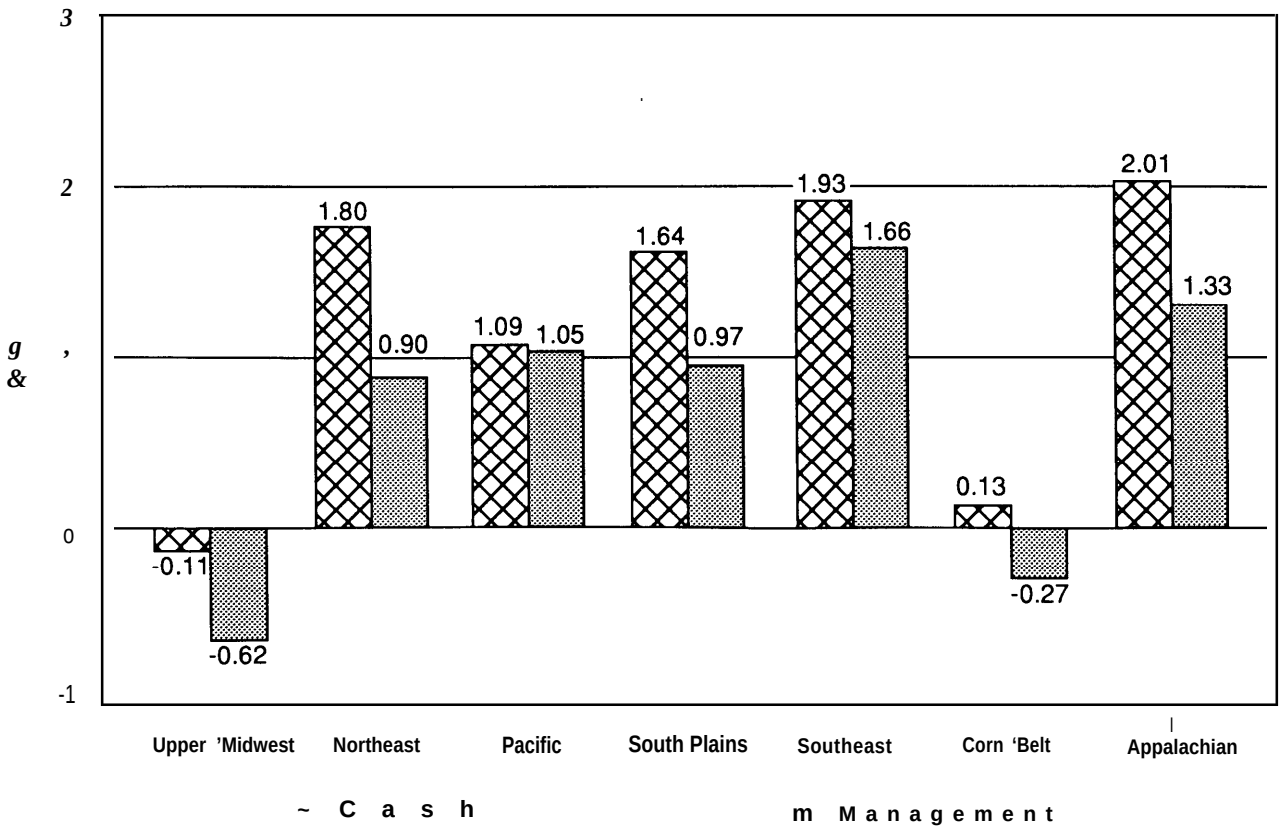
Demand Changes

Changes in demand may be as important as changes in supply in determining the future course of the dairy industry. Shifts in population toward the West and South have favored increased milk production in these regions.

There have also been major changes in demand for individual dairy products, such as sharply reduced butter consumption, increased lowfat (2.0 percent butterfat or less) milk consumption (see figures 2-12 and 2-13), and increased cheese consumption. The shifts from whole milk to lowfat milk and the rapidly rising cheese consumption have been particularly dramatic. The trend away from consuming whole milk likely reflects increasing consumer concerns about calories, fat, and cholesterol consumption.

Cheese is overwhelmingly the bright spot in terms of dairy product demand. While American-style cheeses (predominantly cheddar) have experienced substantial growth (see figure 2-14), the demand for

Figure 2-8—Regional Differences in Net Income (profit), 1988



SOURCE: U.S. Department of Agriculture, Economic Research Service, *Dairy Situation and Ouf/ook Report, 1989.*

other cheeses (predominantly Italian-style) has grown even more rapidly and consistently (see figure 2-15). Italian-style cheese demand is largely a result of the rapidly growing convenience and fast food (pizza) market. Therefore, cheeses have capitalized on consumer trends toward microwave convenience and eating out. Other dairy products have not benefited as much from these changing market trends.

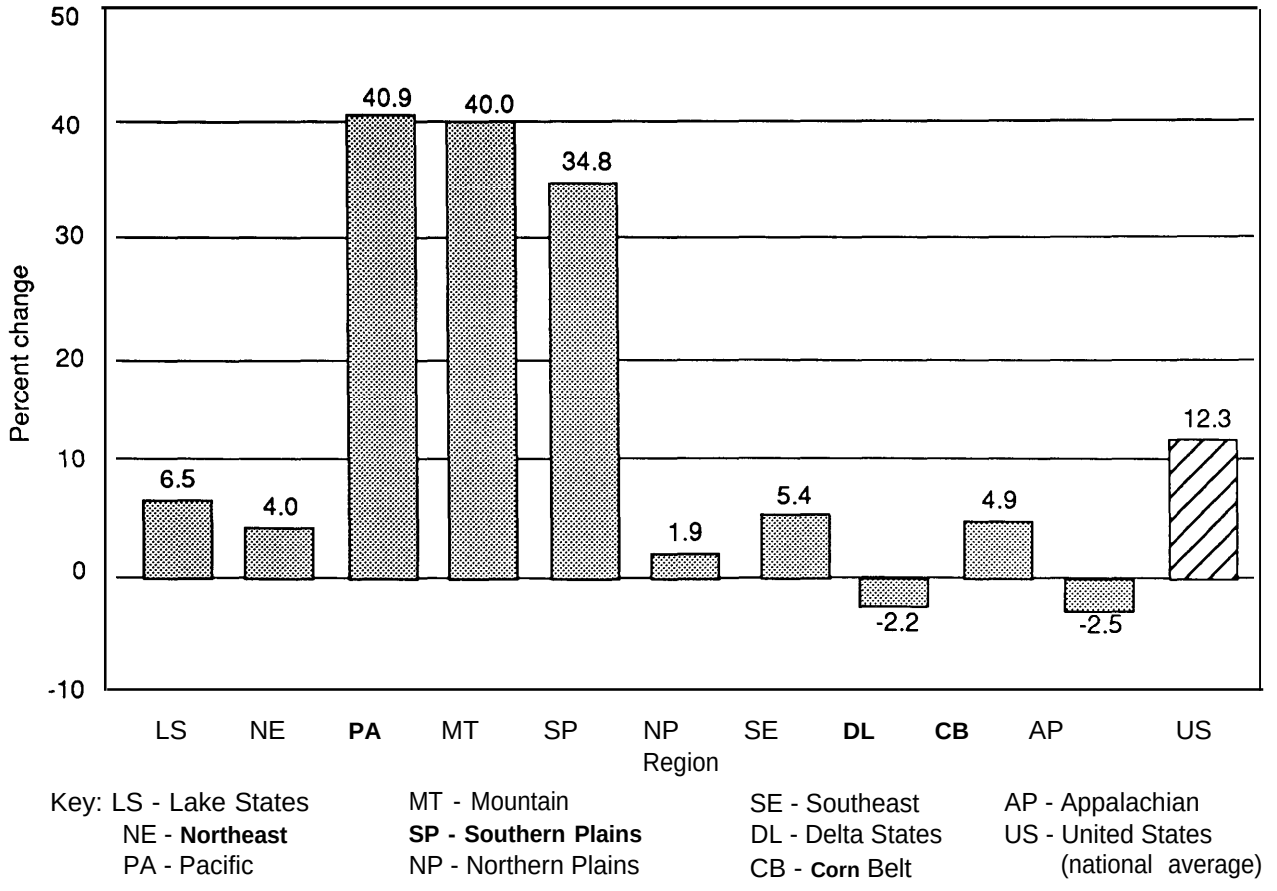
MAJOR DAIRY POLICY ISSUES

The milk industry may well be the most highly regulated of any in the United States. A complex system of health, food safety, and labeling regulations exist at the Federal, State, and local levels. These regulations reflect the perishability of the products, which are ideal media for the growth of microorganisms; the potential for their adulteration; the potential for drugs and/or chemical residues related to milk production processes; and the potential for variations in the nutritional value of products. Over time, more stringent water quality standards have been placed on dairies, affecting the management of animal wastes and runoff. In some instances, air pollution regulations have also been imposed. Overlying the EPA- and FDA-oriented regulations is an extensive set of Federal and State milk-pricing regulations. These include a network of Federal milk marketing orders, State milk marketing orders, and the milk price-support programs discussed earlier. The following section summarizes some of the major issues of dairy policy and how policy considerations and regulatory mechanisms may interact to shape the industry's future.

Butterfat Surplus

Nutrition- and diet-conscious consumers increasingly have shunned higher butterfat products. (Increased consumption of premium ice cream is one of the few exceptions to this trend.) As a result of declining demand, a butterfat surplus has developed, although overall, milk supply and demand have been in relative balance during the late 1980s and early

Figure 2-9—Change in Milk Production by Region, 1980-89



SOURCE: U.S. Department of Agriculture, Economic Research Service, 1990.

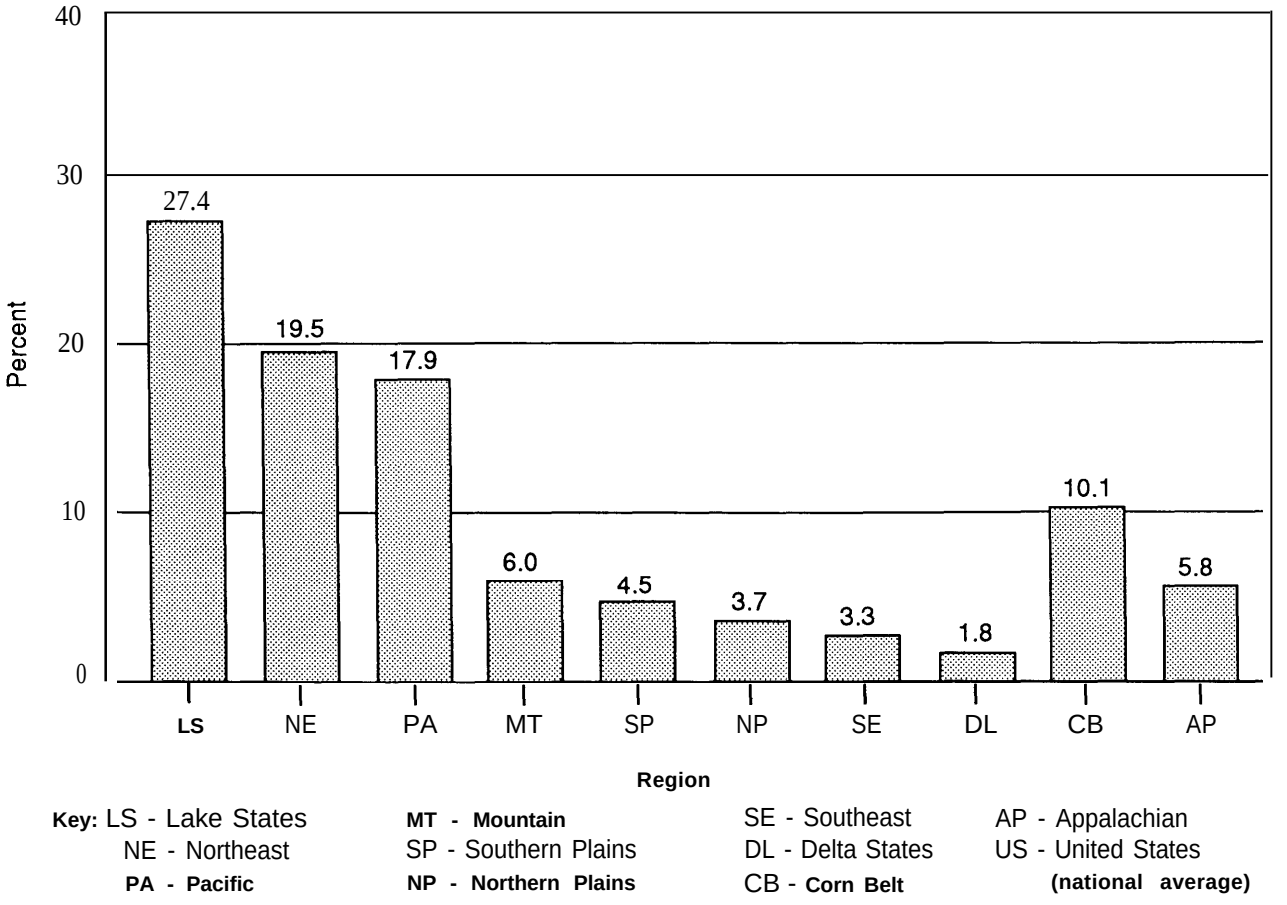
1990. Commodity Credit Corporation (CCC) price-support purchases of butterfat have continued even as USDA has had to enter the commercial market to satisfy cheese demand for its child nutrition programs. USDA has attempted to remedy the butterfat surplus problem by consistently lowering the price of butterfat to stimulate consumer demand while holding the cheese price constant. This strategy has been only partially successful. Surpluses in cheese and nonfat dry milk (NFDM) have completely disappeared since 1988 and butterfat surpluses continue (see figure 2-16).

Future trends could further complicate the butterfat surplus problem. Lowfat cheeses and lowfat ice cream are capturing a larger part of that market. Fat substitutes are also being developed for use in ice cream, and perhaps other dairy products. These trends represent a two-edged sword; they could result in increased total demand for dairy products, yet further reduce butterfat demand.

Research progress in removing cholesterol from butterfat may be the solution to the problem. However, for reasons of diet and health, consumers are concerned over a range of issues: total fat consumption, calorie intake, saturated fat consumption, and cholesterol intake. Fat substitutes aggravate the butterfat problem whether or not cholesterol is effectively removed from butterfat.

From the above analysis, it seems that the solution to the butterfat problem may be to reduce butterfat production. This can be partially accomplished by changing feeding practices in the short run and by breeding for reduced butterfat in the long run. Pricing incentives must exist for either of these potential solutions to occur. Milk currently is priced, to a large extent, on the basis of butterfat content.

Figure 2-10—Share of Milk Production by Region, 1989



SOURCE: U.S. Department of Agriculture, Economic Research Service, 1990.

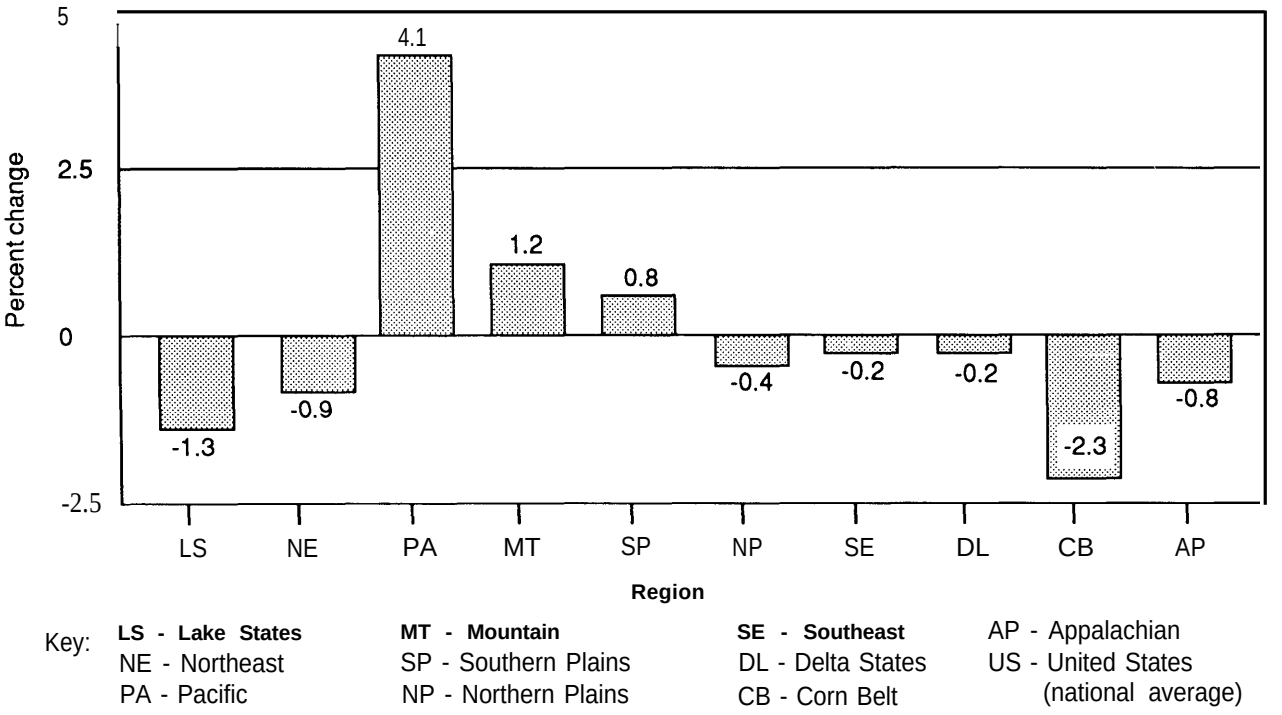
Shifts to pricing on the basis of protein or nonfat solids are possible and practiced in some markets. Industry initiatives and USDA leadership are required to obtain widespread adoption of such innovative pricing alternatives.

Milk Price Support

Related to the butterfat issue is the mechanism for adjusting the milk price-support level. From 1949 through 1981, the milk price-support level was set as a percent of parity (a price that will give a farmer the same purchasing power he/she had in abase period). Generally, the Secretary of Agriculture was given a discretionary range of 75 to 90 percent of parity within which to set the milk price-support level. In 1981, a trigger mechanism relating changes in the price support to the level of government purchases was adopted. Under the 1985 farm bill, the milk price support was raised in $0.50 per cwt increments when CCC purchases of dairy products were projected for the following year to be less than 2.5 billion pounds and decreased at the same rate when such purchases were projected to be greater than 5.0 billion pounds. The pounds were measured on a butterfat-milk-equivalent basis. The butterfat basis became an issue when CCC cheese and dry milk purchases ended in 1989, and as butterfat purchases increased.

The 1990 farm bill dairy policy provisions froze the price support at $ 10.10 per cwt through 1995. For deficit reduction purposes, it assesses $0.05 per cwt for all milk produced in 1991 and $0.1125 in 1992-1995. This assessment is refunded on proof that the farmer's milk production was not increased over the previous year. The Secretary is required to prepare a report with recommendations to Congress on how it plans to limit growth of CCC purchases of dairy products by August 31, 1991 with exclusions

Figure 2-1 l—Change in Share of Milk Production by Region, 1980-89



SOURCE: U.S. Department of Agriculture, Economic Research Service, 1990.

of cow slaughter and price-support reduction options. If Congress fails to enact dairy legislation by 1992 and CCC purchases are expected to exceed 7 billion pounds, an assessment covering the full cost of the CCC purchases over 7 billion pounds is authorized.

As a result of these decisions, the following policy issues are pending as the industry enters the 1990s:

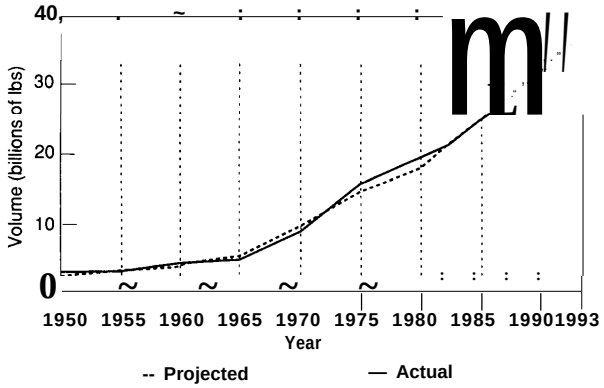
- the potential for effective demand expansion programs-the 1990 farm bill authorizes a processor-funded demand expansion check-off if approved by referendum,
- the potential for developing effective temporary supply and/or management systems that do not lead to industry inefficiencies and rigidity in production patterns,
- what to do about declining demand for butter and the accumulation of butter stocks, and
- how much discretion the Secretary of Agriculture should have in determining the provisions of dairy policy.

Price Instability

As the price-support level has declined, the price of milk and manufactured dairy products has become more variable. This instability is the result of the interaction of an inelastic supply and demand for milk. With lower price supports, instability is particularly evident in autumn when milk supplies are often relatively short. For example, in 1989, the Minnesota-Wisconsin (M-W) price rose from a low of $11.20 per cwt in May to $15.10 in December. It then fell back to $12.20 in March 1990 (see figure 2-17). By September 1990, the M-W was approaching the milk price-support level of $10.10 per cwt.

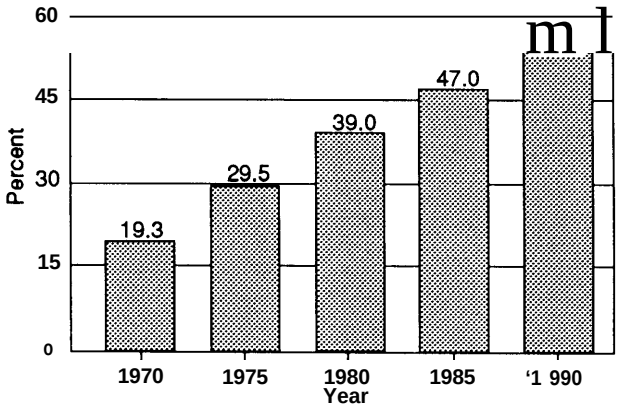
From an industry perspective, one of the benefits of dairy policy has been the stability provided by the price support and Federal order program. Current predictions regarding M-W prices are widely variable. While some argue that the milk price support will once again determine the price of milk under the 1990 farm bill, others suggest that significant segments of the milk industry cannot survive such low prices. Planning for the future has become exceedingly difficult for producers, processors, USDA, and Congress.

Figure 2-12—Actual and Projected Consumption of Lowfat Milk, 1950-93



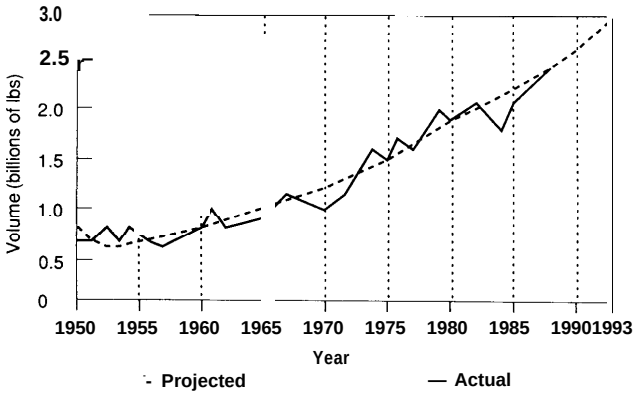
SOURCE: Reginald Adamus and Emerson Babb, "Projections of U.S. Dairy Product Consumption, 1989 -1993," Food and Resource Economics Department, University of Florida, 1990.

Figure 2-1 3—Market Share of Lowfat Milk as a Percent of Total Fluid Milk Consumption



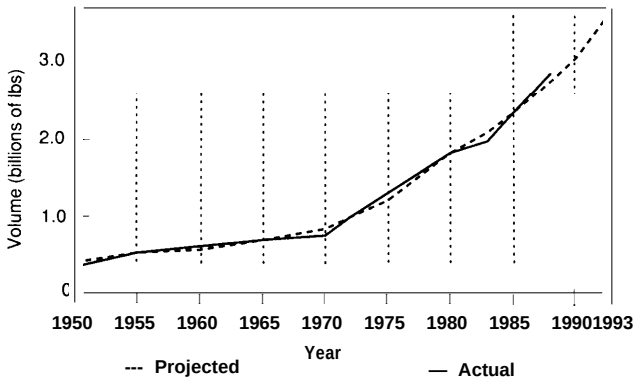
SOURCE: U.S. Department of Agriculture, Economic Research Service, *Dairy Situation and Outlook Report,* various years, 1970-1991.

Figure 2-14—Actual and Projected Consumption of American Cheese, 1950-93



SOURCE: Reginald Adamus and Emerson Babb, "Projections of U.S. Dairy Product Consumption, 1989 -1993," Food and Resource Economics Department, University of Florida, 1990.

Figure 2-15—Actual and Projected Consumption of Other Cheese



SOURCE: Reginald Adamus and Emerson Babb, "Projections of U.S. Dairy Product Consumption, 1989 -1993," Food and Resource Economics Department, University of Florida, 1990.

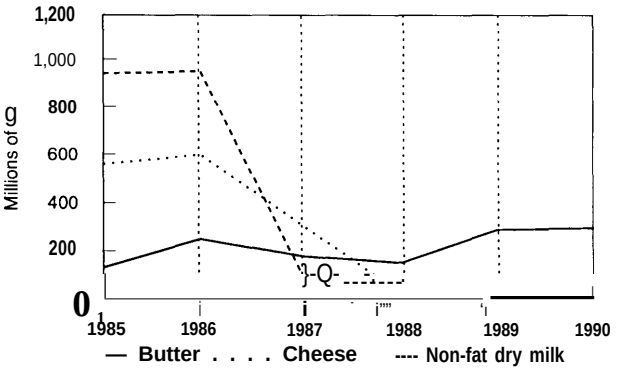
Milk Production Controls

During the 1980s, a dairy diversion program and a dairy termination (buyout) program were implemented as means of reducing milk production—in addition, the price-support level was lowered from a high of $13.10 per cwt to $10.10 per cwt. The termination program was considerably more effective than the diversion program but also more controversial because of its negative impact on the price of beef.

The combination of the termination program and lower price supports has brought milk production into relative balance with consumption. With this accomplished, attention has turned to the potential need for production controls should surpluses once again accumulate. This could happen if milk supply increases sharply due to rapid adoption of a new technology, and/or if demand falls due to negative consumer reaction to the same technology. After passage of the 1990 farm bill, options for production controls (or inventory management) would appear to include:

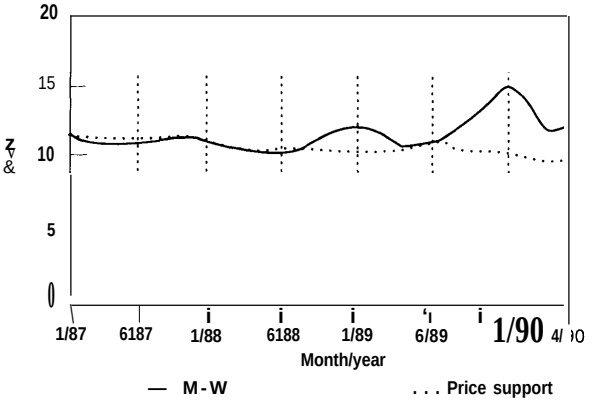
- utilization of a combination assessment and production control system;
- implementation of some type of quota system; and
- in concert with either assessments and/or quotas, an aggressive program to expand domestic and foreign demand.

Figure 2-16—Uncommitted Government Dairy Product Inventories, 1985-90



SOURCE: U.S. Department of Agriculture, Economic Research Service, *Dairy Situation and Outlook Report,* various issues, 1985-1991.

Figure 2-17—Minnesota-Wisconsin (M-W) Price and Milk Price-Support Level, January 1987 to April 1990



SOURCE: U.S. Department of Agriculture, Economic Research Service, Dairy Situation *and Outlook Report,* various issues, 1988-1991.

Federal Milk Marketing Orders[5]

Historically, decisions regarding Federal milk marketing orders have been left largely to the Secretary of Agriculture. However, the 1985 farm bill increased Class I milk prices, emphasizing markets distant from the Upper Midwest. In 1988, the General Accounting Office (GAO) published a study indicating that Federal orders tended to favor regions to the South and East at the expense of producers in the Upper Midwest. The GAO report recommended a gradual but progressive succession of steps to reduce the level of regulation in Federal orders.

In light of these developments, the Secretary of Agriculture has initiated a series of national hearings, which were to be completed by the end of 1990. The 1990 farm bill mandates decisions on Federal orders by 1992. Major issues identified for the hearings include:

- the level of class prices for milk,
- the number of classes and products included,
- the geographic structure of prices including the potential for multiple basing points,
- the need for uniformity in order provisions, and
- the appropriate basis for new Federal order class prices (as opposed to the Minnesota-Wisconsin series).

Basic Formula Price

Since the 1960s, the Minnesota-Wisconsin price series has served as the basic formula price used to move or change the level of all Federal order milk prices. The M-W price has also served as the guide for determining if the milk price support objective set by Congress or the Secretary of Agriculture has been realized.

The M-W price series is the average price paid for Grade B milk (which can only be used for processing dairy products such as cheese and butter) by Minnesota and Wisconsin processing plants. However, the volume of Grade B milk produced in Minnesota and Wisconsin has declined to where the M-W price series may not reliably reflect the forces of supply and demand for this milk

In 1989, the GAO concluded that alternatives to the M-W price series should be evaluated and implemented. It recommended two options:

. a product formula based on the market prices for butter, NFDM, and/or cheese; and

. a competitive price for Grade A and Grade B milk.

[5]A regulation issued by the Secretary of Agriculture Specifying minimum prices and conditions under which milk can be bought and sold within a specified geographic area.

Emerging Technology

The dairy industry will be among the first to adopt many of the newly emerging technologies from the biotechnology era. Considerable controversy surrounds the potential use of these technologies. This is especially true of bovine somatotropin (bST), now undergoing review by the Food and Drug Administration (FDA). Concerns about food safety, animal safety, the manufacturing process to produce the technology, and the economic impacts on the dairy industry have all coalesced to make bST the focus of a controversy of unprecedented magnitude in the dairy industry.

A number of actions have already been taken to slow or stop the use of bovine somatotropin. Two States have declared a moratorium on the use of the technology if approved by FDA. Four States have enacted or are considering enacting labeling requirements on dairy products produced from bST-supplemented milk. And consumer groups have successfully pressured some large retail food stores not to market dairy products produced with this technology.

The next chapter provides information and an analysis of the issues relevant to this technology. Subsequent chapters discuss other major emerging technologies that should become available in this decade for the dairy industry.

CHAPTER 2 REFERENCES

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