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Dairy Backgrounder

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Abstract

Over time, shifts in consumer demands, in the location and structure of milk production, in industry concentration, in international markets, and in trade agreements have dramatically altered the U.S. dairy industry and changed the context for dairy policies and the sector as a whole. In the future, the U.S. dairy industry is likely to become more fully integrated with international markets. At the same time, dairy products such as fluid milk, butter, and cheese are likely to continue to be increasingly used as ingredients for restaurants and in processed foods while still being sold in their traditional forms.

Keywords: Dairy, milk, farm policy, Farm Act, ERS, USDA

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Approved by USDA's World Agricultural Outlook Board

Introduction

Consumer demand is a key economic force that molds the U.S. dairy industry, but other forces are also at work. Changes in the structure and behavior of firms that manufacture and process dairy products can have significant effects, as do aspects of farm price and income support programs and policies, agricultural trade policies or programs, and environmental issues. These forces from beyond the farm gate combine with farm-level forces that are important in their own right—structural change, significant reductions in production costs, and increasing productivity—to shape the ways U.S. milk is produced.

The U.S. dairy industry is built on a series of complex economic relationships that are defined by the nature of milk and its products. Over time, government dairy policies and programs have become key components of the industry and have changed as the industry has evolved. Policymakers and the general public will be better able to evaluate proposed dairy policy or program changes by understanding the complex economic relationships that characterize the industry and what dairy policies and programs can achieve within those economic bounds.

Industry Overview

How has the U.S. dairy industry evolved? More milk is produced on fewer farms each year and that milk is handled and marketed by fewer dairy cooperatives and proprietary firms. Fewer firms are converting milk into fluid and manufactured products demanded by end-users, be they retail supermarket consumers or hotel and restaurant purchasing agents. The growing demand for milk and dairy products is also changing. New uses for milk components (such as individual proteins and lactose) and for dairy-based products are emerging, at-home and away-from-home consumption patterns are changing, and the consuming population is becoming more diverse.

Milk and Dairy Product Demand

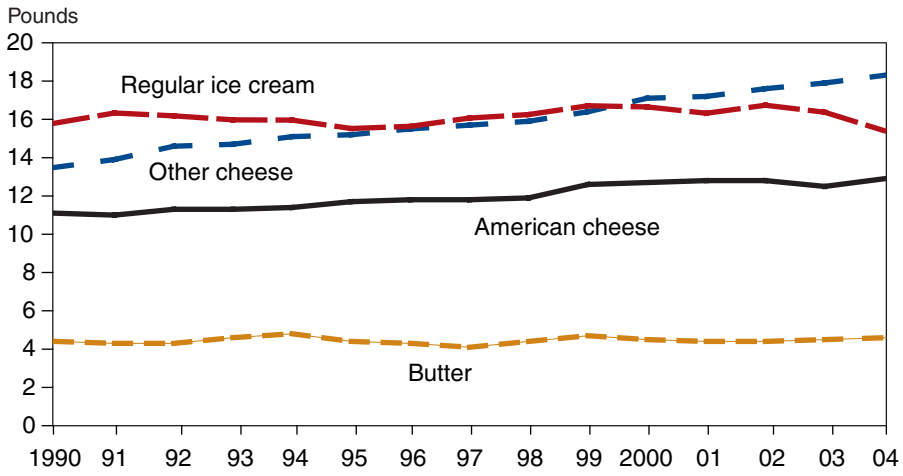
Per capita domestic commercial use of all dairy products (milkfat basis) has grown only 0.4 percent annually since 1995. This modest increase resulted in an overall market in 2004 that was 14 percent larger than 9 years earlier—even though the record nominal dairy prices were more than one-fourth higher than 1995. Demand strength has been very uneven across dairy products, and the increase in total demand can be attributed to a very few products. In addition, the dairy market has gradually shifted from retail sales to restaurant and food processor use.

Cheese has provided most of the dairy-product demand growth for many decades. Per capita cheese consumption has more than doubled since 1980 to just over 31.2 pounds in 2004, with most of the growth coming from sales of natural cheese.[1] Wider availability of a greater diversity of cheeses, expanded use by fast food and pizza restaurants, increased use as an ingredient in cooking, and increased consumption of cheese-heavy ethnic foods (e.g., Italian and Mexican) all fueled total sales increases. Restaurant and food processor use generated almost all the growth in recent years as retail sales stagnated.

[1]Natural cheese is produced directly from milk, or in some cases, whey. Processed-cheese products are made by grinding natural cheese and reheating it.

Figure 1

Per capita consumption of selected dairy products, 1990-2004



Source: ERS using data from USDA's Foreign Agricultural Service, *Dairy Monthly Imports*; Farm Service Agency, PS-18R *Purchase/Utilization Report–Dairy Products*; and National Agricultural Statistics Service, *Cold Storage*; *Dairy Products; Milk Production;* and *Milk Production, Disposition and Income*, various issues.

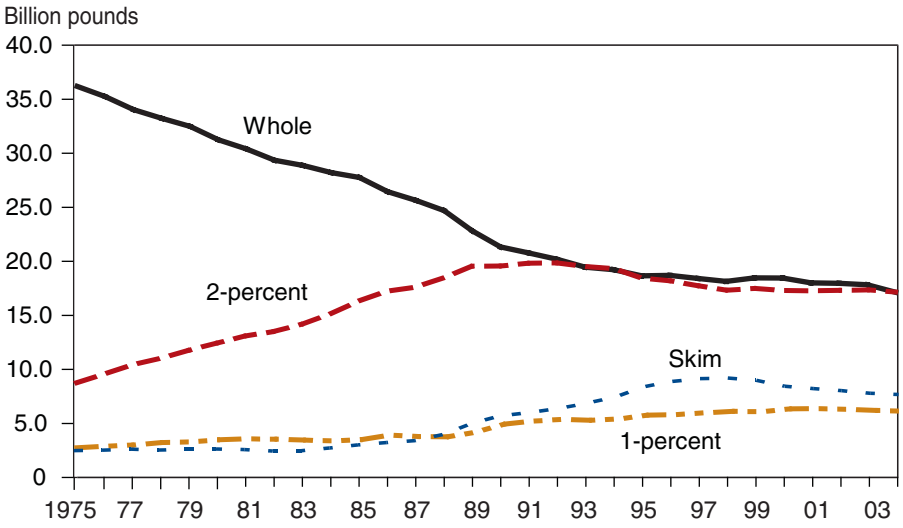
Cheese sales in recent years have not risen across the board as they had earlier, and sales of some cheeses (e.g., Swiss and Muenster) have declined. About three-fourths of the increase in total use since 1995 came from increases in Mozzarella and Cheddar. The narrowing base of growth in cheese sales raises the possibility that the cheese market might soon become fully mature with growth potential limited to increases in population.

Butter demand has varied over the long run but has increased considerably since 1995. Per capita domestic commercial use in 2004 was only about 10 percent more than 1995, but in 2004 the butter was sold at more than twice the price. Demand for products other than cheese and butter in recent years generally has been either declining or contributing little to total dairy product demand growth.

Current beverage milk sales are virtually the same as in the mid-1980s, a sizable drop in per capita use. Contributing factors include a smaller share of children in the population, the increase in meals eaten away from home, children's greater control over their food consumption, and stronger and more diverse competition from other beverages. The once clearcut dramatic substitutions of lower fat milks for whole milk have not been seen since the mid-1990s. Recent data suggests little or only slow growth in any of the key fluid milk categories.

Away-from-home eating and food processing now account for a majority of dairy product use. Restaurant demand, mainly for cheese, butter, and fluid cream, has become particularly important in recent years. The greater importance of the away-from-home and food-processing sectors probably

Figure 2
Fluid milk sales, 1975-2004



Source: ERS using data from USDA's Agricultural Marketing Service, *Federal Milk Order Market Statistics*; California Department of Agriculture, *California Dairy Statistics and Trends;* Hawaii Department of Agriculture, *Milk Control Section Monthly Statistics Report;* Maine Department of Agriculture, Food and Rural Resources Maine Milk Commission, (www.maine.gov/agriculture/mmc); Montana Department of Livestock, *Milk Control Bureau Annual Report;* Nevada Department of Business and Industry, *Nevada State Dairy Commission Statistical Bulletin;* New York Department of Agriculture and Markets, *Western New York Milk Marketing Area Annual Statistical Report*; and Virginia State Milk Commission, *Milk Market Information Bulletin.*

has made responses to shortrun milk and dairy product price changes more sluggish, but might also have made dairy demand more sensitive to incomes and general economic conditions.

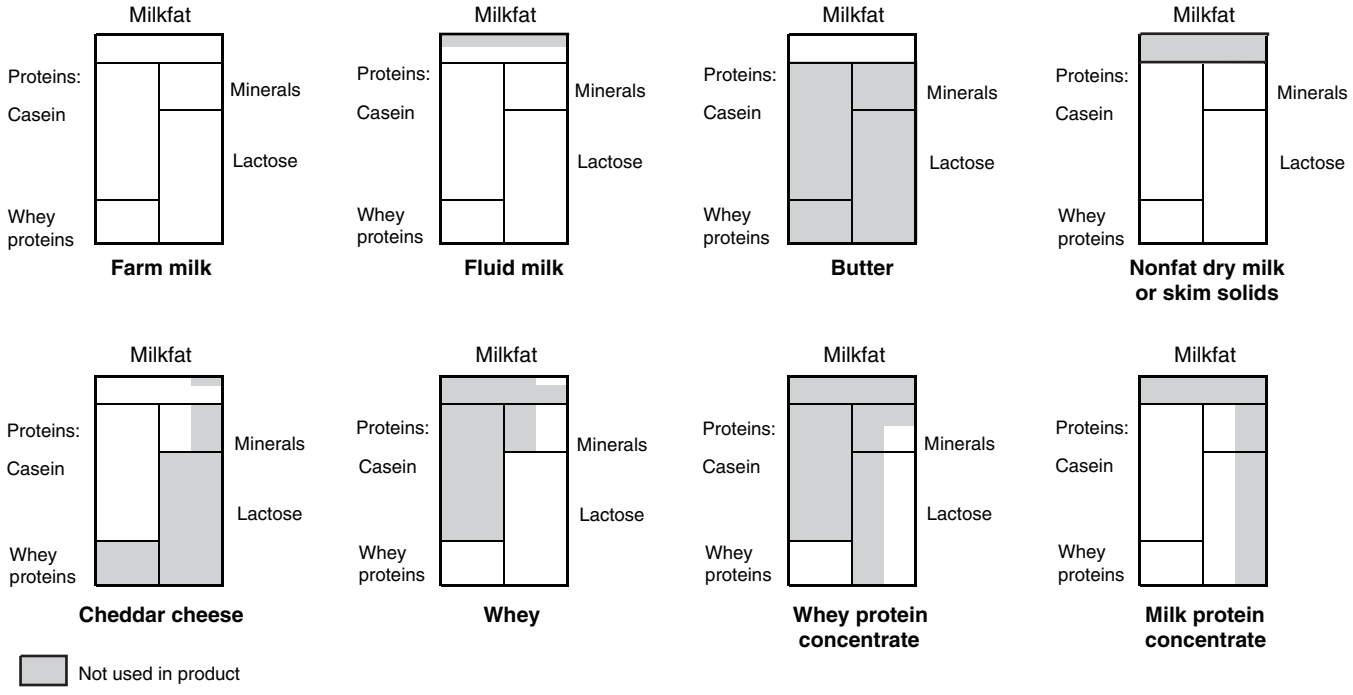
Processed-food manufacturers have shown renewed interest in using dairy-derived ingredients in their products in recent years. Milkfat, skim solids, whey proteins, and lactose have emerged as important food ingredients mostly due to desirable taste, nutritional, and functional characteristics—but partly also due to cost advantages. New markets are expected to emerge for milk-based fractions but the net addition to milk demand is unclear.

The changing mix of milk and dairy product demands is reflected in raw milk utilization. The once-dominant fluid milk products represented 36 percent of milk utilization in 2004, down from almost 50 percent in 1975. Of the other dairy products, cheese has become the primary end-product use for raw milk, its share (52 percent in 2004) more than doubling from 1975.

Between the Table and the Farm

Dairy processing, manufacturing, and distribution firms are subject to most of the pressures affecting other agribusiness firms. Plants have become fewer and larger, and firms have tended to become multi-plant companies. These trends are facilitated by a decrease in relative transportation costs and by the concentration of both the firms' suppliers and customers. Cooperatives are very prominent in farm milk and dairy-product marketing, perhaps more so than in any other agricultural sector.

Figure 3
Composition of selected dairy products*



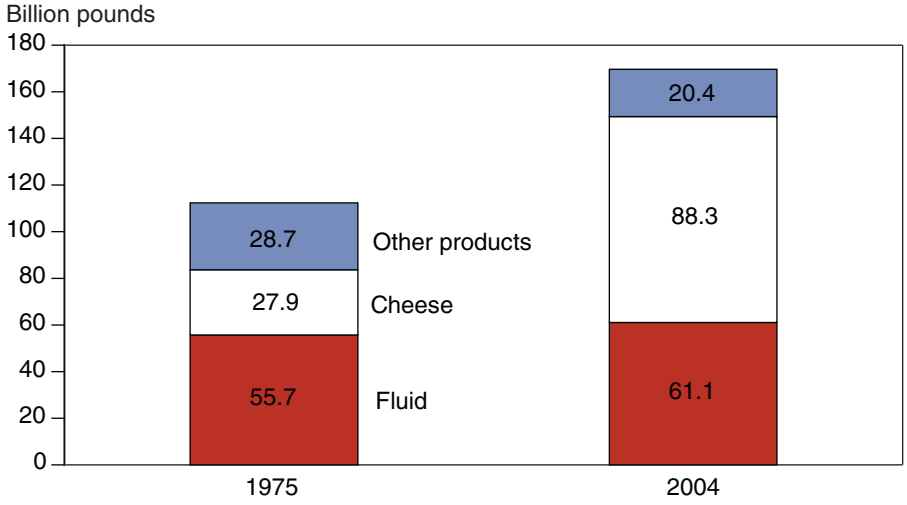
*Excludes water. Compositions not shown to scale.
Source: ERS using data from various sources, including: *Modern Dairy Products* (Lincoln M. Lampert, author; Chemical Publishing Company, 1970).

The structure and location of dairy processing and manufactured product firms depend in part on the products they make. Fluid milk processing is dominated by proprietary firms, and the fluid plants tend to be located near major population (consumer) centers. Production of storable manufactured products tends to occur nearer to where milk is produced and the cooperatives play a greater role. A geographic pattern for perishable manufactured products is more difficult to discern although most are produced by fluid milk processors. However, some storable manufactured-product plants operate lines for the perishable products and there are some firms (and plants) that specialize solely in these products (see Gloy, 2006, for more information on plant location at www.cpdmp.cornell.edu/CPDMP/Pages/Workshops/Syracuse06/).

Concentration of dairy processing and manufacturing firms has been notable in recent years and has altered how traditional wholesale markets function. Concentration has also occurred in markets for many other foods, in many cases to a greater extent than for the dairy-product sectors. Much of the dairy-product sector concentration has been paralleled by the concentration of the firms purchasing those products.

Cooperatives differ from proprietary firms in several significant ways. They can, and in some cases do, play two roles, one as marketers of their members' raw milk and the second as processors and manufacturers of products for marketing. Cooperatives handle more than four-fifths of all milk produced but process or manufacture only about one-third. As farmer-owned and -directed companies, cooperatives long have been shaped by the priority placed on being able to handle whatever amount of milk their members choose to produce. Lastly, cooperatives were granted an exemption from antitrust laws by the Capper-Volstead Act, which allows them to

Figure 4
Milk in three use categories, 1975 and 2004



Source: ERS using data from USDA's Foreign Agricultural Service, *Dairy Monthly Imports*; Farm Service Agency, PS-18R *Purchase/Utilization Report–Dairy Products*; and National Agricultural Statistics Service, *Cold Storage; Dairy Products; Milk Production;* and *Milk Production, Disposition and Income*, various issues.

market products jointly. One example is California-based Dairy America, a major marketing firm for dry milk products.

On the Farm

Milk sales of $27.4 billion in 2004 accounted for about 11.4 percent of total cash receipts from agricultural commodities. Dairy farms tend to be more specialized, because of the inputs and capital facilities required, and depend more on farm-generated income to meet household needs. Family income of dairy farmers is therefore more sensitive to prices of the primary commodity than that of most farmers. Milk production decisions rest overwhelmingly in the hands of individuals and families.

Milk Production: Fewer Cows, Fewer Farms, and More Milk

Since 1980, the number of milk cows on farms in the U.S. has declined by about 16.5 percent and the number of dairy farms (operations) has fallen almost 75 percent. As a result, the average operation has more than tripled in size, from 32 to 111 cows.[2] Output per cow and total milk production have moved upward, driven by genetic, technological, and production-management improvements. Milk per cow in 2004 was 18,967 pounds, almost 60 percent above 1980, and total production increased by nearly one-third over the same period, to about 170.9 billion pounds. Technological advances in dairy facilities and equipment, better understanding of animal breeding, health, nutrition, and improved input management have all contributed to milk production increases.

Aggregate farm number and milk production data mask significant structural changes in dairy farming in the United States. The smallest dairy operations have declined the most, while large operations have increased. Very large operations (500 or more milk cows) represented 3.7 percent of all dairy farms in 2004 but they produced over 47 percent of the milk.

The top 10 milk-producing States in 2004—California, Wisconsin, New York, Pennsylvania, Idaho, Minnesota, New Mexico, Michigan, Texas, and Washington—accounted for over 71 percent of total U.S. output, up modestly from 66 percent in 1980. Two noteworthy facets of this production growth emerge. First, the 71 percent of output in 2004 represents almost 122 billion pounds of milk compared to the almost 85 billion pounds produced by the top 10 States in 1980.

Second, the 2004 top 10 list includes States not in the 1980 list, Idaho and New Mexico. Also, Wisconsin was the largest producing State in 1980—California did not become the largest producing State until 1994.

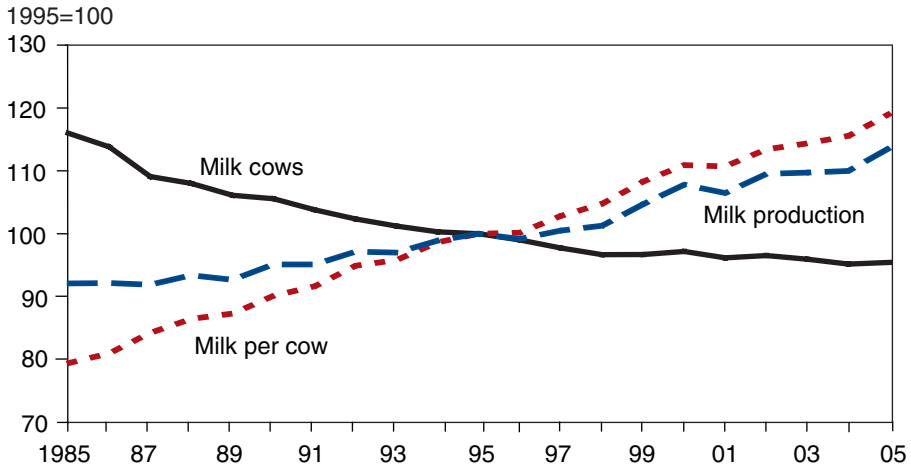
Regional Changes in Milk Production

During the 1970s and 1980s, changes in regional production shares were rather steady and predictable. But during the last 10-15 years, numerous States and even some regions have reversed long-established trends.

[2]USDA data on the number of dairy operations is of two types. The first is for any operation that had at least one dairy cow on it during the year. The second is the number of licensed dairy farms, those permitted to sell milk. The data here are of the first type.

Figure 5

Milk cows, milk per cow, and milk production, 1985-2005



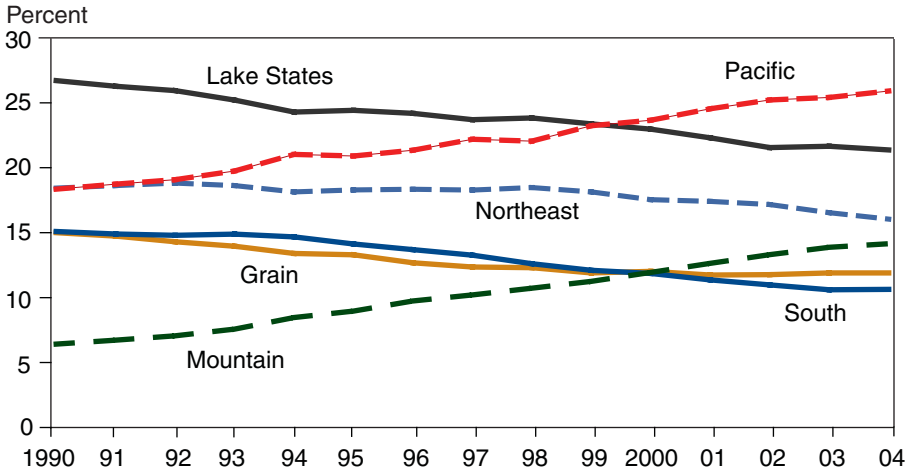
Source: ERS using data from USDA's National Agricultural Statistics Service, *Milk Production,* various issues.

Improvements in raw milk quality and declining transportation costs reduced advantages of local milk production over time. Faced with more competition and smaller local price premiums, milk producers in some areas could no longer compete. In some southern regions, such as the Southeast, where the climate is less conducive to milk production and forage quality problems persist, producers saw and continue to see their share of total production declining. Into the 1980s and 1990s, milk production in regions well suited to grain production also had declining shares of total production as dairy farmers producing their own feed grains found it more profitable to specialize in grain production. Core northern dairy areas, such as the Lake States, initially gained share as their production increased while other regions slipped. However, northern shares began to decline as the rapid western production growth lowered milk prices and began to squeeze resources out of dairying in northern areas.

By the 1970s, several western States (particularly California) had rapidly growing output. Milk producers in these areas had developed a new style of dairy farm that was dramatically larger than farms in most of the country. Plenty of land away from urban centers, adequate input supplies and mild, dry climates also contributed to the increases in milk supplies. More importantly, the western producers had developed and adopted a business organization that emphasized management capable of operating dairies of significant size resulting in relatively low total milk production costs. The price impacts of this western growth began to put pressure on producers to reduce output in most other regions. Thus began the westward "shift" of milk production that still continues.

As milk production growth in California, western Washington and a few more of the original western producing areas became more difficult because of tightening alfalfa hay markets and environmental pressures, farmers looked to other places to build new operations. At first, attention was focused in the west, a process that brought New Mexico, Idaho, and Arizona into the ranks of leading dairy States. Recently, the larger new-style farms

Figure 6
Regional milk production shares, 1990-2004



Note: Two regions have been redefined in this chart from existing NASS definitions: South is combination of Appalachian, Delta States, Southeast, and Southern Plains regions; and Grain is combination of Corn Belt and Northern Plains regions.
Source: ERS using data from USDA's National Agricultural Statistics Service, *Milk Production,* various issues.

typically built by western producers are appearing in the Midwest and Northeast regions where they are helping to stem long-term declines in total production shares. However, the surge in 2004 milk prices may have partially masked other factors that will determine the ability of producers in these regions to compete with western producers.

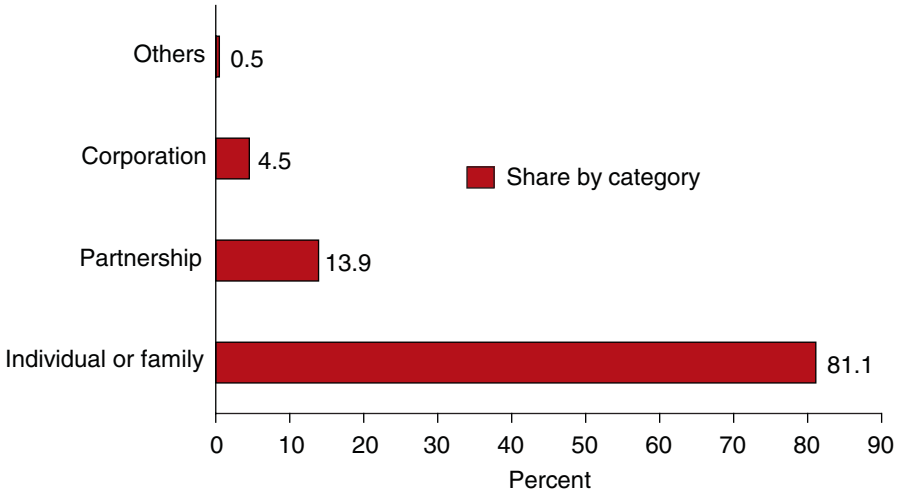
Environmental regulation, zoning, and animal nuisance laws have become increasingly important factors in structural change, particularly for large dairy farms. Water and air quality, traffic impacts, and odors are concerns related to milk production. Except for a few areas of very high animal density, these regulations have not yet had major effects on industry growth. However, the time needed to bring a new farm or expansion into full production has lengthened, and farm location is more likely to be affected by environmental issues.

Milk production decisions are firmly in the hands of individuals and families. In 2002, almost 85 percent of dairy farms were either individual or family-operated businesses or family-held corporations. Many partnerships are also restricted to family members.

Income, Costs, and Returns

Between 1991 and 2001, dairy farm household income averaged slightly lower than the income of all farm households but was close to U.S. household income, ranging from 75 percent (1994) to 120 percent (1999 and 2001) of average U.S. household income. Dairy farm households received a smaller share of their income—about one-third—from off-farm sources, compared with almost 90 percent for all farms. In addition, dairy farms receive a larger share of farm income from the primary enterprise than do most farms. Under these conditions, price variability generates higher levels of variation in dairy farm household income than for other types of farms.

Figure 7
NAICS dairy business organizations, 2002[1]



[1]North American Industry Classification System (NAICS) is used by U.S. Census Bureau to estimate farm and farm-related employment.
Source: ERS using data from USDA National Agricultural Statistics Service, *2002 Census of Agriculture, Summary and State Data*, Volume 1, Geographic Area Series Part 51. AC-02-A-51. Issued June 2004.

The wealth (net worth) of dairy farm households was among the highest, but it is held mostly as illiquid farm assets, reflecting the large investment in specialized equipment and cows (Mishra et al., 2002).

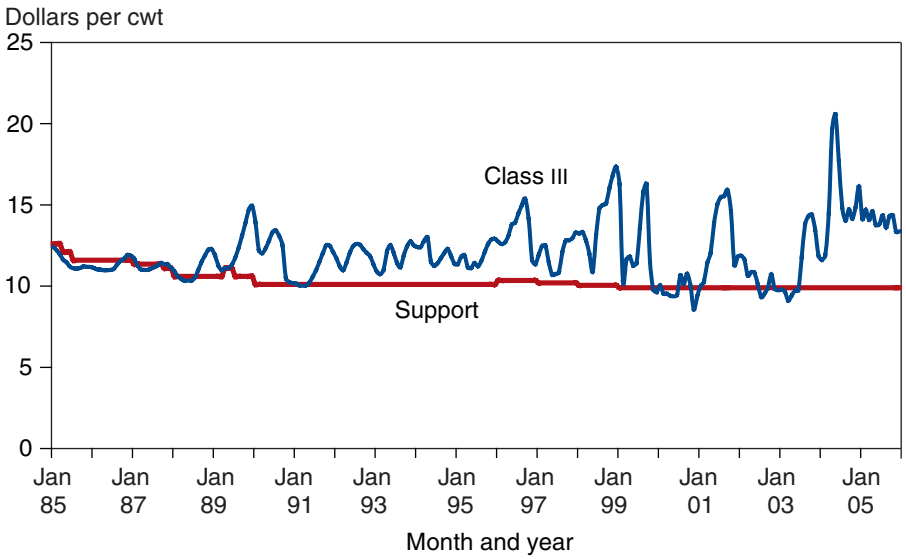
During 2000-04, dairy farms had an average $4.73 per 100 pounds of milk (cwt) left over after paying operating costs and hired labor. These returns were available to cover such costs as unpaid labor, capital costs and replacement, and general farm overhead. In three of these years, returns to cover unpaid labor, capital costs and replacement and general farm overhead were between $3 and $4 per cwt, while running above $6 in the other 2 years (ERS Costs and Returns Data at www.ers.usda.gov/Data/CostsAndReturns/testpick.htm).

Prices and Markets

Farm Prices. The all-milk price has trended very slightly upward in nominal terms between the early 1990s and 2004, although it has declined in real terms. Farm milk prices are influenced by a combination of market forces and dairy policy. Since 1990, growth in output generally has been similar to (but not synchronized with) demand expansion. Milk price volatility has become greater in recent years. Increased volatility adds challenges for farm business planning, debt repayment, and, in some cases, achieving or maintaining solvency.

Milk price variation is the largest source of variation in returns, although changes in the quantity of milk sold and the cost and amount of inputs used can be significant for individual farms. Price variations arise from both shortrun and longrun changes in supply and demand relationships and expectations of future prices. Volatility since the late 1980s appears much greater than in most previous decades. Structural changes in wholesale dairy

Figure 8
Monthly Class III and support prices, January 1985-December 2005[1]



[1]The Class III price is for milk used to manufacture cream cheese and hard cheese. The support price is the announced milk support price level.
Source: ERS using data from USDA's Agricultural Marketing Service, *Federal Milk Order Market Statistics,* various issues; and Farm Service Agency, *Milk Price Support Program Fact Sheet,* July 2004.

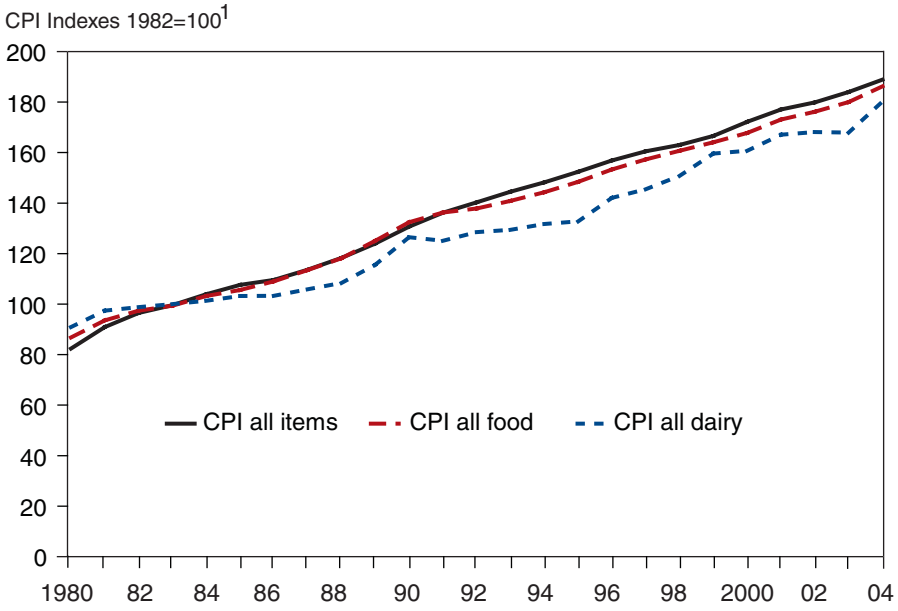
product markets, industry reluctance to carry sizable stocks and changes in the milk price support program have been the major causes of increased volatility. Since about 1990, the milk support price has generally been set far enough below market prices so that it has been breached infrequently, thus having little effect on dampening price swings.

Thin Wholesale Markets. Spot markets for the major bulk storable dairy products have long been a cornerstone of dairy markets and programs. However, traders increasingly are bypassing these key markets, a trend accelerated by increasing concentration of both sellers and buyers in recent years. Large firms generally prefer tailored flows of products of absolutely consistent quality, something that is most easily assured through contracts. A large manufacturer and a large user may well find it mutually advantageous to produce product to custom specifications, keeping that product from ever being traded in any spot markets.

Concentration creates problems for spot markets beyond simply removing product volume. Not only are there fewer traders, but individual decisions become much more potent. Decisions by a very large firm can have a significant effect on spot prices, even if that firm does no spot trading.

Retail Prices. Increases in retail dairy prices during the 1980s and early 1990s lagged price increases of all items and of all food by a considerable margin. Strong dairy supply growth and decreasing relative prices in the early 1990s were key factors in this lag. Since the mid-1990s, retail dairy prices generally have risen relative to other prices, although the relationship has been somewhat volatile. This retail price pattern resulted from continued modest supply shifts being outstripped by strong demand growth.

Figure 9
Prices of all Items, all foods, and all dairy products, 1980-2004



[1] CPI = *Consumer Price Indexes*.
Source: United States Department of Labor, Bureau of Labor Statistics, *Consumer Price Indexes*.

Trade and Trade Agreements

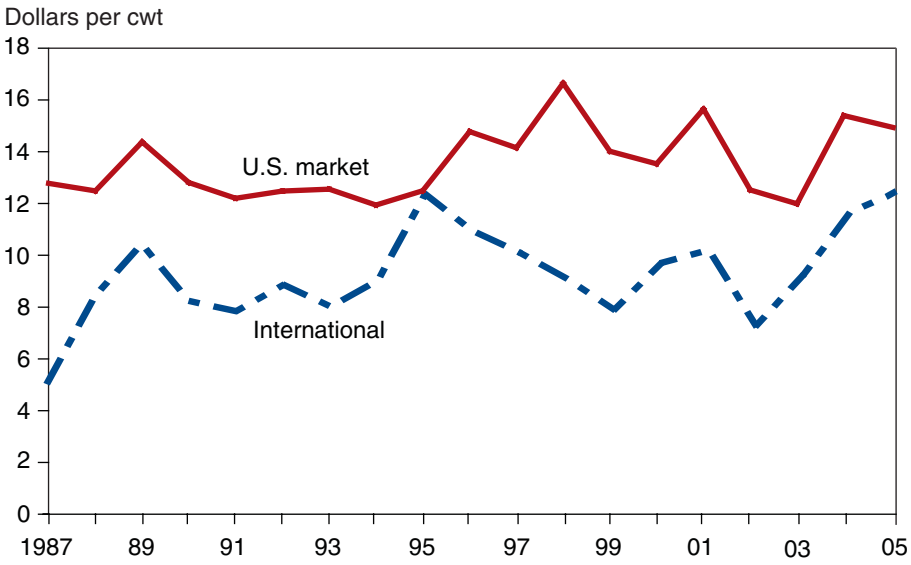
Until recently, substantial gaps between international and U.S. domestic milk values persisted, reflecting chronic large depressions of international dairy product market prices. Gaps that would have existed in any case because of New Zealand and Australia supplying markets with low-cost products were accentuated by export subsidies (particularly those of the European Union (EU)) and U.S. limits on imports. U.S. domestic prices (measured by the value of butter and nonfat dry milk produced from 100 pounds of milk) exceeded international prices by almost half during most of the 1995-2004 period. Most of this gap resulted from domestic market strength and import constraints, with the dairy price support program playing only a minor role.

The gaps between international and U.S. milkfat prices have been much larger than those on skim solids. During 1995-2004, domestic butter prices were about 175 percent of international prices, compared with nonfat dry milk prices only about 125 percent of international levels. In either case, the price relationships varied greatly from year to year.

International dairy trade has generally been small relative to milk production for the United States. Import quantities during 2000-04 equaled about 3 percent of milk production, and were only that large because the United States is the largest cheese-importing nation in the world. Much of the variation in annual imports has been due to changes in high-tariff imports of butter and cheese. Exports of skim solids were quite similar to import levels during 2000-04. However, about half of these were either subsidized or food-aid exports. Quantities of milkfat exported were only about 1 percent of production.

Figure 10

Butter and nonfat dry milk powder values per 100 pounds of milk



Source: ERS using data from USDA's Agricultural Marketing Service, *Dairy Market News,* various issues; and Foreign Agricultural Service, *Dairy: World Markets and Trade,* various issues.

Trade agreements, whether global (the World Trade Organization (WTO)), regional (the North American Free Trade Agreement (NAFTA), or bilateral (U.S.-Australia Free Trade Agreement), have become more widespread. The biggest impacts of the Uruguay Round Agreement on Agriculture (URAA) on international dairy markets were related to limits placed on export subsidies. Since the United States had been a relatively modest user of export subsidies, at least compared with the EU, the direct effects of the export disciplines have been relatively small. However, these disciplines severely limited quantities the EU could subsidize and ensure that it will not return to the massive subsidies that had often pushed international market prices extremely low.

Prior to adoption of URAA, U.S. imports of dairy products were limited to fixed amounts by so-called Section 22 quotas that had been authorized since the late 1930s. A quota for a product could be established any time imports threatened to materially interfere with the operation of the U.S. milk price support program. Under the URAA, the fixed dairy product import quotas generally were increased and converted to tariff-rate quotas (TRQs). A TRQ allows a fixed amount of a product to enter the United States at a very low tariff, while imports in excess of the fixed amount are charged a higher tariff. By charging a high tariff on imports above the set quantity, the dairy products TRQs have worked very similarly to the Section 22 quotas.

The URAA changed trade rules in one key way by prohibiting new import quotas. Consistent with the overall principle of promoting freer trade, countries could not erect new barriers restricting imports of agricultural products that were truly new or where now tradable due to technological changes. However, these provisions curtailed countries' leeway to deal with products that did not fit neatly into established import regulations (see Milk Protein Products box).

Milk Protein Products

Imports into the United States of concentrated milk protein products (casein, total milk protein, and milk protein concentrates) have been a contentious issue for some time. The root of the controversy is the gap between typically higher domestic prices for skim milk solids and lower prices of imported milk proteins. As alternative uses for skim milk, imported protein prices align with the international price of skim milk powder, which in the past had been heavily distorted by export subsidies. To the extent that imported proteins are substituted for some form of domestic skim solids, domestic milk prices are lowered or purchases of nonfat dry milk under the price support program are boosted. On the other hand, many users of imported proteins have no suitable domestic substitute.

Much of the concern over today's imports of concentrated protein products can be traced to the handling of casein imports in the past. Casein is precipitated from skim milk using technology similar to cheese-making. Originally used for industrial purposes, casein came to be used in an increasing number of foods in the 1960s and 1970s, particularly in imitation dairy products. However, any restrictive measures against casein imports were quite limited by General Agreement on Tariffs and Trade (today known as the World Trade Organization) rules. Casein was not considered a primary agricultural product and therefore was not included in the support-program waivers that allowed such things as non-tariff barriers and export subsidies.

Milk protein concentrates (MPC) are the current manifestation of a situation similar to the casein situation of the past. Like whey protein concentrates, MPCs are concentrated by ultra-filtration, leaving behind a permeate of water and some of the lactose and minerals. Wet forms of MPC began to be produced in the United States during the 1970s and were mostly used to reduce costs of transporting milk long distances for cheese or for boosting cheese yields. U.S. development of these products was fairly limited.

However, other countries (particularly New Zealand) devoted considerable efforts to produce dry MPC suitable for international trade. MPC are often produced to custom specifications with protein content ranging from 40 to 90 percent. After completion of the URAA, dry MPC emerged as a significant product in international trade. U.S. imports rose from virtually nothing in 1992 to a peak in 2000 before slipping back in recent years. There were some allegations that some of the "MPC" imported was actually a simple mixture of casein and nonfat dry milk.

MPC easily can be substituted for other forms of skim solids in many applications such as cheese products, while other applications rely on specific functional or nutritional characteristics of MPC. Processors favor MPC where the capability to tailor the product composition is important or where the lactose found in skim milk solids is not needed or wanted. High-protein foods and supplements have become a major use of MPC. However, most analysts have concluded that imports of MPC aggravated the surplus of nonfat dry milk in the late 1990s and early 2000s.

Possible actions to limit U.S. MPC imports are quite constrained by WTO rules. Negative consequences of flagrant violation of those rules, as advocated by some, could extend far beyond the direct penalties imposed. Subsidization of domestic MPC production may not be very effective and might be subject to WTO challenge. Imports of MPC may be an important issue for the domestic industry if international protein product prices are viewed as badly distorted.

Government Policy and Programs

The objectives of U.S. dairy policy have primarily focused on producer milk prices and market stability. Both national and State dairy programs operate in the United States. While Federal legislation clearly directs national programs, any influence over State programs appears limited except in cases where contiguous States coordinate efforts as in dairy compacts.

U.S. dairy policy rests on two fundamental concepts—price and income support and orderly marketing. The price and income support objective is promulgated currently through three major programs: a dairy product purchase program, a direct payment program, and a subsidized dairy product export program. Price and income support is primarily a Federal responsibility. Orderly marketing objectives, as embodied in milk marketing orders, are pursued at both the Federal and State levels. The programs designed to achieve price and income support and orderly marketing are separate but are also effectively linked.

Dairy programs have been adjusted to meet changing economic conditions facing producers and the industry. In addition, there have been subtle shifts in the level of direct government involvement in dairy markets. Prior to about 1990, prices paid to dairy farmers for manufacturing grade milk fluctuated above and below announced milk price support levels, at times triggering significant purchases for support, and the price stabilizing effects of the program were observable. Since 1989, the farm price has been above the support level and, though not the expressed objective of their use, export subsidies at certain times directly boosted domestic prices. In recent years, the milk support price has been set at a level that only provides protection against extremely low prices, and export subsidies, if used at all, have been viewed mostly as a disposal mechanism for surplus stocks.

Domestic dairy programs, particularly the milk price support program, are strongly linked to trade policy and agreements. Import controls originally were implemented to limit the cost and improve the effectiveness of the support purchase program. The direct link has been severed but import controls remain quite important. Arguably, import restrictions currently have larger price supporting effects than domestic programs.

Milk Price Support

Price Support Purchase Program

Under the Agricultural Act of 1949, the Secretary of Agriculture supports the price of milk through the Commodity Credit Corporation (CCC). The CCC purchases unlimited amounts of butter, nonfat dry milk, and cheese at announced prices, if the products are offered to it. The announced prices are calculated so as to enable plants of average efficiency to pay the announced support price for milk for manufacturing. Dairy farmers can receive and have received less than the support price, depending on supply and demand conditions, milk composition, and market competitiveness.

Early on, the milk support price was established to maintain the relationship between farm milk prices and prices farmers paid for production inputs during a base period ("parity" pricing). In the 1980s, burgeoning government product stocks and rising program costs led Congress to freeze the support price for milk. In 1985, program changes were made to slash surpluses by cutting the support price, introducing surplus-level triggers to further reduce the support price, and offering incentives to eliminate excess capacity. The 1990 Farm Act set a minimum milk support price and established an adjustment mechanism to achieve that minimum linked to projected product purchases. The 1996 Farm Act called for elimination of the support purchase program entirely at the end of 1999. However, Congress instituted emergency supplemental payments to dairy producers and extended the support price program annually. The 2002 Farm Act reauthorized the support purchase program as a long-term program and fixed the milk support price at $9.90 per cwt.

Direct Payments

Direct payments were not a major policy tool of U.S. dairy policy until the 2002 Farm Act. Dairy Market Loss Assistance (DMLA) payments were authorized for 1999, 2000, and 2001 through annual budget appropriation legislation to offset the very low milk prices received by dairy farmers during those periods. Direct payments were also used in the 1980s but they were not designed to directly affect the returns of all milk producers. To receive payments, participating producers in the two voluntary programs—the Milk Diversion Program (MDP) and the Dairy Termination Program (DTP)—had to cut production (MDP) or cease milk production for at least 5 years (DTP). Reducing CCC product purchases and cutting the costs of the milk price support program were objectives of both programs.

The Milk Income Loss Contract (MILC) program authorized in 2002 provides monthly payments to milk producers when milk prices are lower than a target price (similar to pre-1996 Farm Act target price-deficiency payments for crops). The monthly payments are based on current production and are limited to 2.4 million pounds per farm for the fiscal year. The program was terminated on September 30, 2005, but budget appropriation legislation passed early in 2006 reauthorized the program through fiscal year 2007 (October 1, 2006 through September 30, 2007). The only significant program change was to lower the payment rate to producers from 45 percent to 34 percent of the price shortfall. Program details are available at www.fsa.usda.gov/dafp/psd/MILC.htm.

Dairy Export Incentive Program

The Dairy Export Incentive Program (DEIP), established in 1985, "helps exporters of U.S. dairy products meet prevailing world prices for targeted dairy products and destinations." Its major objective is to "develop export markets for dairy products where U.S. dairy products are not competitive because of the presence of subsidized exports from other countries." Since 1990, exporters have been paid cash bonuses, allowing them to sell nonfat dry milk, butter, certain cheeses, and (formerly) dry whole milk at prices lower than the exporter's costs of acquiring them. By removing dairy

products from the domestic market, DEIP at times has played an indirect role in milk price support. Since 1995, the DEIP has been constrained by WTO commitments. Subsidized export quantities and expenditures on the subsidies were both limited. For program details and further information on exporting dairy products, see: www.fas.usda.gov/info/factsheets/deip.asp.

Orderly Marketing

Federal milk marketing orders (FMMOs) are regulations issued by the Secretary of Agriculture under the authority of the Agricultural Marketing Agreement Act of 1937, as amended, and approved by milk producers who desire the regulations. During 2004, about 61 percent of all milk marketed in the United States was marketed under Federal milk marketing orders.[3] The objective of FMMOs is to promote orderly milk marketing relationships to ensure adequate supplies of milk and dairy products to meet consumers' demands at reasonable prices.

[3]Including milk marketed under State marketing orders, more than four-fifths of U.S. milk is marketed under regulated pricing systems (for an example of a State system of marketing orders, see box, California's Milk Pricing System).

Monthly minimum prices for Grade A milk that must be paid by regulated first handlers are established and auditors verify that at least the minimum is being paid (the price milk producers actually receive generally will be higher, depending on market conditions (see appendix, How Federal Milk Marketing Order Pricing Works). A system of classified prices is used to set minimum milk class prices according to end use—there are currently four such milk classes in FMMOs. The fluid (Class I) price is the highest (Manchester and Blayney, 2001).

Formulas relate prices for milk in each class to wholesale market prices for manufactured dairy products, which in turn may be influenced by the milk price support program (fig. 11). Differences in the minimum prices among the FMMOs, which define geographic areas, are due to different Class I differentials and differing patterns of milk use (utilization rates).[4] The different Class I differentials provide incentives for milk for fluid products to move from surplus to deficit milk production areas (Manchester 1983). The Class I prices are set high enough to ensure that there will be sufficient fluid milk to meet peak demand despite seasonal, weekly, or daily variability of production and use.

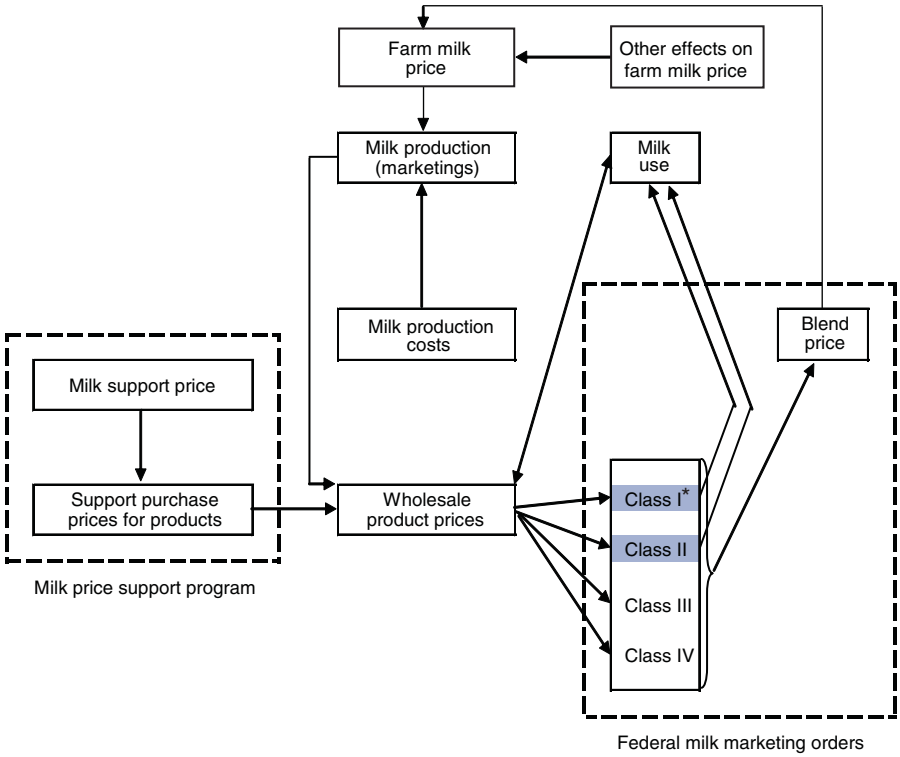
[4]The Class I price differential is the amount added to the manufacturing milk price (the higher of the Class III or Class IV values) to derive the Class I milk price. It provides a price incentive to move Grade A milk from points of production to fluid milk processing plants, which are typically located closer to population centers than to production areas (USDA, AMS, 1999).

Milk marketing orders potentially impact the consumption of dairy products through their price effects. To the extent that classified pricing under the Federal (and some State) milk marketing orders might raise the minimum price of milk used in beverage and perishable manufactured dairy products (cream products, cottage cheese, ice cream and related products) above cost-justified levels, quantities demanded of these products will be reduced. The diverted milk lowers the price of milk used in the hard manufactured products (cheese, butter, and dried milk products), increasing their consumption.

Pooling the milk revenues based on minimum prices for all uses may boost average farm returns and stimulate extra milk production, further lowering prices and increasing consumption of these manufactured dairy products. However, Class I minimum prices will also fall as they rest on the minimum manufacturing milk price serving as the Class I mover. Any redistribution of

Figure 11

Linkages between the milk price support program and the Federal milk marketing orders



*Class I, II, III, and IV milk are defined in the appendix.
Source: Manchester and Blayney, 2001.

pool revenues is therefore likely to be short-lived since market generated prices are generally above the minimum prices (see appendix.)

In the 1996 Farm Act, Congress required that the number of milk marketing orders be reduced and that several pricing issues be reexamined. The reform of the Federal milk marketing order system, effective January 1, 2000, reduced the number of Federal milk marketing orders from 31 to 11 to better reflect movements of milk, natural market boundaries, and existing institutional or market arrangements. It also made changes to pricing provisions to provide incentives for greater structural efficiencies in the assembly and shipment of milk for fluid milk products (USDA, AMS, 1999).

There have been several contentious Federal order issues addressed since implementation of the 2000 reforms. The proper level of manufacturing allowances[5], other elements of the class minimum price formulas and pooling provisions are prominent technical issues that have been considered. Very basic questions about the desirable number, size, and boundaries of orders and about the appropriate number of classes have been raised. These issues are being addressed administratively and do not necessarily need to be treated in new legislation. Since the 2000 reforms, several hearings have been held on various issues, and producers voted one order (the Western) out of existence, leaving 10 still in place.

[5]The manufacturing (or "make") allowance is the difference between the wholesale value of the products produced from 100 pounds of milk and the regulated minimum milk price for that class.

State and Regional Regulation

Several individual States implemented milk and dairy product market programs during the Depression in the 1930s, after legal constraints on Federal actions to regulate intrastate activity through marketing agreements were imposed (Manchester 1983). California, the largest milk-producing State, still has an extensive State-level milk-pricing program (see box, California's Milk Pricing System), and State regulation affects prices in at least parts of Pennsylvania, New York, and Maine. Federal and State regulation generally do not overlap.

The Northeast Interstate Dairy Compact (NIDC) was authorized in the 1996 Farm Act. The compact allowed individual States to act together to regulate fluid milk prices so as to return added revenues to milk producers in the Northeast. The NIDC included the six New England States—Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont and operated from July 1997 to September 2001. Making the NIDC permanent and permitting creation of additional compacts had both ardent supporters and opponents. Knutson, Capps, and Schwart (2003) provide a concise overview of many facets of the compact experience.

California's Milk Pricing System

California's position as the largest milk-producing State and the largest or second-largest producing State of most major dairy products means its unique milk regulations can have national effects. California's regulations were developed when it was a much more modest dairy State and was largely geographically isolated from flows of raw and fluid milk or perishable dairy products. Although milk production growth in other western areas has lessened California's isolation, the State has maintained its own milk pricing system. Several factors support continuation of the system including use of milk "quota" and established solids standards for fluid milk that are higher than in other areas.

California market order provisions are generically similar to Federal order provisions but differ in several key areas. California uses five classes of milk, instead of four. It has defined prices for separate classes for milk used in cheese production and milk used in butter production based on product prices for many more years than in the Federal marketing orders. Surveys of California's manufacturing "make allowances" are made regularly but changes to them in regulations are not made automatically—hearings and producer votes determine if changes will be made.

A major difference between the Federal and the California milk pricing systems is how the higher Class I revenues are distributed to producers. In California, a quota system, originating in the 1960s, is used to distribute the Class I revenues. Producers with quota do not share the Class I revenues equally since the quotas are based on each individual farm's history of production used in fluid products. Quotas are fully transferable among California producers and have been widely traded. The continued maintenance of the quotas underlies the capitalized value quotas have taken on over time.

California was given a legal exemption from the provision of the Nutrition Labeling and Education Act that prohibited individual States from setting different food standards of identity than the Federal standards. This enabled the State to continue to use fluid milk standards that generally require the fortification of fluid milk with added nonfat milk solids. California's unique standards have been in use since the 1960s and have resulted in increased use of nonfat solids.

Upcoming Farm Legislation Issues

Aspects of dairy policy and programs will be debated in farm legislation deliberations within the context of domestic economic priorities and international obligations. Domestic market conditions and Federal budget concerns will be important in the policy debate. International agricultural trade and domestic support issues raised in multilateral or regional trade negotiations also will be key.

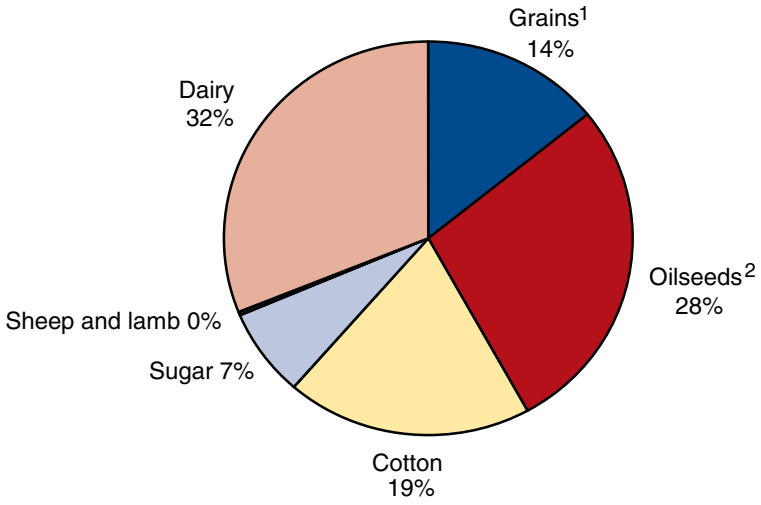
Commodity-specific policies and programs have long been the core of most farm support efforts. The upcoming farm legislation is occurring at a time when budget concerns loom large. Either the overall level of funding or the operational parameters of existing programs could be changed. For the dairy industry, the milk price support program and the operation of the Commodity Credit Corporation could come under scrutiny.

The support purchase program with a low support price, similar to the current program, serves as a safety net against extraordinarily low commodity prices and is administratively relatively simple. The procedure that establishes CCC purchase prices may be addressed in upcoming farm policy discussions. Even though the purchase price was reduced in 2001 and 2002, substantial CCC nonfat dry milk purchases, over 2.5 billion pounds in the 2000-04 period, were made because the purchase price was still above the market clearing price. When the support price is at such a low level and opportunities to adjust it are limited, the ability of the program to address price volatility is diminished.

Direct countercyclical payments, like milk income loss contract (MILC) payments, also can serve a safety net function for dairy farmers. The 2002 Farm Act established a national milk income loss contract (MILC) program to provide such a safety net. Direct payments allow the relative prices of dairy products to adjust freely and mitigate stock accumulation problems. Although the payment rate and the price level that triggers the payments are important considerations, it is the targeting of payments that is sometimes most contentious. The limit on the amount of milk for which a producer could receive MILC payments was set at 2.4 million pounds per fiscal year (October 1 through September 30). Only about one-fourth of 2004 milk production was produced on farms small enough to receive benefits on all their milk if payments were made every month. Large farms may actually be hurt by such a direct payment program if output increases by small farms result in lower milk prices that more than offset the payments large farms receive.

Benefits directly linked to current production are generally defined as trade-distorting and therefore contributing to a country's aggregate measure of support (AMS). Under the URAA procedures, the dairy contribution (from the milk price support program) to the U.S. AMS is calculated as milk production times the difference between the U.S. per cwt support price and an international market price during the base period, 1986-1988.

Figure 12
Composition of U.S. aggregate measure of support, 2001/2002



[1] Corn and rice.
[2] Soybeans, sunflower, peanuts, rapeseed, flaxseed, crambe and canola.
Source: World Trade Organization, Committee on Agriculture. Notification. G/AG/N/USA/51 March 17, 2004.

Because the base-period international price is fixed at $7.25 per cwt, well below the current milk support price, these procedures can result in a large contribution to the AMS—even if or when the international price is above the U.S. support price. Unless the calculation procedure is renegotiated, the milk price support program's AMS situation will continue to be a problem for U.S. producers and international trade negotiators.

Coda

When we began drafting this report, the most complete data available was for 2004. As we go to press in 2006, another year of data has become available. Rather than try to revise the text and guarantee faithful reporting, we note that the general trends and stories reported here are unchanged. Milk producers, dairy processing and manufacturing firms, and milk and dairy product consumers are intertwined in a complex set of economic relationships that we have only lightly touched on here. Government dairy policies and programs are key components of the industry and have changed as the industry has evolved. Policymakers and the general public will be able to evaluate proposed dairy policy or program changes by better understanding the overall structure of the dairy industry.

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Appendix: How Federal Milk Marketing Order Pricing Works

Two concepts are at the core of Federal milk marketing orders: classified pricing and market-wide revenue pooling. Classified pricing means that milk is priced based on its end use or "class." Under revenue pooling, all producers that sell milk in a particular milk marketing order area receive the same minimum "uniform" or "blend" price.

Classified Pricing

Federal milk marketing orders establish the minimum prices that regulated handlers must pay for Grade A milk based on its uses within a specified geographic area (order). The prices are minimums—producers and/or their cooperatives are free to negotiate for prices above the minimum with the handlers buying their milk (Blayney et al., 1995). Market conditions can and generally do lead to prices paid to producers or their cooperatives higher than the minimums by amounts known as "over-order" payments.

There are currently four classes of milk in Federal orders:

Class I: Beverage milk,

Class II: Fluid cream products, yogurt, perishable manufactured products (ice cream, cottage cheese, and others),

Class III: Cream cheese and hard manufactured cheese, and

Class IV: Butter and dry milks.

All classified prices are set by formulas, announced by USDA's Agricultural Marketing Service, that reflect both national and local market conditions. The highest price is that of Class I milk, recognizing the higher costs associated with supplying fluid milk markets.

The product-pricing formulas for Class III milk and Class IV milk link the Federal milk marketing orders to wholesale dairy product prices that are market determined (fig. 11). Class I prices are determined by adding differentials to the manufactured milk value (the higher of the Class III or Class IV values), a value that may reflect price support for manufactured products (butter, nonfat dry milk, and American cheese). The actual calculations of class prices involve several steps and factors that are somewhat detailed. For information on that detail see the Agricultural Marketing Service Dairy Program website at www.ams.usda.gov/dairy/index.htm.

Revenue (Price) Pooling

The minimum class prices are not paid directly to producers by the regulated handler. Milk receipts for each order are pooled by the market administrator and a use-weighted average, or blend, price (again a minimum) is calculated as a basis for payments to producers (or their cooperative) each month.

A simplified example based on a hypothetical order illustrates the procedure: Four regulated handlers are pooled under a milk marketing order surrounding Emerald City: a fluid milk bottler, an ice cream plant, a cheese

plant, and a butter-dry milk powder plant. Each handler represents one of four classes in current orders. Four producers sell milk, all of it Grade A, to each of the handlers.

Even though the individual producers sold their milk to different types of plants, they will each have the same minimum blend (or uniform) price for their milk. The monthly minimum blend price is calculated by multiplying the class prices by the amounts of milk used in each class to determine the total receipts under the order. The total receipts are then divided by the total quantity of milk sold to the regulated handlers (e.g., 180,000 cwt) to determine the minimum blend price ($12.02 per cwt) each producer receives for milk sold that month.

As noted previously, market forces generally generate prices higher than the minimums that are paid by processors and received by milk producers. The money associated with these over-order payments flow outside of the Federal market order pools and directly to producers or the cooperatives supplying the handler paying the over-order premium.

Farmer	Sells milk to:	Class	Minimum Class Price	Amount sold (cwt)	Receipts	Minimum Blend price
Brown	Butter-dry milk powder plant	IV	$10.89	37,000	$402,930	
Jones	Cheese plant	III	$11.41	80,000	$912,800	
Green	Ice cream plant	II	$11.81	15,000	$177,150	
McDonald	Fluid milk bottler	I	$13.96	48,000	$670,080	
Total				180,000	$2,162,960	$12.02