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DAIRY INDUSTRY

Information on Milk Prices and Changing Market Structure

GAO-01-561

Contents

Letter		1
Appendix I	**Objectives, Scope, and Methodology**	7
Appendix II	**Factors That Influence the Price of Fluid Milk as It Moves From the Farm to the Consumer**	15
Appendix III	**Analysis of Farm-to-Retail Prices for 2-Percent Milk in Selected Markets**	26
Appendix IV	**Retail Prices for Four Kinds of Fluid Milk in Selected Markets**	63
Appendix V	**Monthly Retail, Wholesale-, Cooperative-, and Farm-Level Prices for Four Kinds of Fluid Milk in Selected Markets**	79
Appendix VI	**Consolidation Trends and the Degree of Concentration in the Dairy Industry**	96
Appendix VII	**Research Measuring the Impact of Concentration and Market Power on the Dairy Industry and Fluid Milk Sector**	107
Appendix VIII	**GAO Contacts and Staff Acknowledgments**	120

Tables

Table 1: Portion of the Retail Price of a Gallon of 2-Percent Milk Received by Farmers, Cooperatives, Wholesale Milk Processors, and Retailers for 15 Markets, March 1998 Through September 2000 26

Table 2: Increases or Decreases in the Farm-to-Retail Price Spread for a Gallon of 2-Percent Milk for 15 Markets, March 1998 Through September 2000 28

Table 3: Correlation Between Farm-Level Price Changes and Changes in Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Milk for 15 Markets, March 1998 Through September 2000 29

Table 4: Correlation Between Cooperative-Level Price Changes and Changes in Wholesale and Retail Prices for a Gallon of 2-Percent Milk for 15 Markets, March 1998 Through September 2000 30

Table 5: Correlation Between Wholesale-Level Price Changes and Changes in Retail Prices for a Gallon of 2-Percent Milk for 15 Markets, March 1998 Through September 2000 30

Table 6: Average Annual Retail Price for a Gallon of 2-Percent Milk in Selected Markets, 1998 31

Table 7: Average Annual Retail Price for a Gallon of 2-Percent Milk in Selected Markets, 1999 32

Table 8: Average Annual Retail Price for a Gallon of 2-Percent Milk in Selected Markets, 2000 32

Table 9: Atlanta, Georgia, Market, Per Gallon Milk Prices, March 1998 Through September 2000 80

Table 10: Boston, Massachusetts, Market, Per Gallon Milk Prices, March 1998 Through September 2000 81

Table 11: Charlotte, North Carolina, Market, Per Gallon Milk Prices, March 1998 Through September 2000 82

Table 12: Cincinnati, Ohio, Market, Per Gallon Milk Prices, March 1998 Through September 2000 83

Table 13: Dallas, Texas, Market, Per Gallon Milk Prices, March 1998 Through September 2000 84

Table 14: Denver, Colorado, Market, Per Gallon Milk Prices, March 1998 Through September 2000 86

Table 15: Miami, Florida, Market, Per Gallon Milk Prices, March 1998 Through September 2000 87

Table 16: Milwaukee, Wisconsin, Market, Per Gallon Milk Prices, March 1998 Through September 2000 88

Table 17: Minneapolis, Minnesota, Market, Per Gallon Milk Prices, March 1998 Through September 2000 89
Table 18: New Orleans, Louisiana, Market, Per Gallon Milk Prices, March 1998 Through September 2000 90
Table 19: Phoenix, Arizona, Market, Per Gallon Milk Prices, March 1998 Through September 2000 91
Table 20: Salt Lake City, Utah, Market, Per Gallon Milk Prices, March 1998 Through September 2000 92
Table 21: San Diego, California, Market, Per Gallon Milk Prices, March 1998 Through September 2000 93
Table 22: Seattle, Washington, Market, Per Gallon Milk Prices, March 1998 Through September 2000 94
Table 23: Washington, D.C., Market, Per Gallon Milk Prices, March 1998 Through September 2000 95
Table 24: Share of Milk Delivered By the Four Largest Dairy Cooperatives in Selected Markets for the Month of December, 1997-1999 99
Table 25: Recent Major Acquisitions of Dairy Processors in the United States by Suiza Foods Corporation and Dean Foods Company 100
Table 26: Percentage of Fluid Milk Marketed by the Top Four Fluid Milk Processors in 14 Selected Markets, for the Month of December, 1997-1999 101
Table 27: Market Share of the Top Four Supermarkets in Selected Markets in 1992 and 1998 103

Figures

Figure 1: Selected Fluid Milk Markets with the Corresponding Defense Commissaries Used for Our Analysis of Milk Prices, and the Federal Milk Marketing Order Areas--January 1, 2000 10
Figure 2: Selected Fluid Milk Markets and the Corresponding Federal Milk Marketing Orders (as they existed prior to January 1, 2000), Used In Our Analysis of Concentration at the Dairy Cooperative and Processor Levels 13
Figure 3: Estimated Costs of Marketing a Gallon of 2-Percent Milk in the New York Metropolitan Area, 1995 22
Figure 4: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Atlanta, Georgia, Market 33

Figure 5: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Boston, Massachusetts, Market 35
Figure 6: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Charlotte, North Carolina, Market 37
Figure 7: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Cincinnati, Ohio, Market 39
Figure 8: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Dallas, Texas, Market 41
Figure 9: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Denver, Colorado, Market 43
Figure 10: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Miami, Florida, Market 45
Figure 11: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Milwaukee, Wisconsin, Market 47
Figure 12: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Minneapolis, Minnesota, Market 49
Figure 13: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the New Orleans, Louisiana, Market 51
Figure 14: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Phoenix, Arizona, Market 53
Figure 15: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Salt Lake City, Utah, Market 55
Figure 16: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the San Diego, California, Market 57
Figure 17: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Seattle, Washington, Market 59
Figure 18: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Washington, D.C., Market 61

Figure 19: Atlanta, Georgia, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 64
Figure 20: Boston, Massachusetts, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 65
Figure 21: Charlotte, North Carolina, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 66
Figure 22: Cincinnati, Ohio, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 67
Figure 23: Dallas, Texas, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 68
Figure 24: Denver, Colorado, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 69
Figure 25: Miami, Florida, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 70
Figure 26: Milwaukee, Wisconsin, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 71
Figure 27: Minneapolis, Minnesota, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 72
Figure 28: New Orleans, Louisiana, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 73
Figure 29: Phoenix, Arizona, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 74
Figure 30: Salt Lake City, Utah, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 75
Figure 31: San Diego, California, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 76
Figure 32: Seattle, Washington, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 77
Figure 33: Washington, D.C., Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk 78

Abbreviations

AMS	Agricultural Marketing Service
DOD	Department of Defense
ERS	Economic Research Service
GAO	General Accounting Office
NASS	National Agricultural Statistics Service

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United States General Accounting Office
Washington, DC 20548

June 15, 2001

The Honorable Russell D. Feingold
The Honorable Patrick J. Leahy
United States Senate

Each year about 7 billion gallons of fluid drinking milk (fluid milk) are marketed in the United States yielding approximately $22 billion in annual retail sales. Farmers, cooperatives, wholesale milk processors,[1] and retailers participate in the process of moving milk from the dairy farm to the consumer. Each of these entities performs a distinct function in the production, processing, distribution, and sale of milk and each receives a portion of the retail price of a gallon of milk for the functions they perform. Recently, milk prices at the farm-level have fallen sharply, prompting the Congress to authorize about $675 million dollars in the past year of emergency assistance to dairy farmers to help mitigate the effects of low farm-level milk prices. At the same time, fluid milk prices at the retail level have not experienced a similar decline. Consequently, the growing price spread between farm and retail milk prices has raised concerns.

At your request, we reexamined issues pertaining to fluid milk pricing and marketing and updated the information included in our October 8, 1998, report.[2] This report examines (1) the factors that influence the price of milk as it moves from the farm to the consumer, (2) the proportionate breakdown of the retail price of a gallon of milk received by farmers, cooperatives, wholesale milk processors, and retailers, (3) how changes in farm and retail milk prices affect the farm-to-retail milk price spread, (4) how price changes at any level of the marketing chain relate to changes in prices at other levels, and (5) the retail prices of the four types of fluid milk—whole, 2-percent (or reduced fat), 1-percent (or low-fat), and skim (or fat-free)—in selected markets. In addition, you asked us to provide information on consolidation and concentration trends in the dairy

[1] Wholesale milk processors include bottlers and major retail food chains with bottling plants, and cooperatives that process, package, and distribute fluid milk for sale to retailers. We did not include other entities that market milk at the wholesale level.

[2] *Dairy Industry: Information on Prices for Fluid Milk and the Factors That Influence Them* (GAO/RCED-99-4, Oct. 8, 1998).

industry and what is known about the impact of concentration on fluid milk prices.

To provide this information, we conducted a comparative analysis of fluid milk prices at each level of the marketing chain for selected markets in 14 states nationwide and the District of Columbia during the period of March 1998 through September 2000.[3] Except for our retail price comparison of the four types of milk, our analysis generally focused on 2-percent milk sold in gallon containers—the largest volume of milk sold nationwide.

In summary, we found the following:

- As we reported in 1998, prices at all levels of the fluid milk marketing chain are determined by the interaction of numerous supply and demand factors. A number of factors influence the supply of milk that entities at one level of the fluid milk marketing chain are willing to sell to entities at the next level, including the costs incurred in the production and marketing of fluid milk; government policies that establish minimum prices for unprocessed milk used for fluid purposes; the degree of competition existing in the market place; and the price that the entities expect to receive for the milk. Similarly, the retail price of milk and substitute goods, along with the size, age, tastes, and income levels of the population living in a given marketing area, can influence that area's demand for fluid milk. Furthermore, the retail price of milk is influenced by retailers' operating costs, their need to earn a return on their investment, and other factors, such as the pricing strategies which retailers and their competitors use to set prices for milk and other products. Since we last reported on this issue, the most significant changes affecting fluid milk prices are the modifications made to the federal milk marketing order system, including the method used to set minimum prices for unprocessed milk in federally regulated markets. These changes resulted in the federally established minimum prices for fluid milk being higher in most markets than they would have been if the changes had not been made.
- Between March 1998 and September 2000, on average, farmers received 43 percent, cooperatives 5 percent, wholesale milk processors 33 percent, and retailers 19 percent of the retail price of a gallon of 2-percent milk in

[3] The 15 markets included in our report are: Atlanta, Boston, Charlotte, Cincinnati, Dallas, Denver, Miami, Milwaukee, Minneapolis, New Orleans, Phoenix, Salt Lake City, San Diego, Seattle, and Washington, D.C.

the markets we reviewed. However, these numbers varied widely depending on the specific market. For example, the farmers' portion of the price of a gallon of 2-percent milk ranged from 35 percent to 52 percent, while retailers collected anywhere from 2 percent to 33 percent, depending on the location analyzed.

- For the period we reviewed, the price spread between farm-level and retail-level milk prices increased in 9 of the 15 markets. Retail prices remained steady or increased in 12 of the 15 markets. However, farm-level prices in almost all of the markets showed no statistically significant trend when we compared prices at the beginning and end of our review period. Farm prices did experience considerable volatility, with price peaks in certain months that were significantly higher than other months.
- As expected, changes in milk prices at one level of the milk marketing chain had the tendency to translate directly to price changes at the next immediate level for our review period. For example, we found a strong correlation between changes in farm and cooperative prices and between wholesale and retail prices in most of the markets we reviewed. In contrast, the correlation between changes in farm-level and retail-level prices was weaker.
- Retail prices for the four kinds of milk varied significantly in the markets we analyzed. For example, we found that some markets sold 1-percent milk at the lowest price while others sold skim and 2-percent milk at the lowest price.
- The dairy industry, like much of the agricultural sector, has faced an increased amount of consolidation in the past decade. As a result, dairy farms, cooperatives, wholesale milk processors, and retail grocery stores have all witnessed consolidation leading to fewer, but larger, players in the industry and a greater degree of concentration at each level of the marketing chain. For example, between 1997 and 1999 in 11 of the 14 federal markets for which we could obtain data, the degree of concentration—measured as the market share of the top four players in the market—-at the cooperative level increased from 72 to 77 percent. At the wholesale level for these 14 federal markets, the degree of concentration increased from 69 to 76 percent. If high levels of concentration occur in a market or industry that lacks competition or has barriers to entry, it can raise concerns and lead to a federal investigation or intervention by the Federal Trade Commission (FTC) or the Department of Justice. In recent years, FTC and Justice have intervened in several cases where merger and consolidation activities of dairy processors or retail grocery stores would have reduced competition in some markets. However, only a limited amount of research has been conducted to determine the impact of concentration on fluid milk prices. The relevant studies that we reviewed show mixed results about the

effects of concentration on prices. While some studies reported that the increased concentration could lead to greater market power and higher prices, others noted that the increased concentration led to greater economies of scale and lower costs.

We presented a draft of this report to USDA and DOD for comment. USDA and DOD officials generally agreed with the information presented in the report. The agencies also provided us with technical clarifications that we incorporated as appropriate.

This report is divided into seven appendixes, each describing an aspect of our analysis of fluid milk prices in 15 markets between March 1998 and September 2000. Appendix I describes in detail our objectives, scope, and methodology. Appendix II describes the factors that influence prices as milk moves from the farmer to the consumer. Appendix III provides information on average fluid milk prices at the farm, cooperative, wholesale, and retail levels; changes in farm and retail milk prices and how they affect the farm-to-retail price spread; and the extent to which price changes at one level in the milk marketing chain are related to price changes at other levels. Appendix IV compares retail prices of whole, 2-percent, 1-percent, and skim milk. Appendix V provides the average monthly prices of the four types of milk at each level of the milk marketing chain. Appendix VI provides information on consolidation trends and concentration levels in the dairy industry. Appendix VII provides a technical review of recent research to measure the effects of industry concentration and market power on fluid milk prices.

Agency Comments

We provided the U.S. Department of Agriculture (USDA) and the Department of Defense (DOD) with a draft of this report for their review and comment. On May 18, 2001, we met with officials from USDA's Agricultural Marketing Service (AMS) including the Chief Economist of AMS, Economic Research Service, and others to obtain their oral comments on the draft report. The USDA officials generally agreed with the information presented in the report, but reiterated their concerns about our use of commissary prices as proxy for wholesale milk prices. (USDA officials had raised similar concerns for our 1998 report.)

According to the officials, commissary prices may not be a good surrogate for wholesale prices because (1) some of the commissaries are not in close proximity to the markets we analyzed, (2) the wholesale price data were derived from a single store in each market we analyzed, and (3) the commissary price is generally based on contracts awarded to the

lowest-cost bidder and may not reflect the wholesale prices paid by retailers in a given market. However, commissary prices were the best surrogate we could obtain for wholesale prices. Actual wholesale price data are considered proprietary industry data and were unavailable. We generally agree with USDA's concerns that commissary prices may not be fully representative of wholesale prices because they are derived from a single store in each of the markets and are often based on contracts awarded to the lowest-cost bidder. However, we disagree with USDA's comment that the commissaries we selected were not in close proximity to the markets we analyzed. As displayed in figure 1 in appendix I, for almost all of the 15 markets included in our analysis, the commissary that we selected was within the marketing area being analyzed.

USDA officials also provided us with technical comments that we incorporated into the report as appropriate.

In its comments on a draft of this report, DOD stated that it agreed with the milk price information obtained from the defense commissaries. In addition, DOD provided us with technical comments that we have included as appropriate.

To update our information of the major factors influencing milk prices, we contacted several national dairy experts working with the federal government, cooperatives, processors, or in academia. We also reviewed legislation, studies, and other publications detailing current trends and transformations in the structure of the dairy industry. To update our information on the pricing relationships among the various levels of the milk marketing chain, we analyzed milk prices in 15 selected markets nationwide, ensuring that (1) these markets provided geographical coverage, (2) at least one market was located in each of the new federal milk marketing orders, and (3) the selected markets included both state and federally regulated markets. For these 15 markets, we obtained data on the prices received by farmers, cooperatives, wholesale milk processors, and retailers, from USDA, a state milk control agency, DOD, and a private data-collection company. We limited our data collection efforts to whole, 2-percent, 1-percent, and skim milk sold in gallon containers—which together constitute about 66 percent of the milk sold in the United States. We limited our detailed data analysis primarily to 2-percent milk sold in gallon containers. As a result, our analysis may not reflect pricing trends for all types of milk. (See app. I for a detailed description of our scope and methodology.) We did not verify the accuracy of the data we received because we did not have access to the information

from which they were compiled. We therefore attributed all the data used in our analysis to the source from which we obtained it. To provide information on trends in consolidation in the dairy industry and the impact of concentration on fluid milk prices, we analyzed national and regional milk marketing data collected by USDA for the month of December for the consecutive years of 1997, 1998, and 1999, and reviewed recent academic and government studies on this issue.

We conducted our review from July 2000 through May 2001 in accordance with generally accepted government auditing standards.

As arranged with your offices, unless you publicly announce its contents earlier, we will make no further distribution of this report until 30 days after the date of this letter. At that time, we will send copies to the Senate Committee on Agriculture, Nutrition, and Forestry; the House Committee on Agriculture; other appropriate congressional committees; interested Members of Congress; the Honorable Ann M. Veneman, Secretary of Agriculture; the Honorable Donald H. Rumsfeld, Secretary of Defense; the Honorable Mitchell Daniels, Jr., Director, Office of Management and Budget; and other interested parties. Copies will also be made available to others upon request.

If you or your staff have any questions about this report, please contact me or Anu Mittal at (202) 512-3841. Other key contributors to this report are listed in appendix VIII.

Lawrence J. Dyckman
Director, Natural Resources
and Environment

Appendix I: Objectives, Scope, and Methodology

In April 2000, Senators Feingold and Leahy requested that GAO examine a number of issues concerning the pricing and marketing of fluid drinking milk (fluid milk) in the United States. Specifically, they asked us to update the information contained in our 1998 report, entitled *Dairy Industry: Information on Prices for Fluid Milk and the Factors That Influence Them* (GAO/RCED-99-4, Oct. 8, 1998). This report examines (1) the factors that influence the price of milk as it moves from the farm to the consumer, (2) the proportionate breakdown of the retail price of a gallon of milk received by farmers, cooperatives, wholesale milk processors, and retailers, (3) how changes in farm and retail milk prices affect the farm-to-retail milk price spread, (4) how price changes at any level of the marketing chain relate to price changes at other levels, and (5) the retail prices of the four types of fluid milk—whole milk, 2-percent (or reduced-fat), 1-percent (or low-fat), and skim (or fat-free) milk—in selected markets. In addition, you asked us to provide information on consolidation trends in the dairy industry and the impact that the resulting concentration has had on the price of fluid milk.

To obtain current information on the major factors that influence the price of milk as it moves from the farm to the consumer, we updated the information contained in our October 1998 report by reviewing documents and interviewing officials from the U.S. Department of Agriculture's (USDA), Agricultural Marketing Service (AMS), Economic Research Service (ERS), and Rural Business-Cooperative Service. We also obtained documents from and the views of academic researchers at Cornell University, the University of Connecticut, the University of Wisconsin, and Texas A&M University, and industry representatives of the Food Marketing Institute and International Dairy Foods Association. In our report, we use Cornell University's 1995 data on the cost of marketing a gallon of 2-percent milk in the New York metropolitan area because it is the most current data available. We also asked the various government officials, academic researchers, and industry representatives that we contacted to comment on the current relevance and accuracy of these data.

To obtain information on the proportionate breakdown of the retail price of a gallon of fluid milk received by farmers, cooperatives, wholesale milk processors, and retailers; changes in farm and retail prices and their effect on farm-to-retail price spreads; and the relationship among price changes at different marketing levels, we obtained information on milk prices in 15 selected markets throughout the United States. These markets were selected because (1) the data were available for these locations, (2) they provided geographical coverage of the nation, and (3) they represented

both state- and federally-regulated markets. For these markets, we collected data on the prices received by farmers, cooperatives, wholesale milk processors, and retailers for March 1998 through September 2000. We limited our data collection efforts to the sale of whole, 2-percent, 1-percent, and skim milk sold in gallon containers, which constitute about 66 percent of the fluid milk sold in the United States.

No precise method exists by which to calculate or determine the price that farmers receive for fluid milk. Because dairy farmers receive a blend price for their milk—which is the average price for milk used for fluid and manufactured products—it is not possible to precisely calculate the value of milk used for just fluid milk. Any selected method only provides an approximation of the value received by farmers for milk that is to be used for fluid purposes, and should not be viewed as a precise measure. Therefore, to determine an estimated farm-level price for fluid milk, we used data provided by AMS. AMS developed an adjustment, which we deducted from the announced cooperative Class I price, to obtain the estimated farm-level fluid milk price for each of the selected cities in our review except San Diego, California which is not covered by the Federal Milk Marketing Order program.[1] The AMS-developed adjustment takes into consideration farm-to-plant hauling costs, cooperative dues and capital assessments, mandatory advertising and promotion costs, competitive and receiving credits, and a representative estimate of the value of reimbursements to cooperatives for the services performed for handlers and for transportation costs not covered by the order minimum price. An AMS official noted that values of some of the items that make up the adjustment are not available for the fluid milk market in a specific city, but rather for all the milk used in an entire order's marketing area in which the city is located. Therefore, an order-wide value used for any of these items provides an estimate rather than the actual city-level value for the item. Also, the values for two of the adjustment items—reimbursements to cooperatives for services performed for handlers and for transportation costs not covered by the order minimum price—were not readily available so they were estimated indirectly based on other reported data items and, in some cases, anecdotal information provided by industry members. However, even after considering these limitations, AMS believes that the estimated farm level price provides a good representation of the price that

[1] Under the federal milk marketing orders, a classified pricing plan provides different classes and minimum prices for milk depending on how the milk is used. Milk used in fluid products is placed in Class I, which is the highest-priced class. Milk used for various manufactured products is placed in lower-priced classes.

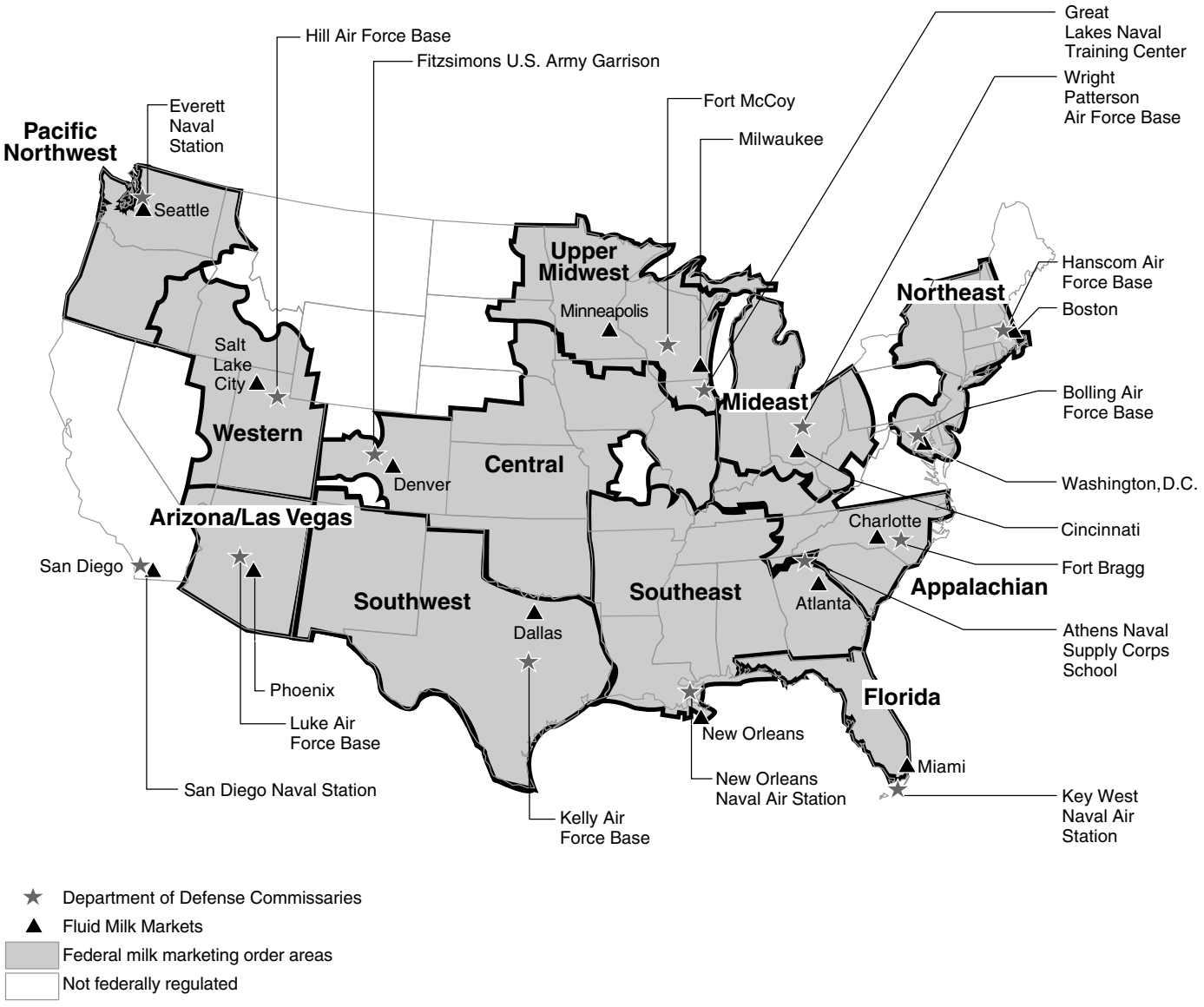
dairy farmers receive for fluid milk. For the farm-level price for the San Diego, California, market, we used the California mailbox price data that are collected by the state. The mailbox price is the weighted average of the prices received by all dairy farmers in the market and therefore is computed as the total net dollars received for milk divided by the total pounds of milk marketed.

To determine cooperative-level prices, we used AMS' announced cooperative prices to represent prices that wholesale milk processors paid to cooperatives. Wholesale milk processors in federally regulated markets generally purchase milk from cooperatives and pay the federal minimum price for fluid milk plus premiums that are negotiated between cooperatives and wholesale milk processors. The announced cooperative price is the Class I milk price announced by the major cooperative in each of the markets. The announced cooperative price does not apply to all Class I sales in federally regulated markets and is not necessarily the price actually received for all of the fluid milk sold by the major cooperative. The announced cooperative prices have not been verified by USDA as actually having been paid by handlers. For San Diego, California—a state-regulated market—we used the minimum fluid prices established by the state. Data on the premiums paid in excess of these minimums were not available for this market. See appendix II for a detailed discussion of over-order premiums.

To determine wholesale-level prices, we used the prices paid by the Department of Defense's Commissary Agency under competitive and non-competitive contracts to wholesalers. We used commissary prices as a surrogate for privately established wholesale prices because (1) defense commissaries sell groceries at cost to active and retired military personnel and (2) wholesale price data are considered proprietary by industry officials and were not available to us. According to Defense Commissary officials, the commissary network of stores ranks seventh in the United States in terms of sales volume for supermarket chains. For each of the 15 markets we reviewed, we selected a nearby commissary and the Defense Commissary Agency provided us with the monthly wholesale prices that selected commissaries paid for gallons of whole, 2-percent, 1-percent, and skim milk. We recognize that these locations may not provide an ideal match with the other price data analyzed for a given location; however, these were the best wholesale data that we could obtain. In those locations where commissaries sold more than one brand of milk, we obtained the prevailing price for the brand that had the highest sales volume for the period we reviewed. Figure 1 shows the locations of the

15 selected markets, corresponding commissaries, and the federal milk marketing order areas.

Figure 1: Selected Fluid Milk Markets With the Corresponding Defense Commissaries Used for Our Analysis of Milk Prices, and the Federal Milk Marketing Order Areas--January 1, 2000



Source: Based on USDA and Defense Commissary Agency information.

For retail-level prices, we contracted with A.C. Nielsen, a private data collection and analysis company, to obtain average monthly retail prices for gallons of whole, 2-percent, 1-percent, and skim milk for supermarkets with yearly sales exceeding $2 million for the markets included in our analysis.

To determine the (1) proportionate breakdown of the retail price of a gallon of milk received by farmers, cooperatives, wholesale milk processors, and retailers; (2) how changes in retail and farm prices affect the farm-to-retail price spread; and (3) how price changes at any level of the marketing chain relate to changes in prices at other levels, we limited our analysis to 2-percent milk, which currently represents the largest volume of reduced-fat milk sold nationwide. Therefore, our analysis of 2-percent prices may not necessarily reflect pricing patterns and trends for the other three kinds of milk. (Appendix III includes graphs that show the relationships among the farm, cooperative, wholesale, and retail prices for a gallon of 2-percent milk for each of the 15 markets.) Because farm-level and cooperative-level prices reflect a higher milkfat content than is present in 2-percent milk, we adjusted these prices to reflect the value of removing milkfat and replacing it with skim milk.[2] This adjustment allowed us to use farm- and cooperative-level prices that were comparable to the wholesale- and retail-level prices for our analysis.

To determine the degree that farm and retail prices had changed and the effect these changes had on the farm-to-retail price spread from March 1998 through September 2000 for each of the 15 markets, we used a statistical procedure to estimate farm-level and retail prices at the beginning and end of the period.[3] We used estimated rather than actual prices to reduce the influence of the starting and ending months and years

[2] For San Diego, California, we used prices that were adjusted for 2-percent milkfat and 10-percent nonfat milk solids so that they were comparable with retail milk sold in that state.

[3] A regression procedure was used for each market to determine whether the price could be reliably predicted as a function of time for both farm-level and retail prices. This procedure allowed us to estimate initial and final prices for farm-level and retail prices that take into account the variability in these price series during the 31-month period. A statistically significant relationship indicates that a stable trend, either up or down, was found between price and time. For statistically significant relationships, a final price estimate (computed for the last month of our data series) was calculated and compared to an estimated price calculated for the first month. In the absence of a statistically significant relationship—when no trend differing from zero was found—initial and final estimates of price are the same, even if actual beginning and final prices differ.

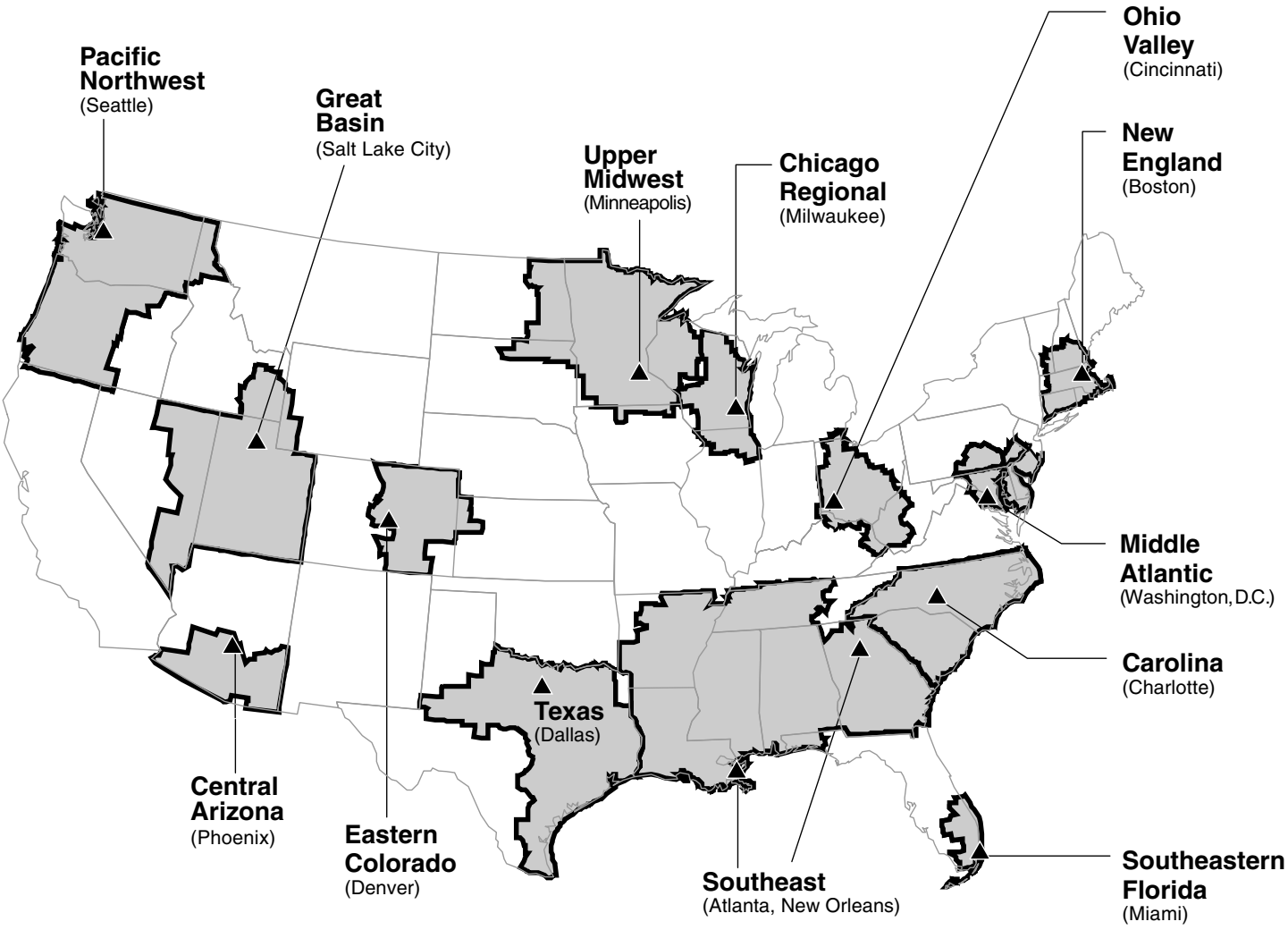
selected for our analysis in markets in which there was considerable month-to-month variability in milk prices. The differences between the estimated initial and final prices represent the trend changes during the period. In some cases, this difference may be zero because there is no apparent trend. We calculated the change in the farm-to-retail price spread as the estimated retail price difference minus the estimated farm price difference.

To describe the relationship between price changes at any given level in the milk marketing chain and price changes at the other levels, we tested for correlations between price changes at the various levels for each of the 15 markets included in our analysis. Specifically, we calculated coefficients describing the degree of correlation between changes in farm-level prices and price changes at the cooperative, wholesale, and retail levels; price changes at the cooperative-level and price changes at the wholesale and retail levels; and price changes at the wholesale and retail levels. In appendix III, we report those correlation coefficients that are statistically different from zero at the 95-percent confidence level.

To provide information on the retail prices for four kinds of milk, we analyzed the retail price data that we obtained from A.C. Nielsen. These data are arrayed in appendix IV for each of the selected 15 markets for March 1998 through September 2000.

To obtain information on consolidation trends in the dairy industry, we reviewed reports and studies by USDA, dairy and supermarket industry organizations, and academic experts. We interviewed USDA officials and other dairy industry experts regarding the structural changes occurring in the dairy industry and retail food industry. To determine the degree of concentration at various levels of the fluid milk marketing chain, we estimated the market share of the four largest dairy cooperatives and the four largest wholesalers in each of 14 federally-regulated markets included in our review. For this analysis, we obtained proprietary data from USDA for those federal milk marketing order areas (as they existed prior to January 2000), that corresponded to the 14 selected markets. For each of the 14 markets, we analyzed data on total milk deliveries by dairy cooperatives and on total fluid milk processed by wholesalers during the month of December in 1997, 1998, and 1999. Figure 2 shows the locations of the 14 markets and their corresponding federal milk marketing order area as it existed prior to January 2000. In addition, we obtained data from the Economic Research Service on market share of the four largest supermarkets in 1992 and 1998 for the 15 markets included in our review.

Figure 2: Selected Fluid Milk Markets and the Corresponding Federal Milk Marketing Orders (as they existed prior to January 1, 2000), Used in Our Analysis of Concentration at the Dairy Cooperative and Processor Levels



Source: Based on USDA information.

To obtain information on the impact of concentration and market power on fluid milk prices, we summarized the methods and results of several economic studies relating to market power in the dairy industry or fluid milk market. We reviewed the economic literature on this issue and discussed our observations about these studies with several USDA officials and other agricultural economists familiar with dairy and industrial organization. We also analyzed the economic issues surrounding

the application of market power models to the dairy industry and the fluid milk market.

Appendix II: Factors That Influence the Price of Fluid Milk as It Moves From the Farm to the Consumer

Each year the United States processes about 7 billion gallons of the approximately 20 billion gallons of raw milk into fluid milk products, such as flavored milks, buttermilk, whole, 2-percent, 1-percent, and skim milk, that yield approximately $22 billion in retail sales. The rest of the raw milk supply is used to produce manufactured products, such as butter, ice cream, yogurt, powdered milk, and cheese. Dairy farmers receive a price for unprocessed milk, and each entity involved in the processing and marketing of fluid milk adds value to the product and receives a portion of the difference between the farm and retail price. (This difference is known as the price spread.) This appendix describes how unprocessed milk prices are determined at the farm level and the factors that influence the price of milk as it moves from the farm to the retail level. In addition, it provides information on the costs associated with marketing milk, as estimated by researchers at Cornell University, and industry officials' views regarding these estimates. We could not obtain specific cost data for our analysis because wholesale and retail cost data in the private sector are proprietary.

Federal and State Policies Influence Milk Prices at the Farm Level

Farm level prices for the unprocessed milk that is sold for use in fluid milk products are determined by supply and demand forces that are influenced by federal and state dairy programs. Federal and state programs ensure that farm prices do not fall below a minimum level or provide a safety net for individual farmers who lack market power compared with other entities, such as wholesale milk processors and retailers. The primary federal programs include the milk marketing order and dairy price support programs.

About 70 percent of the milk produced in the United States is regulated under the federal milk marketing order program. The federal program sets minimum prices that must be paid to farmers for unprocessed fluid grade milk in specified marketing order areas. These prices vary by the class of product for which the milk is used, and for milk used in fluid products the minimum price also varies by location.

Since our last report, the method for determining the minimum price for fluid milk under the federal milk marketing order program has changed as a result of reforms authorized by the Federal Agriculture Improvement and

Reform Act of 1996 (1996 farm bill).[1] As of January 1, 2000, minimum prices are no longer based on the price of Grade B milk—manufacturing-grade milk that can only be used for manufactured dairy products—in Minnesota and Wisconsin. Under the revised program, USDA uses the following four classes of milk prices: (1) Class I prices for milk used for fluid purposes; (2) Class II prices for milk used for soft manufactured products such as yogurt and ice cream; (3) Class III prices for milk used in hard cheese production; and (4) Class IV prices for milk used for butter and powdered milk. This modification to the order recognizes that the markets for cheese and butter/powdered milk are distinct and therefore should be priced separately. Under the revised federal milk marketing order program, the minimum price that processors pay for Class I milk is based on the higher of the Class III or Class IV price in each month.[2] In addition, for milk used for fluid products, Class I differentials are also added to the higher of the Class III or Class IV prices to set the minimum Class I price in every county of the contiguous 48 states. USDA estimates that after the changes went into effect on January 1, 2000, the average Class I differential increased by 7 cents per hundredweight.

Dairy farmers who sell milk to wholesale milk processors who are regulated by a federal milk marketing order receive an average price or blend price that is based on the weighted average of the four usage classes for all the raw milk sold to all processors regulated by that marketing order. The average price of milk they receive depends, in part, on the extent that the total milk supply in an order is being used for fluid or manufacturing purposes. For example, in some areas of the country, such as the Southeast region, fluid milk accounted for a greater proportion of a dairy farmer's milk check—about 66 percent in October 2000. However, in that same month, in other parts of the country, such as the Upper Midwest region, fluid milk prices accounted for only about 20 percent of a dairy farmer's milk check. Buyers of milk regulated by federal and state programs are permitted to pay farmers prices in excess of the established minimums—known as over order premiums.

[1] The 1996 farm bill authorized USDA to reform the federal milk marketing order program to include (1) the consolidation of the existing 31 milk marketing orders to between 10 and 14 orders and (2) revising the basic formula price which is used to set the federal minimum price for milk.

[2] According to a USDA estimate, in calendar year 2000, this change resulted in about a $1.76 per hundredweight increase in the Class I milk price in calendar year 2000.

Some areas, such as California, which are not under the federal milk marketing order program, are covered by state programs. In these areas, dairy farmers are paid the minimum milk prices that are established by the state government. These minimum prices may be higher than federal minimum prices.

In addition to federal and state regulatory programs that enforce minimum milk prices, in 1996, the Congress approved the creation of the Northeast Interstate Dairy Compact for six New England states.[3] The Compact supplements federal and state programs by setting the minimum price to be paid by processors for fluid milk marketed in the six-state area. In July 1997, the Compact set a minimum price of $16.94 per hundredweight for fluid milk, and that minimum price has not changed. Consequently, in months when the federal minimum price for fluid milk for the Northeast milk marketing order falls below the Compact price, milk processors in that order must pay at least the Compact price on their Class I use. In other months, when the federal minimum price is higher than the Compact price, milk processors must pay at least the federal minimum price. Since the Compact price was established, federal minimum prices in the Northeast milk marketing order have ranged between $13.50 to $20.50 per hundredweight. Dairy farmers from other states that supply milk to the Compact area also benefit from the Compact set minimum. A number of other regions in the country, such as some southeastern states, are considering the adoption of similar compact arrangements.

Farm-level prices are also influenced by the dairy price support program created in 1949. This program supports farm-level prices by providing a standing offer from the government to purchase butter, cheese, and nonfat dry milk at specified prices. The prices offered for these dairy products are intended to provide sufficient revenue so that dairy product manufacturers can pay farmers, on average, the legislatively mandated support price. This program has the effect of providing a floor for the price of milk used for manufacturing purposes. As a result, it influences the price that farmers receive for milk used for fluid purposes under the milk marketing order program because the support price sets a floor below which manufacturing product prices are unlikely to fall for very long. The price support program offers a safety net to all dairy farmers, including those

[3] The six compact states include Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont. The Compact is scheduled to terminate, unless reauthorized, by September 30, 2001.

who do not participate in federal or state milk marketing orders. The 1996 farm bill provided for the dairy price support program to terminate by the end of 1999. However, the Congress has twice extended the program and the current authority extends the program through calendar year 2001.

The decrease in farm-level milk prices from the latter part of 1999 through 2000 has been largely attributed to record increases in production during 1998 through 2000. During this time period, milk production increased by almost 7 percent, and even though demand was relatively strong, it was not strong enough to absorb the increase in production without decreasing the price. According to USDA, farm-level prices for milk in 2001 are recovering due to a decline in milk production and continued strong demand for milk.

Services Provided by Dairy Cooperatives Affect the Price of Milk

The price at which cooperatives sell raw milk to wholesale milk processors is influenced by the minimum price established by federal and state milk marketing order programs, the cost of services that the cooperatives provide, the relative market power of cooperatives and milk processors, the supply of milk available from farmers, and the demand for fluid and manufactured milk products by consumers.

About 83 percent of all milk produced in the United States is marketed through dairy cooperatives that are owned and financed by farmer-members.[4] Cooperatives can either (1) process, package, and distribute fluid milk or manufactured dairy products to retail outlets for sales to consumers or (2) sell the unprocessed milk to wholesale milk processors who process, package, and distribute fluid milk or manufactured dairy products for sale to retail outlets.[5] Cooperatives operate like corporate businesses to perform services for their members. Some distinctive features of cooperatives include member-user ownership and control, services at cost to their members, and distribution of income to their members on the basis of their patronage. For example, Land O' Lakes, one of the largest dairy cooperatives in the country, serves over

[4] Milk not marketed through cooperatives is sold directly to processors or, in some instances, is processed into dairy products by farmers themselves. Cooperatives processed and marketed about 14 percent of all fluid milk produced in 1997, down from about 16 percent in 1992.

[5] See our report entitled *Dairy Industry: Information on Marketing Channels and Prices for Fluid Milk* (GAO/RCED-98-70, Mar. 16, 1998) for more information on the role of cooperatives and other entities in the marketing of fluid milk.

11,000 members and processes about 12 billion pounds of milk annually. According to company documents, all Land O' Lakes members are owners of the cooperative and participate in a democratic process by which they direct the policies of the organization, and they share the profits of the business based on their business volume.

Most dairy cooperatives require that farmers sign a 1 year membership agreement that commits them to market all of their milk through the cooperative.[6] In return, the cooperative commits to performing a variety of services for its members. Some reasons that farmers join dairy cooperatives are to:

- guarantee a market outlet for their milk,
- gain bargaining power to obtain the best price in the market,
- have their milk marketed efficiently, including the assurance that their milk will be accurately weighed and tested, and
- be effectively represented in legislative, regulatory, and public relations matters.

Cooperatives generally sell unprocessed milk that will be used for fluid purposes to wholesale milk processors at prices above the federal or state minimums. In federally or state-regulated markets, any differences between the prices charged to the wholesalers and the minimum prices are known as over-order premiums. Over-order premiums are set by the marketplace and, in part, compensate cooperatives for the services they provide to wholesalers. These services include (1) transporting milk from different milk-producing areas, (2) scheduling milk deliveries to coincide with demand, and (3) standardizing the component content of milk deliveries. In addition, over-order premiums reflect both market conditions and market power acquired by cooperatives relative to processors. According to some dairy experts, actual supply and demand conditions in the market have a greater impact on the amount of over-order premiums charged by cooperatives than the market power exercised by the cooperatives. In commenting on a draft of this report, a USDA official stated that over-order premiums offset the market power of cooperatives relative to processors. According to this official, processors may have market power that is attributable to concentration in the industry and because they are purchasing a perishable commodity.

[6] Typically, these agreements are self-renewing.

Wholesalers' Processing, Packaging, and Distributing Costs Influence the Price of Fluid Milk

The price at which wholesale milk processors[7] sell fluid milk to retailers is influenced by the price that wholesalers pay to acquire the unprocessed milk; the costs they incur for processing, packaging, and distributing fluid milk to retail outlets; the wholesalers' need to earn a return on investment in order to remain in business; and consumer demand for fluid milk. Wholesalers provide processing services including pasteurization, homogenization, and the standardization of milkfat and nonfat solids in flavored milks, buttermilk, whole, 2-percent, 1-percent, and skim milk. Wholesalers also package these products into a variety of types and sizes of containers and arrange for their distribution to retail outlets for sale to consumers. In addition to shipping the products to retailers, some wholesalers provide different levels of in-store service, according to industry officials. For example, some wholesalers provide a full range of services to retailers including unloading the milk on the store dock, restocking the dairy case, and removing outdated or leaking containers, while others may not provide any services to retailers beyond delivering products to the shipping docks. Differences in wholesale-level prices reflect differences in any or all of these factors.

Furthermore, according to dairy industry officials we contacted, in some highly regulated markets, state regulations may increase both wholesale and retail milk prices. For example, an official from one of the nation's largest grocery wholesalers told us that the distribution of milk in North Dakota is restricted to wholesale distributors that are state approved. Consequently, milk can only be delivered to retail stores on trucks that are owned by an approved wholesale distributor. This requirement prohibits retailers and non-approved wholesale distributors from using their own trucks to deliver milk to retail stores, which in some cases may be a less costly and more economical delivery method, especially in isolated, rural areas.

Typically, wholesale cost and pricing data for the private sector are not available to the public because such data are considered proprietary and do not reflect standard terms of sale. Furthermore, any sharing of cost or pricing data with competitors or others could be considered a violation of state and/or federal antitrust laws. However, in 1997, researchers at Cornell University published a study that estimated these costs based on

[7] Wholesale milk processors include bottlers and major retail food chains with bottling plants, and cooperatives that process, package, and distribute fluid milk for sale to retailers. We did not include other entities that market milk at the wholesale level.

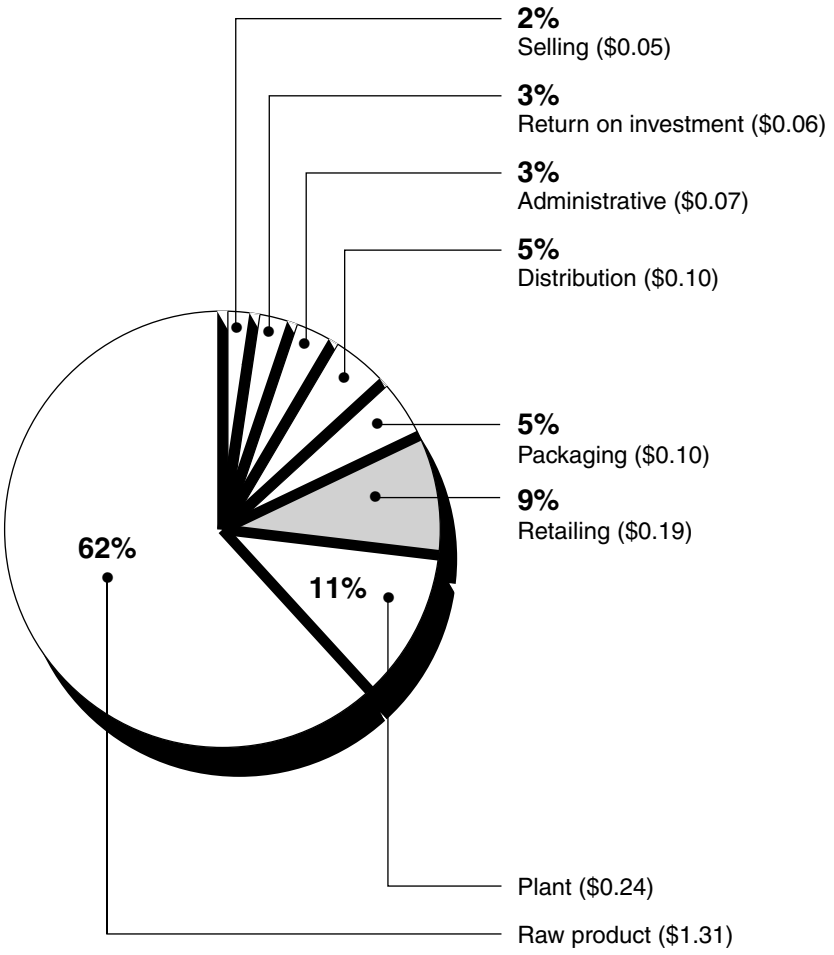
information obtained from a survey of wholesalers. The researchers surveyed 35 well-managed plants that were operated by 23 companies.[8] The 35 plants in the sample included 22 proprietary plants, 5 cooperative plants, and 8 supermarket-owned plants. The plants processed an average of 28 million pounds of milk per month, ranging from slightly more than 13 million pounds to more than 51 million pounds. Distribution cost estimates were based on large accounts served by the plants, including supermarkets, large convenience stores, and club stores.

The Cornell researchers estimated that in 1995, the total cost to sell a gallon of 2-percent milk for a large supermarket in the New York metropolitan area was about $2.12. (This amount also included an estimated 19 cents per gallon for handling costs incurred by the retailer and the retailer's return on investment.) According to officials of dairy cooperatives, wholesalers, and retailers of fluid milk, the estimates developed by the researchers at Cornell University were generally representative of the cost of performing fluid milk processing and marketing functions in 1995. However, many of the costs included in the Cornell study have increased significantly since 1995. We were unable to identify any other study with more recent estimated costs and the Cornell study has also not been updated.

In addition, dairy industry experts told us that the costs for distributing milk in other markets could be significantly higher than the 10 cents per gallon estimated in the study for the New York metropolitan area. In particular, distribution costs in rural markets could range as high as 25 cents to 40 cents per gallon of milk. According to one industry official, delivery costs to rural markets are higher than some urban markets because wholesalers have to deliver smaller quantities of fluid milk products to more isolated, rural stores. These additional costs are often reflected in higher wholesale and retail prices for fluid milk in these areas. Figure 3 shows the various estimated costs associated with marketing a gallon of 2-percent milk through supermarkets in the New York metropolitan area in 1995.

[8] E. M. Erba, R.D. Aplin, and M.W. Stephenson, *An Analysis of Processing and Distribution Productivity and Costs in 35 Fluid Milk Plants.* R.B. 97-03, Department of Agricultural, Resource, and Management Economics. (Ithaca, NY: Cornell University, 1997).

Figure 3: Estimated Costs of Marketing a Gallon of 2-Percent Milk in the New York Metropolitan Area, 1995



Furthermore, industry representatives told us that the Cornell study did not include a wide range of marketing costs that wholesalers incur. They stated that, in recent years, wholesalers have had to engage in a variety of new marketing activities due to the changing nature of demand for milk products and competition in the beverage market. For example, a 1999 report commissioned by the Fluid Milk Processor Promotion Board found that between 1995 and 1999, the annual growth rate in fluid milk consumption was about 0.4 percent, whereas the annual growth rate in consumption of other competing beverages, such as soft drinks, fruit juices, and bottled water, was 3.7 percent. The report found that fluid milk

is experiencing intense competition from branded beverages that have co-opted many of the benefits of milk, for example, juices that have been fortified with calcium. According to dairy industry experts, as other beverage competitors have eroded the market share of fluid milk products, milk processors have had to be more creative in providing a wider range of products, in a wider assortment of packaging, for a broader variety of outlets. Consequently, they have incurred higher costs for (1) research and development of new products and packaging, (2) new packaging machinery and equipment, (3) packaging materials, (4) handling and distribution, and (5) advertising and promotion for both new and existing products. These elevated marketing costs are ultimately reflected in higher wholesale and retail prices for fluid milk.

Retail Milk Prices Depend on the Pricing Strategies Used by Retailers

When retailers sell fluid milk to consumers, the prices are influenced not only by supply and demand considerations that determine the overall retail-level market price for fluid milk, but also by specific considerations that affect prices at individual retail outlets. To determine the overall price charged at the retail level, the quantity of fluid milk supplied by retailers is influenced by the prices that retailers have to pay wholesalers to acquire the product; retailers' operating costs, such as labor, rent, and utilities; the volume of milk sold; and their need to earn a return on investment to stay in business. On the other hand, the amount of fluid milk that consumers purchase at the retail level is influenced by factors beyond the price of fluid milk, such as the size, age, income levels, and tastes of the population in the marketing area, and the prices of substitutes. Studies performed by economists and others over the years have shown that the demand for milk at the retail level is relatively insensitive to changes in price because of the lack of close substitutes. Generally, these studies have concluded that a 1-percent increase or decrease in the price of fluid milk will result in less than a 1-percent decrease or increase in the quantity that consumers will purchase. However, several industry officials told us that they believe that the demand for milk in recent years, although still relatively insensitive to changes in price, has become more sensitive than in the past. In commenting on a draft of this report, USDA officials disagreed with the views of industry officials and believe that demand for milk is generally insensitive to milk price changes.

Additional considerations influence the manner in which retail prices for milk are set at individual retail outlets. To meet their stores' goals, such as profit maximization and increased market share, retailers use a combination of strategies for pricing fluid milk. In developing these pricing strategies, retailers consider their retailing costs, the prices charged by

their competitors, the role that milk prices play in attracting customers to their stores, the convenience offered by their store compared with other stores, and their desire to build an image of quality or low prices for their stores. The retail pricing strategies that are primarily based on a retailer's operating costs are generally referred to as vertical pricing strategies, whereas those strategies that are based on responding to prices charged by competitors are referred to as horizontal pricing strategies. Retailers generally use a combination of horizontal and vertical pricing strategies when setting prices for fluid milk.

Retailers who emphasize a vertical pricing strategy set retail prices in a manner that allows them to recoup (1) the price paid to wholesalers; (2) operating costs such as rent, labor, interest expense, and general overhead; and (3) a return on investment. Some retailers charge different markups on various products sold in their stores while seeking an overall profit margin target for the store. For example, a retailer wishing to promote a low-cost image for the store may sell gallons of 2-percent milk at or near cost while raising the price of other items in the store. On the other hand, retailers wishing to increase the profitability of their dairy products might maintain relatively high prices for fluid milk but set lower prices for other items in the store. Retailers' pricing strategy choices will depend on their views about the importance of milk prices versus the prices of other products sold in their stores in influencing consumers' overall perceptions about their stores.

Retailers who emphasize a horizontal pricing strategy set fluid milk prices in response to the prices being charged by competitors in their area. Retailers who emphasize such strategies are very sensitive to price levels at neighboring retail outlets and will adjust their prices accordingly to create an image of lower or more competitive prices. Also, retailers who emphasize horizontal pricing strategies may be less sensitive to market signals on the wholesale price of milk. Instead, they may continue to price milk at a certain price even though wholesalers have either increased or decreased prices.

Furthermore, retail prices are influenced by state regulations and customers' desire for convenience or high quality. For example, state regulations that prohibit wholesalers and retailers from selling milk below cost can result in higher retail milk prices. Such regulations prevent retailers from using lower-priced milk as a means of attracting more customers to their stores. In addition, according to industry officials, retail prices for fluid milk may be influenced by the fact that some consumers are willing to pay a higher price for convenience and quality. For example,

convenience stores sell only a limited number of items, allowing consumers to purchase fluid milk quickly and spend less time in the store. As a result, these stores can charge a higher price for fluid milk than supermarkets charge primarily for the convenience that they provide. Similarly, retail stores that emphasize high-quality products may stock widely recognized brand-label fluid milk products for which their customers are willing to pay a higher price because they associate the brand label with better quality. Industry officials told us that some retailers believe that a stable retail price for milk may also help create an impression of high quality. However, some recent research on milk price stability indicates that some consumers value price variability over stable prices because it allows them to take advantage of lower prices.[9]

[9] "Empirical Tests of the Argument that Consumers Value Stable Retail Milk Prices", *Journal of Agribusiness*, 18-II (2000): 155-72.

Appendix III: Analysis of Farm-to-Retail Prices for 2-Percent Milk in Selected Markets

This appendix summarizes our analysis of farm-to-retail prices for a gallon of 2-percent milk in 15 selected markets nationwide for March 1998 through September 2000. Our analysis includes information on (1) the proportionate breakdown of the price of a gallon of milk received by farmers, cooperatives, wholesale milk processors, and retailers; (2) how changes in farm and retail milk prices affect the farm-to-retail milk price spread; and (3) how price changes at any level of the marketing chain relate to changes in prices at other levels. We limited our analysis to gallons of 2-percent milk because in recent years sales of milk products with a reduced fat content have increased and account for about 63 percent of all retail sales of fluid milk. Of this amount, sales of 2-percent milk account for about 55 percent of the total sales of milk with a reduced fat content. The farm and cooperative prices, which are included in our analysis and presented in this appendix, have been adjusted for 2-percent milkfat. Our analysis of 2-percent milk prices may not reflect pricing patterns and trends for the other three kinds of milk. Complete data on prices for all four kinds of milk—whole, 1-percent, and skim as well as 2-percent—are presented in appendix V.

Portion Received by Farmers, Cooperatives, Wholesale Milk Processors, and Retailers

Between March 1998 and September 2000, on average, farmers received 43 percent, cooperatives 5 percent, wholesale milk processors 33 percent, and retailers 19 percent of the retail price of a gallon of 2-percent milk in the markets we reviewed. However, these numbers varied widely depending on the specific market. For example, the farmers' portion of the price of a gallon of milk ranged from 35 percent to 52 percent, while retailers collected anywhere from 2 percent to 33 percent. Table 1 provides these data for each of the selected markets.

Table 1: Portion of the Retail Price of a Gallon of 2-Percent Milk Received by Farmers, Cooperatives, Wholesale Milk Processors, and Retailers for 15 Markets, March 1998 Through September 2000

Selected market area	Percent received by farmers	Percent received by cooperatives	Percent received by wholesale milk processors	Percent received by retailers	Percent received by wholesale milk processors and retailers
Atlanta, GA	39	6	31	24	55
Boston, MA	47	5	23	25	48
Charlotte, NC	42	5	29	24	53
Cincinnati, OH	50	5	36	9	45
Dallas, TX	52	4	65	(21)[a]	43
Denver, CO	38	4	24	33	57

Selected market area	Percent received by farmers	Percent received by cooperatives	Percent received by wholesale milk processors	Percent received by retailers	Percent received by wholesale milk processors and retailers
Miami, FL	43	7	34	16	50
Milwaukee, WI	46	5	29	21	49
Minneapolis, MN	35	4	32	30	62
New Orleans, LA	40	6	52	2	54
Phoenix, AZ	50	3	36	11	47
Salt Lake City, UT	43	4	36	16	53
San Diego, CA	35	7	28	31	58
Seattle, WA	45	4	18	33	52
Washington, DC	46	5	17	32	49
Average for the 15 markets	43	5	33	19	52

[a]Our analysis shows that retailers in the Dallas market received a negative return on a gallon of 2-percent milk for the 31-month period. According to an AMS official, this is because a price war was occurring in Dallas during this time period.

Source: GAO's analysis of farm level and cooperative price data provided by USDA, wholesale price data provided by the Defense Commissary Agency, retail price data provided by A.C. Nielsen, and for San Diego, the mailbox and Class I price data provided by the California Department of Food and Agriculture.

Changes in Farm and Retail Prices and the Price Spread

From March 1998 through September 2000, the price spread between farm-level and retail-level milk prices increased in 9 of the 15 markets. Retail prices remained steady or increased in 12 of the 15 markets.[1] However, farm-level prices showed no statistically significant trend when we compared prices at the beginning and end of our review period. Farm prices did experience considerable volatility, with price peaks in certain months that were significantly higher than other months. Table 2 provides these data for each of the selected markets.[2]

[1] In one of the three markets where the average retail price decreased, it was because of a price war.

[2] The values used to calculate increases or decreases in retail and farm-level prices in table 2 are based on statistical estimates of initial and final prices for these two levels, not the actual observed prices recorded in the first and last month of the period for which we have data. The method for calculating these estimates is described in app. I. The changes in the farm-to-retail price spread are the differences between the changes in retail- and farm-level prices from March 1998 to September 2000 and consequently are determined from the statistically estimated initial and final prices for the retail and farm levels.

Table 2: Increases or Decreases in the Farm-to-Retail Price Spread for a Gallon of 2-Percent Milk for 15 Markets, March 1998 Through September 2000

Selected market area	Increases or decreases in the farm-to-retail price spread
Atlanta, GA	$.53
Boston, MA	.45
Charlotte, NC	[a]
Cincinnati, OH	.88
Dallas, TX	(.99)
Denver, CO	[a]
Miami, FL	.15
Milwaukee, WI	(.24)
Minneapolis, MN	.41
New Orleans, LA	.26
Phoenix, AZ	.38
Salt Lake City, UT	.35
San Diego, CA	(.24)
Seattle, WA	.89
Washington, DC	[a]

[a]No statistically significant change was observed in the price over the 31-month period and therefore represent a constant price for the market.

Correlation Between Price Changes at the Four Marketing Levels

The strongest correlation between price changes occurs between any level and its adjacent level in the marketing chain. For example, in most of the markets we analyzed, there was a strong correlation between changes in farm prices and changes in cooperative prices. Similarly, changes in wholesale prices were generally reflected in changes in retail prices. In contrast, changes in the prices received by farmers less frequently correlated with changes in retail prices than they did with changes in cooperative or wholesale prices. As discussed in appendix II, many factors other than farm or wholesale prices influence the price of fluid milk at the retail level. Tables 3 through 5 present data on our correlation analysis for price changes at the four marketing levels. The values of correlation coefficients presented represent estimates of the degree that price changes at one level in the milk marketing chain are associated with price changes at other levels.

Table 3: Correlation Between Farm-Level Price Changes and Changes in Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Milk for 15 Markets, March 1998 Through September 2000

Selected market area	Correlation coefficients for cooperative prices	Correlation coefficients for wholesale prices	Correlation coefficients for retail prices
Atlanta, GA	.9952*	.6684*	.0916
Boston, MA	.9994*	.7197*	.5485*
Charlotte, NC	.9967*	.8780*	.6787*
Cincinnati, OH	.9995*	.5501*	.2302
Dallas, TX	.9986*	.1391	.4452*
Denver, CO	.9980*	.7788*	.6198*
Miami, FL	.9913*	[a]	.4988*
Milwaukee, WI	.9995*	(.0290)	.6997*
Minneapolis, MN	.9995*	.5684*	.4588*
New Orleans, LA	.9956*	.7477*	.4326*
Phoenix, AZ	.9941*	.7318*	.2938
Salt Lake City, UT	.9984*	.5722*	.4873*
San Diego, CA	.7342*	.7064*	.5411*
Seattle, WA	.9999*	.7593*	.2244
Washington, DC	.9998*	.7297*	.6430*

Note: In calculating the correlation coefficients for each market, we omitted the months for which data were missing.

*Indicates that the correlation coefficient is statistically significant (i.e., $p < .05$). However, we have not included the p-values in the table.

[a]We could not calculate the correlation coefficients for the wholesale level for Miami, Florida, because the wholesale price did not change during our analysis period.

Table 4: Correlation Between Cooperative-Level Price Changes and Changes in Wholesale and Retail Prices for a Gallon of 2-Percent Milk for 15 Markets, March 1998 Through September 2000

Selected market area	Correlation coefficients for wholesale prices	Correlation coefficients for retail prices
Atlanta, GA	.6564*	.1484
Boston, MA	.7161*	.5414*
Charlotte, NC	.8601*	.6989*
Cincinnati, OH	.5450*	.2253
Dallas, TX	.1664	.4156*
Denver, CO	.7926*	.6358*
Miami, FL	[a]	.5443*
Milwaukee, WI	(.0136)	.6957*
Minneapolis, MN	.5667*	.4745*
New Orleans, LA	.7791*	.4831*
Phoenix, AZ	.7632*	.3475*
Salt Lake City, UT	.5561*	.4761*
San Diego, CA	.9667*	.7077*
Seattle, WA	.7593*	.2274
Washington, DC	.7288*	.6429*

Note: In calculating the correlation coefficients for each market, we omitted the months for which data were missing.

*Indicates that the correlation coefficient is statistically significant (i.e., $p < .05$). However, we have not included the p-values in the table.

[a]We could not calculate the correlation coefficients for the wholesale level for Miami, Florida, because the wholesale price did not change during our analysis period.

Table 5: Correlation Between Wholesale-Level Price Changes and Changes in Retail Prices for a Gallon of 2-Percent Milk for 15 Markets, March 1998 Through September 2000

Selected market area	Correlation coefficients for retail prices
Atlanta, GA	.0823
Boston, MA	.7153*
Charlotte, NC	.4510*
Cincinnati, OH	.7459*
Dallas, TX	(.5796)*
Denver, CO	.5719*
Miami, FL	[a]
Milwaukee, WI	(.3925)*
Minneapolis, MN	.3257
New Orleans, LA	.7715*
Phoenix, AZ	.5492*
Salt Lake City, UT	.7312*
San Diego, CA	.7968*
Seattle, WA	(.1000)
Washington, DC	.2200

Note: In calculating the correlation coefficients for each market, we omitted the months for which data were missing.

*Indicates that the correlation coefficient is statistically significant (i.e., $p < .05$). However, we have not included the p-values in the table.

[a]We could not calculate the correlation coefficients for the wholesale level for Miami, Florida, because the wholesale price did not change during our analysis period.

Comparison of Average Annual and Monthly Prices for 2-Percent Milk

Tables 6 through 8 show the average annual price for a gallon of 2-percent milk in the 15 markets for each of the four marketing levels during 1998, 1999, and 2000. Figures 4 through 18 present average monthly data for the period of March 1998 through September 2000 on farm, cooperative, wholesale, and retail prices for gallons of 2-percent milk in each of the 15 markets. Gaps in any of the lines shown in the figures are the result of unavailable data.

Table 6: Average Annual Retail Price for a Gallon of 2-Percent Milk in Selected Markets, 1998

Selected market area	Farm price	Cooperative price	Wholesale price	Retail price
Atlanta, GA	$1.09	$1.27	$2.17	$2.71
Boston, MA	1.14	1.28	1.83	2.41
Charlotte, NC	1.14	1.27	2.13	2.72
Cincinnati, OH	1.11	1.23	1.89	1.91
Dallas, TX	1.11	1.20	2.34	2.57
Denver, CO	1.05	1.16	1.76	2.68
Miami, FL	1.29	1.49	2.56	2.98
Milwaukee, WI	1.04	1.16	1.78	2.42
Minneapolis, MN	0.97	1.07	2.00	2.82
New Orleans, LA	1.08	1.26	2.68	2.74
Phoenix, AZ	1.06	1.12	1.83	2.02
Salt Lake City, UT	0.97	1.08	1.84	2.17
San Diego, CA	1.17	1.34	2.15	3.20
Seattle, WA	1.04	1.13	1.69	2.06
Washington, DC	1.14	1.26	1.75	2.52

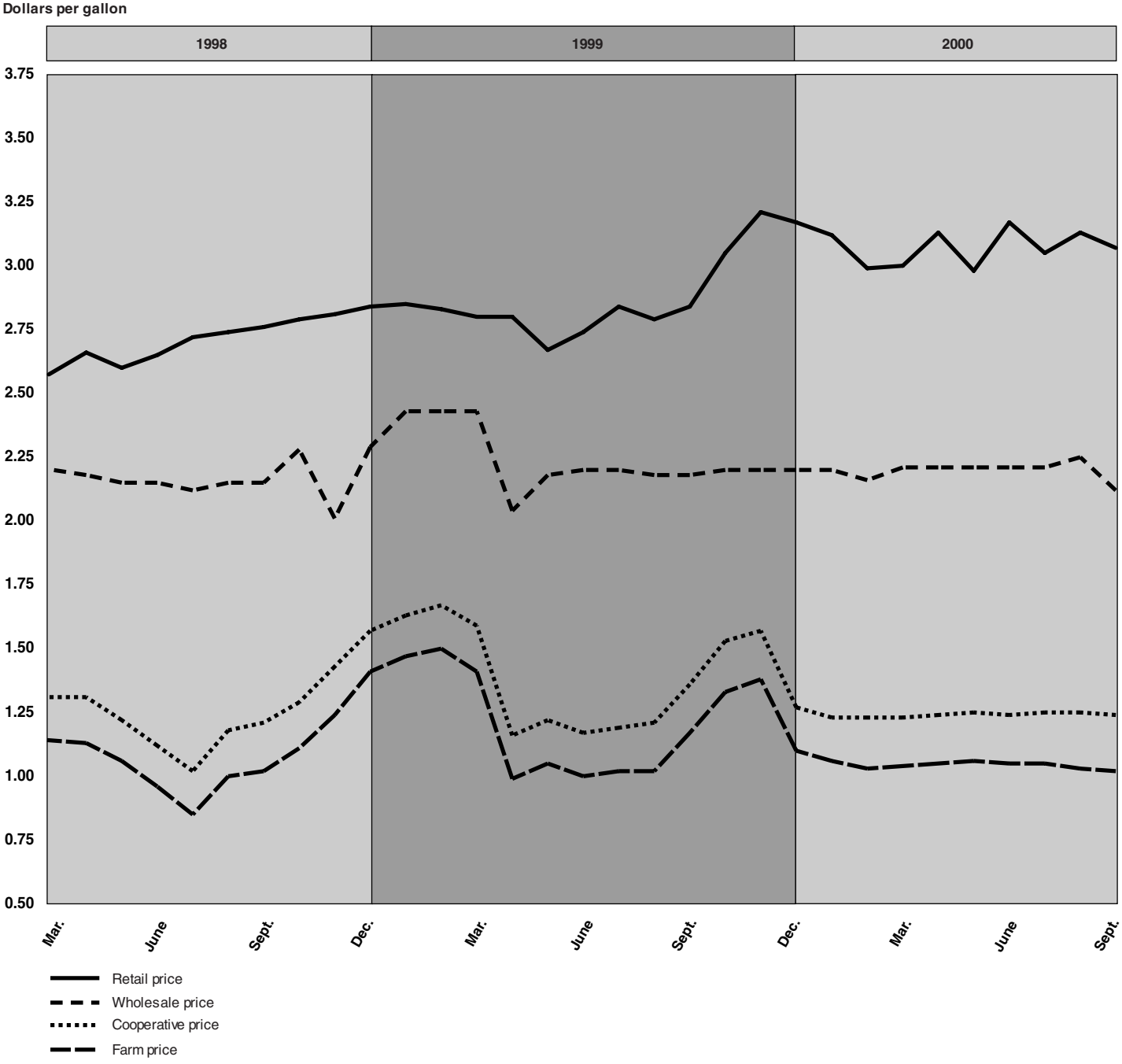
Table 7: Average Annual Retail Price for a Gallon of 2-Percent Milk in Selected Markets, 1999

Selected market area	Farm price	Cooperative price	Wholesale price	Retail price
Atlanta, GA	$1.20	$1.38	$2.24	$2.88
Boston, MA	1.30	1.44	2.02	2.68
Charlotte, NC	1.24	1.38	2.18	2.84
Cincinnati, OH	1.22	1.35	2.23	2.48
Dallas, TX	1.22	1.32	2.76	2.14
Denver, CO	1.17	1.30	2.06	2.93
Miami, FL	1.38	1.59	2.56	3.10
Milwaukee, WI	1.17	1.29	1.83	2.44
Minneapolis, MN	1.10	1.21	2.11	2.95
New Orleans, LA	1.20	1.38	2.85	2.87
Phoenix, AZ	1.17	1.23	1.99	2.24
Salt Lake City, UT	1.10	1.20	2.07	2.47
San Diego, CA	1.10	1.38	2.25	3.20
Seattle, WA	1.19	1.28	1.69	2.58
Washington, DC	1.24	1.36	1.85	2.57

Table 8: Average Annual Retail Price for a Gallon of 2-Percent Milk in Selected Markets, 2000

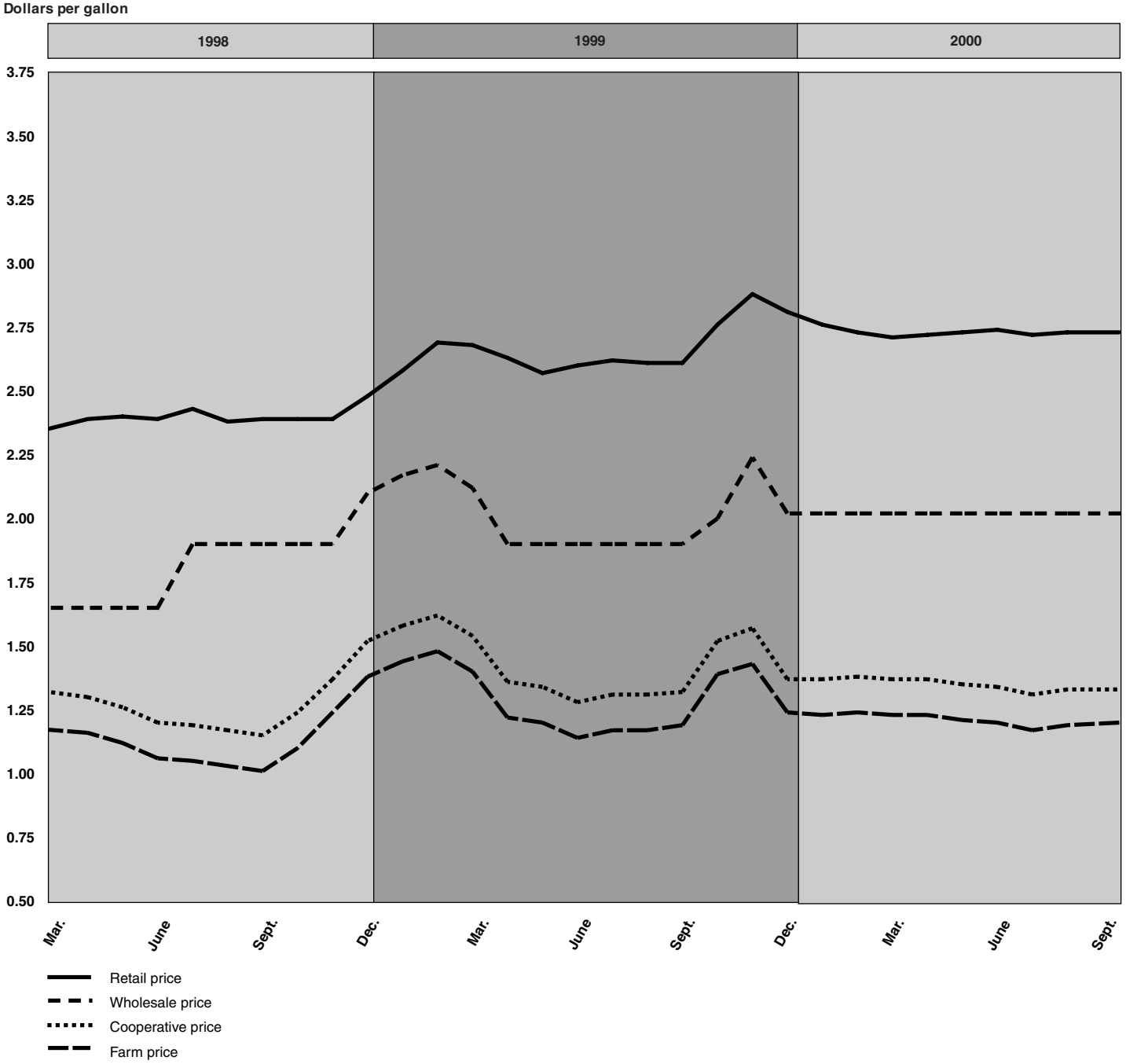
Selected market area	Farm price	Cooperative price	Wholesale price	Retail price
Atlanta, GA	$1.04	$1.24	$2.20	$3.07
Boston, MA	1.22	1.36	2.03	2.74
Charlotte, NC	1.09	1.24	2.00	2.79
Cincinnati, OH	1.07	1.19	2.12	2.52
Dallas, TX	1.09	1.19	2.89	1.86
Denver, CO	0.99	1.12	1.77	2.77
Miami, FL	1.23	1.46	2.56	3.11
Milwaukee, WI	1.02	1.15	2.08	2.26
Minneapolis, MN	0.98	1.09	2.10	3.11
New Orleans, LA	1.06	1.25	2.81	2.90
Phoenix, AZ	0.99	1.09	1.97	2.29
Salt Lake City, UT	0.93	1.03	1.96	2.41
San Diego, CA	0.93	1.09	1.95	2.81
Seattle, WA	1.02	1.11	1.47	2.70
Washington, DC	1.10	1.23	1.52	2.56

Figure 4: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Atlanta, Georgia, Market



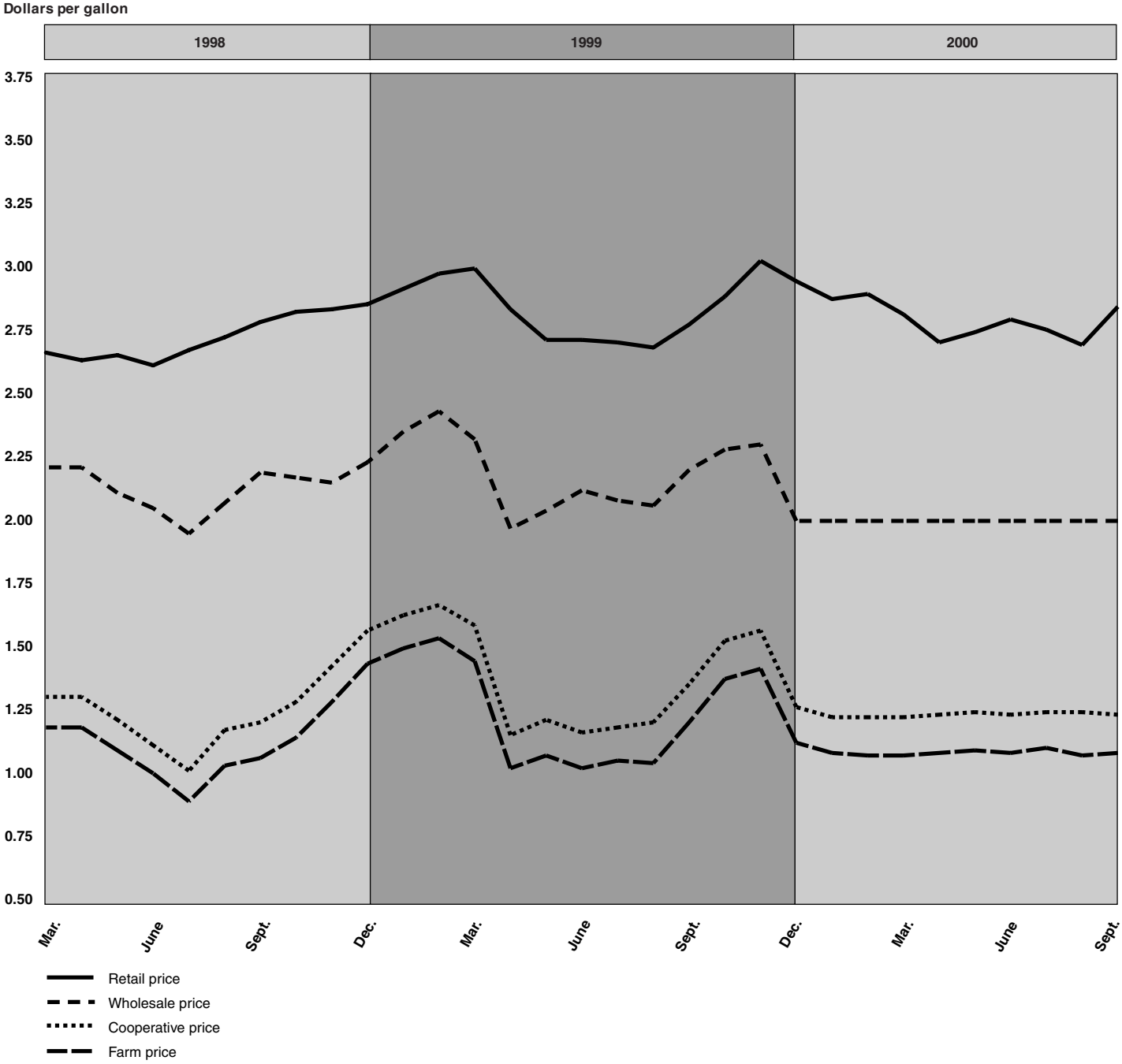
Note: For the Atlanta, Georgia, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Atlanta adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the Athens Naval Supply Corps School; and the retail price is the A.C. Nielsen price for the Atlanta market.

Figure 5: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Boston, Massachusetts, Market



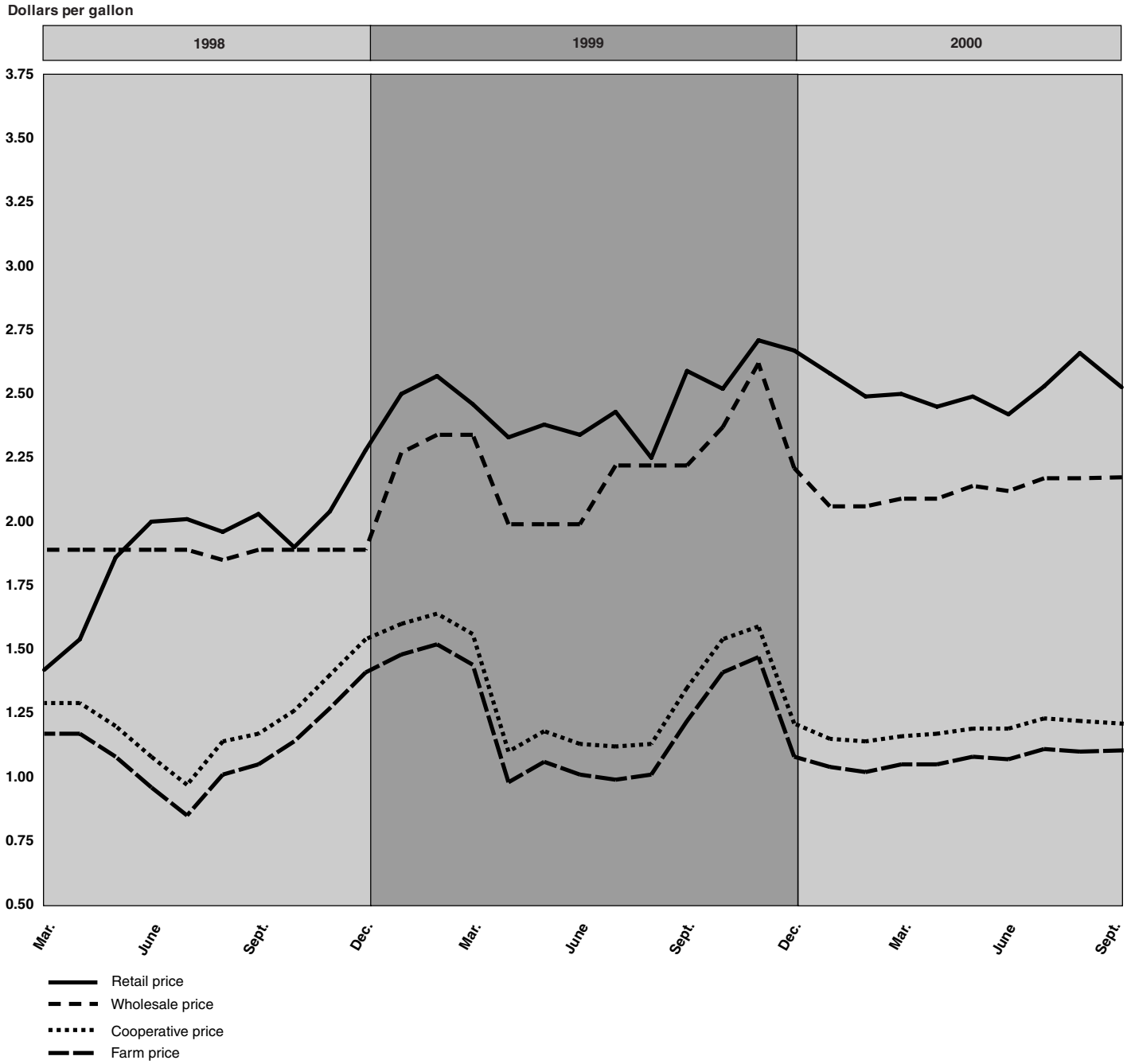
Note: For the Boston, Massachusetts, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the effective cooperative Class I price for Boston adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the Hanscom Air Force Base; and the retail price is the A.C. Nielsen price for the Boston market.

Figure 6: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Charlotte, North Carolina, Market



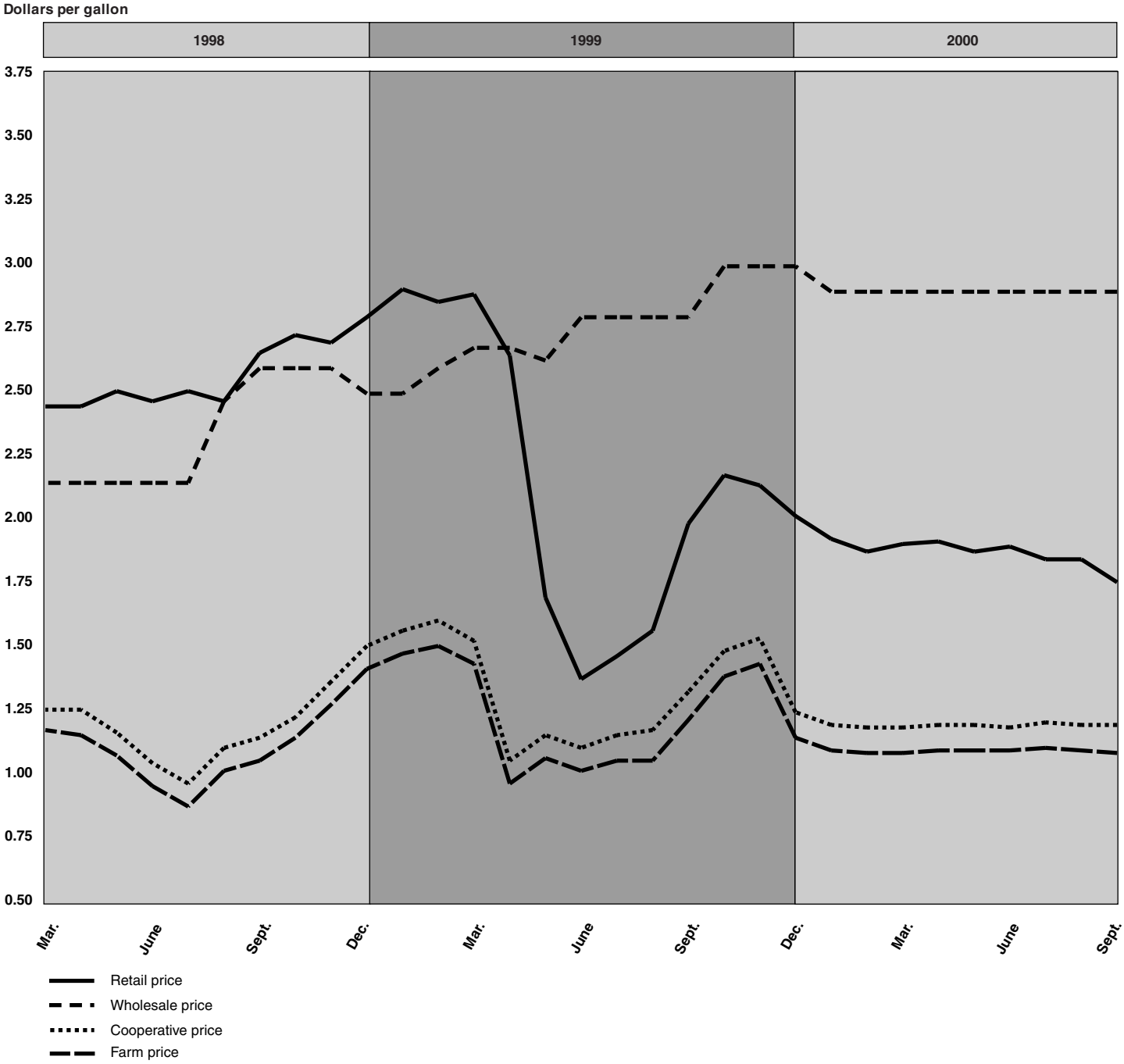
Note: For the Charlotte, North Carolina, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Charlotte adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at Fort Bragg; and the retail price is the A.C. Nielsen price for the Charlotte market.

Figure 7: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Cincinnati, Ohio, Market



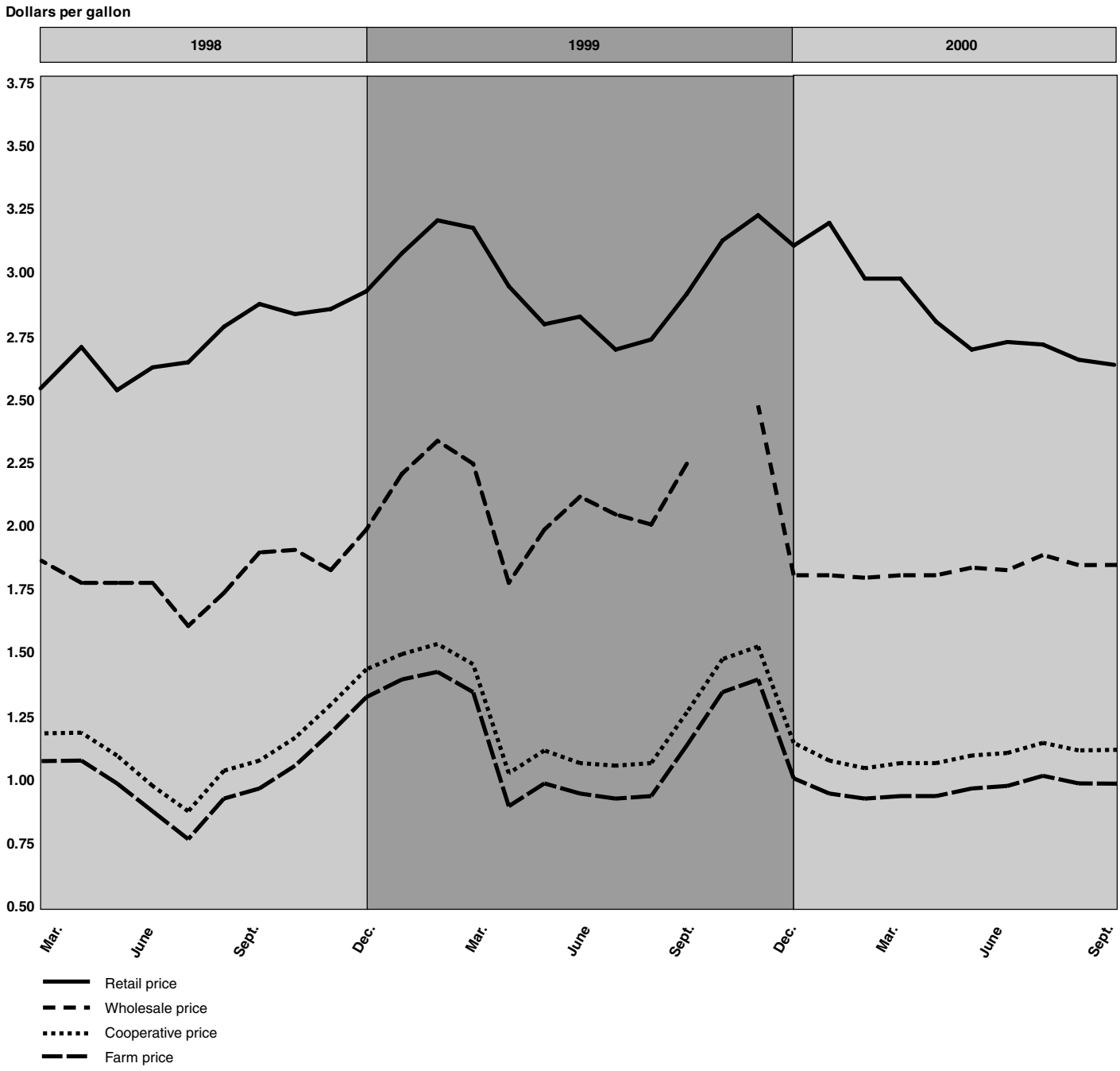
Note: For the Cincinnati, Ohio, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Cincinnati adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the Wright Patterson Air Force Base; and the retail price is the A.C. Nielsen price for the Cincinnati market.

Figure 8: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Dallas, Texas, Market



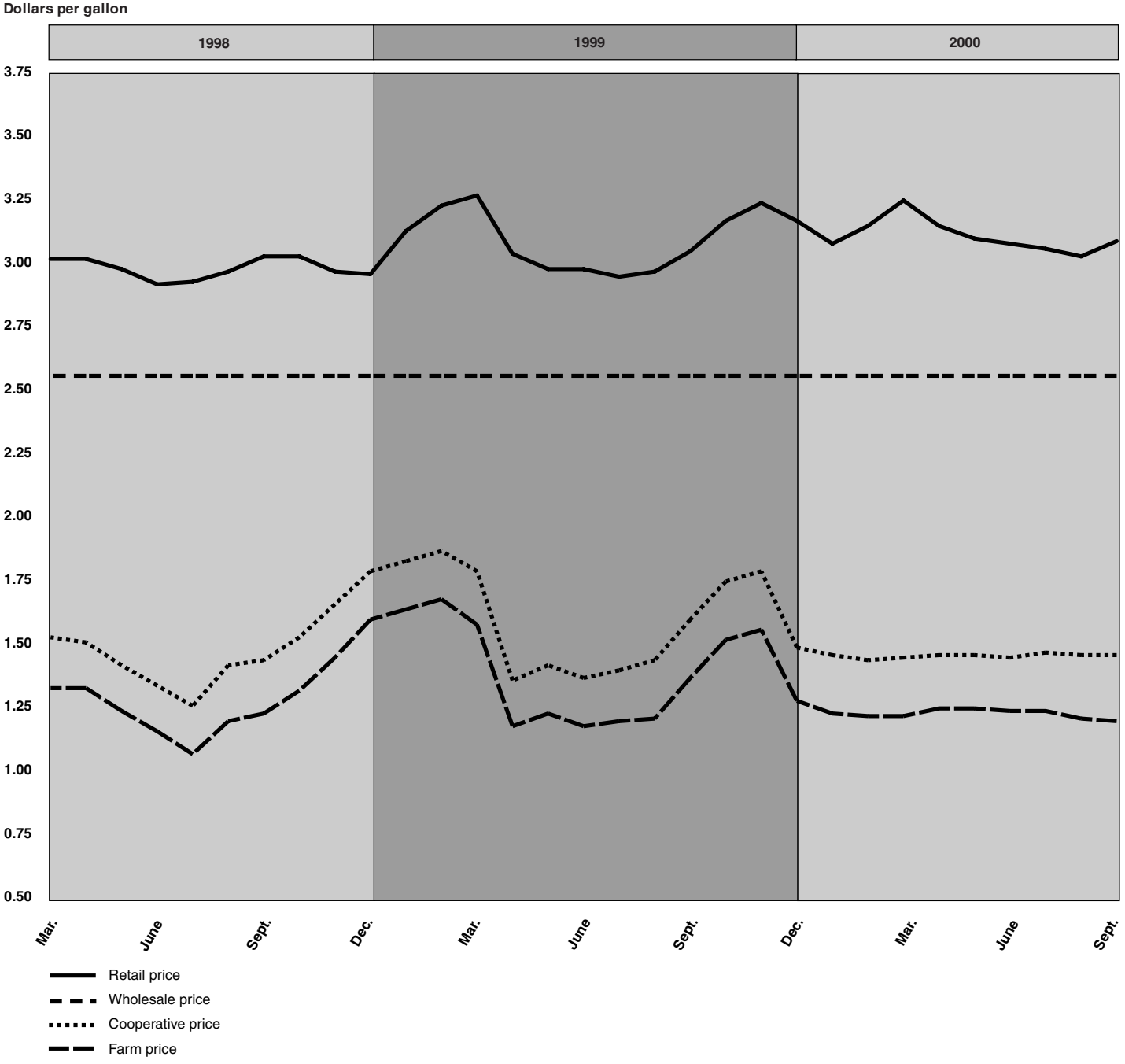
Note: For the Dallas, Texas, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Dallas adjusted to 2-percent milkfat content; the wholesale price is the GAO estimated price paid by the commissary at the Kelly Air Force Base; and the retail price is the A.C. Nielsen price for the Dallas market. Because data were not available for all wholesale 2-percent milk prices except September 2000, we estimated these prices as equal to the lower of the whole milk prices or the 1-percent milk prices.

Figure 9: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Denver, Colorado, Market



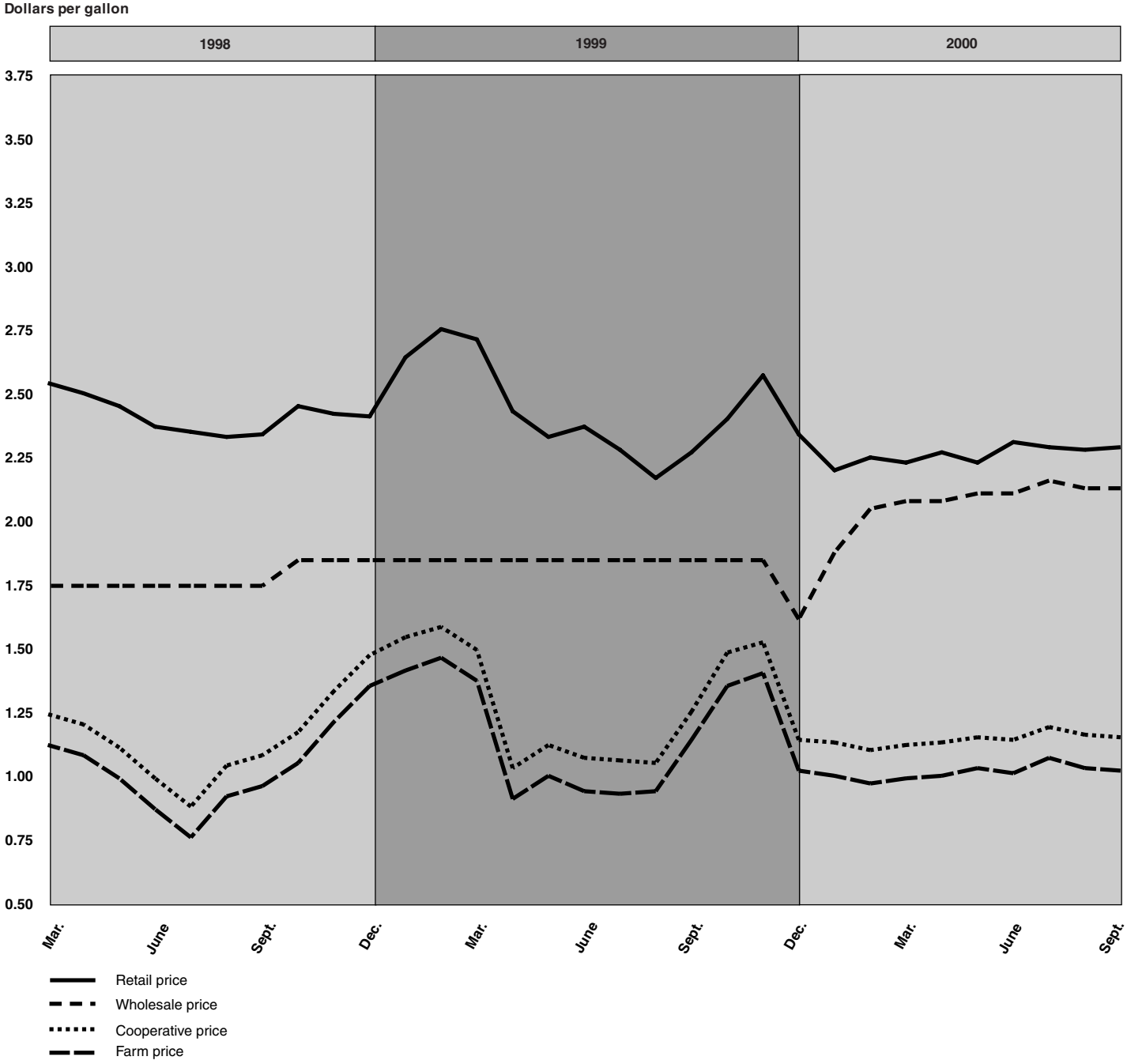
Note: For the Denver, Colorado, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Denver adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the Fitzsimons U.S. Army Garrison; and the retail price is the A.C. Nielsen price for the Denver market. Gaps in any of the lines are the result of unavailable data.

Figure 10: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Miami, Florida, Market



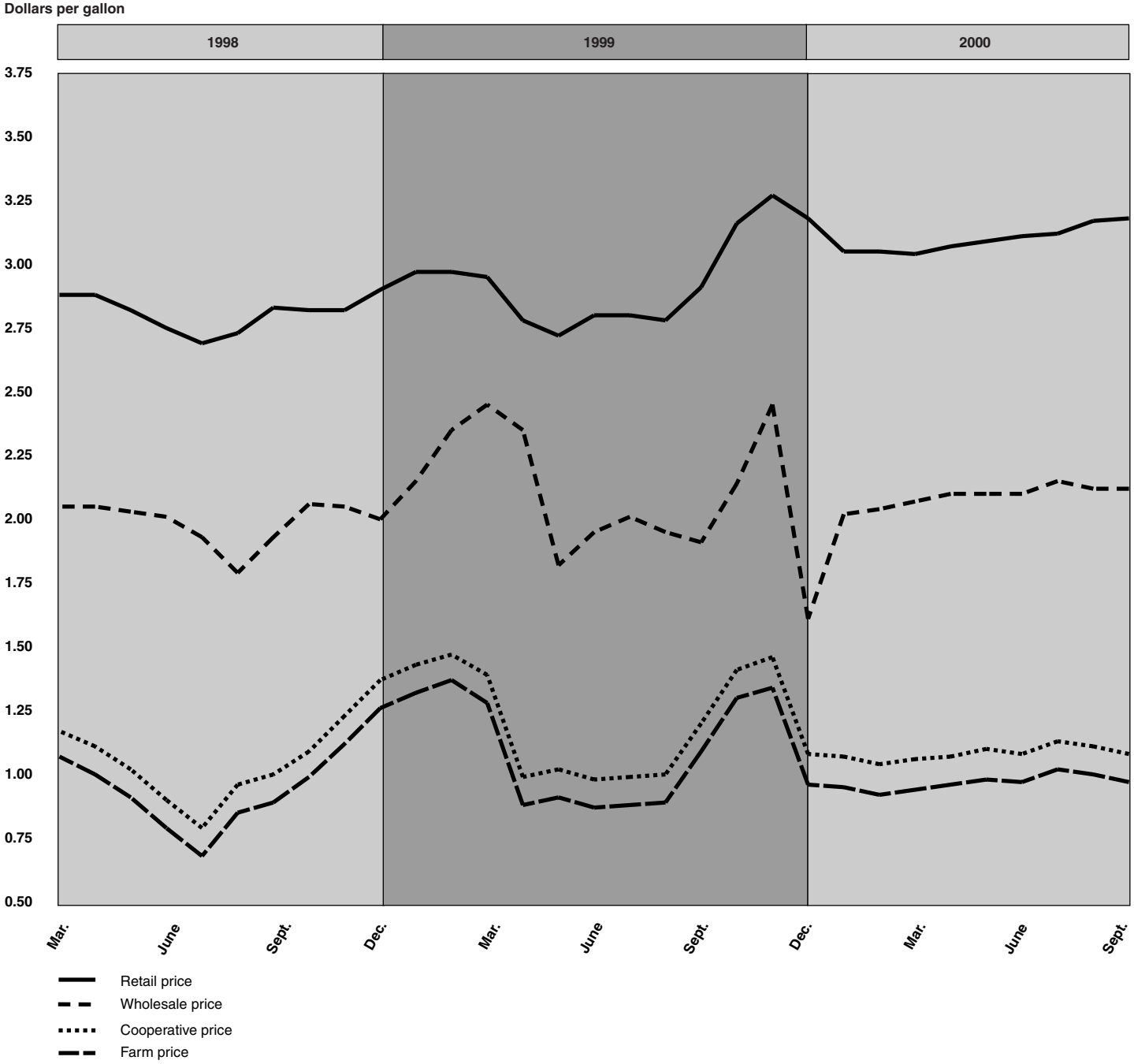
Note: For the Miami, Florida, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Miami adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the Key West Naval Air Station; and the retail price is the A.C. Nielsen price for the Miami market.

Figure 11: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Milwaukee, Wisconsin, Market



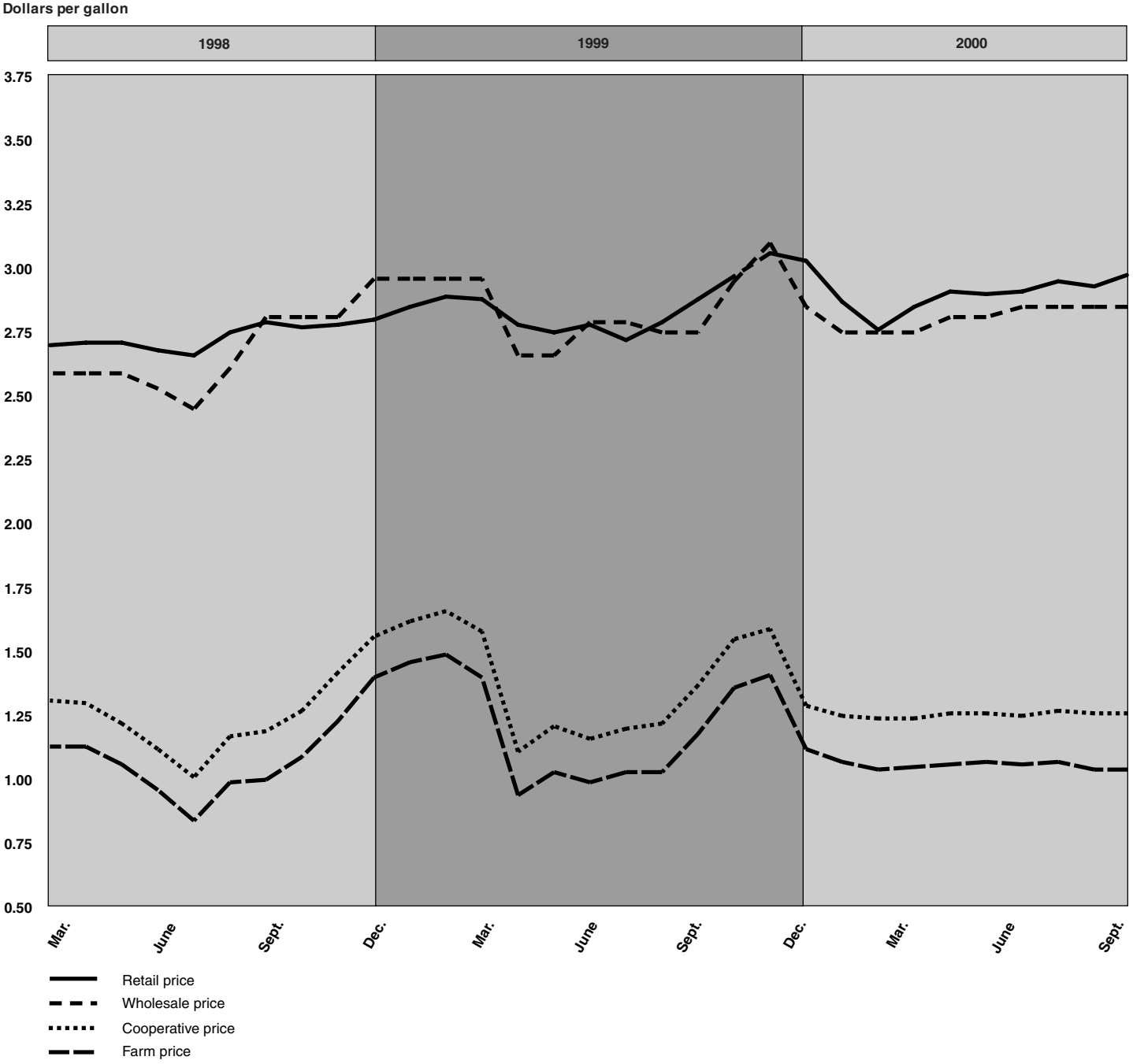
Note: For the Milwaukee, Wisconsin, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative GClass I price for Milwaukee adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the Great Lakes Naval Training Center; and the retail price is the A.C. Nielsen price for the Milwaukee market.

Figure 12: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Minneapolis, Minnesota, Market



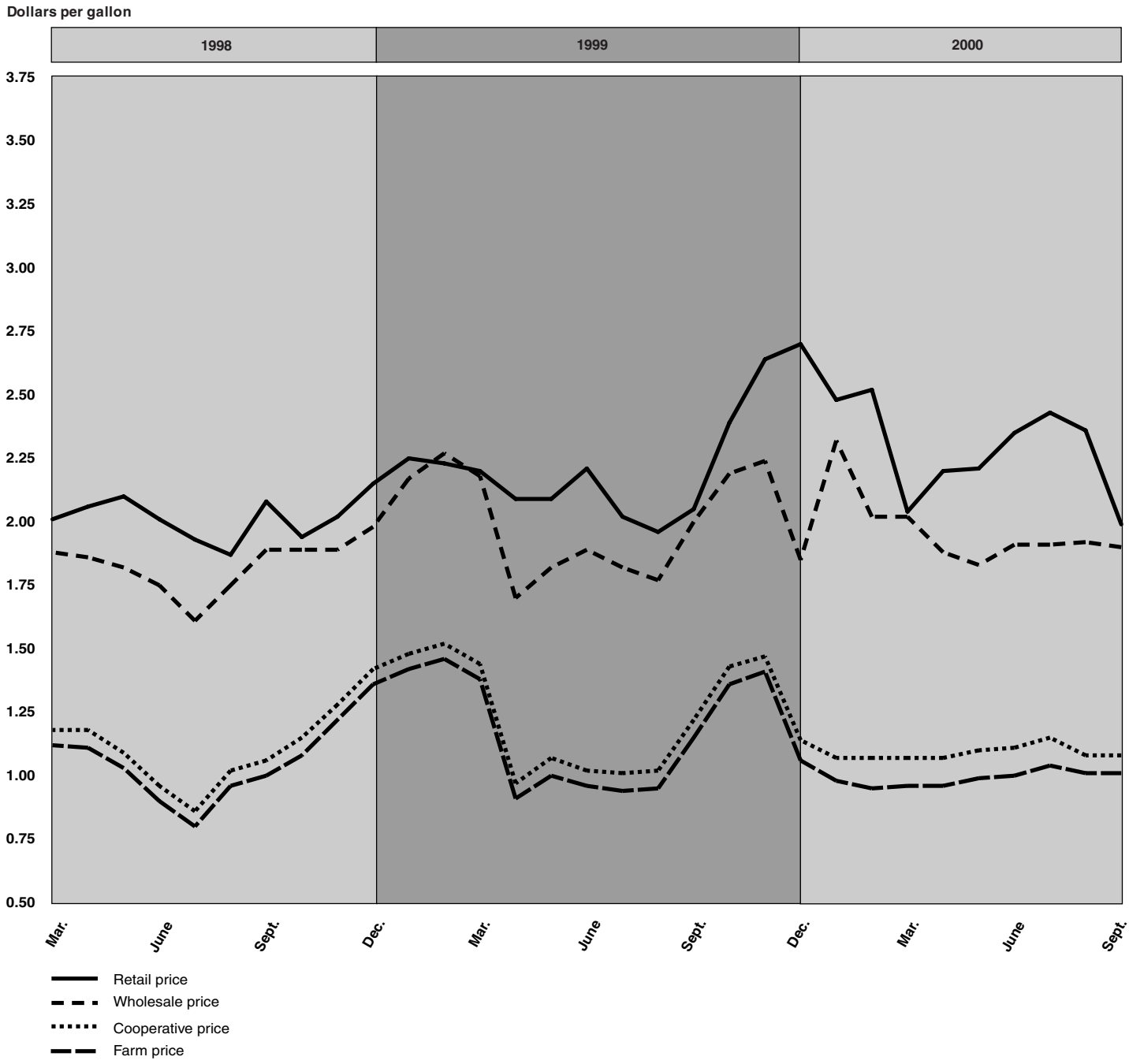
Note: For the Minneapolis, Minnesota, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Minneapolis adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at Fort McCoy; and the retail price is the A.C. Nielsen price for the Minneapolis market.

Figure 13: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the New Orleans, Louisiana, Market



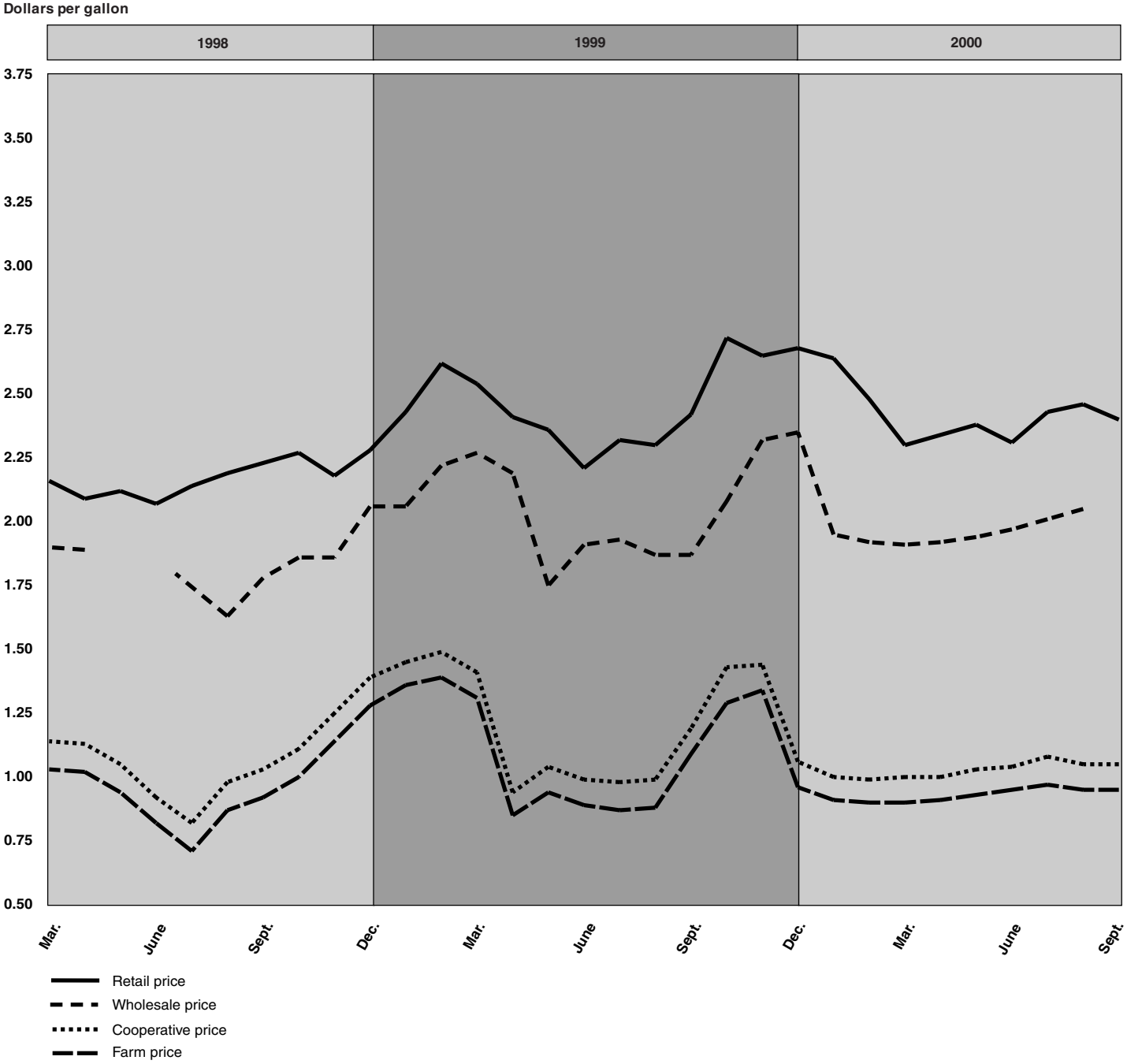
Note: For the New Orleans, Louisiana, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for New Orleans adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the New Orleans Naval Air Station; and the retail price is the A.C. Nielsen price for the New Orleans-Mobile market.

Figure 14: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Phoenix, Arizona, Market



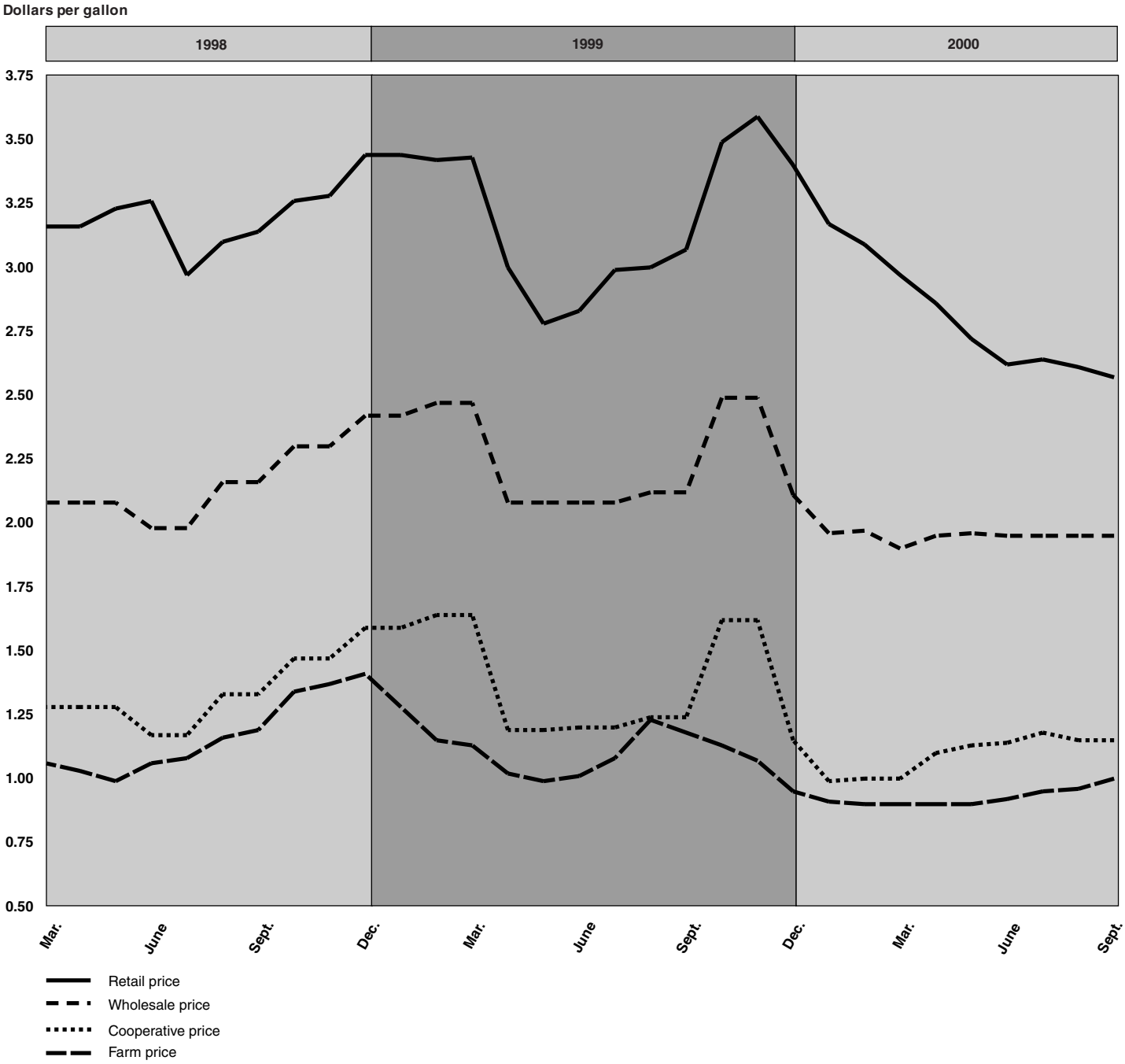
Note: For the Phoenix, Arizona, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Phoenix adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the Luke Air Force Base; and the retail price is the A.C. Nielsen price for the Phoenix market.

Figure 15: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Salt Lake City, Utah, Market



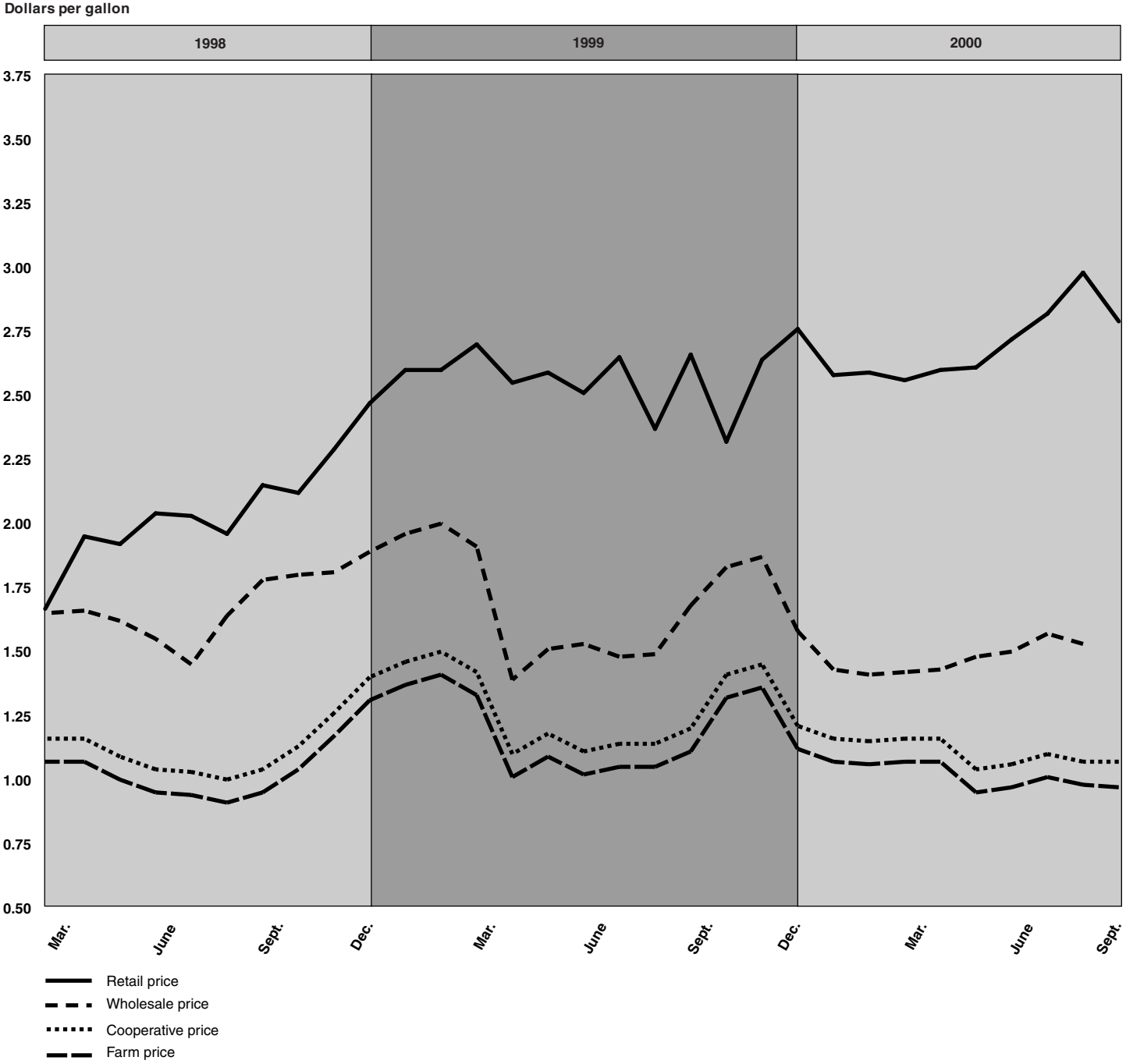
Note: For the Salt Lake City, Utah, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Salt Lake City adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the Hill Air Force Base; and the retail price is the A.C. Nielsen price for the Salt Lake City-Boise market. Gaps in any of the lines are the result of unavailable data.

Figure 16: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the San Diego, California, Market



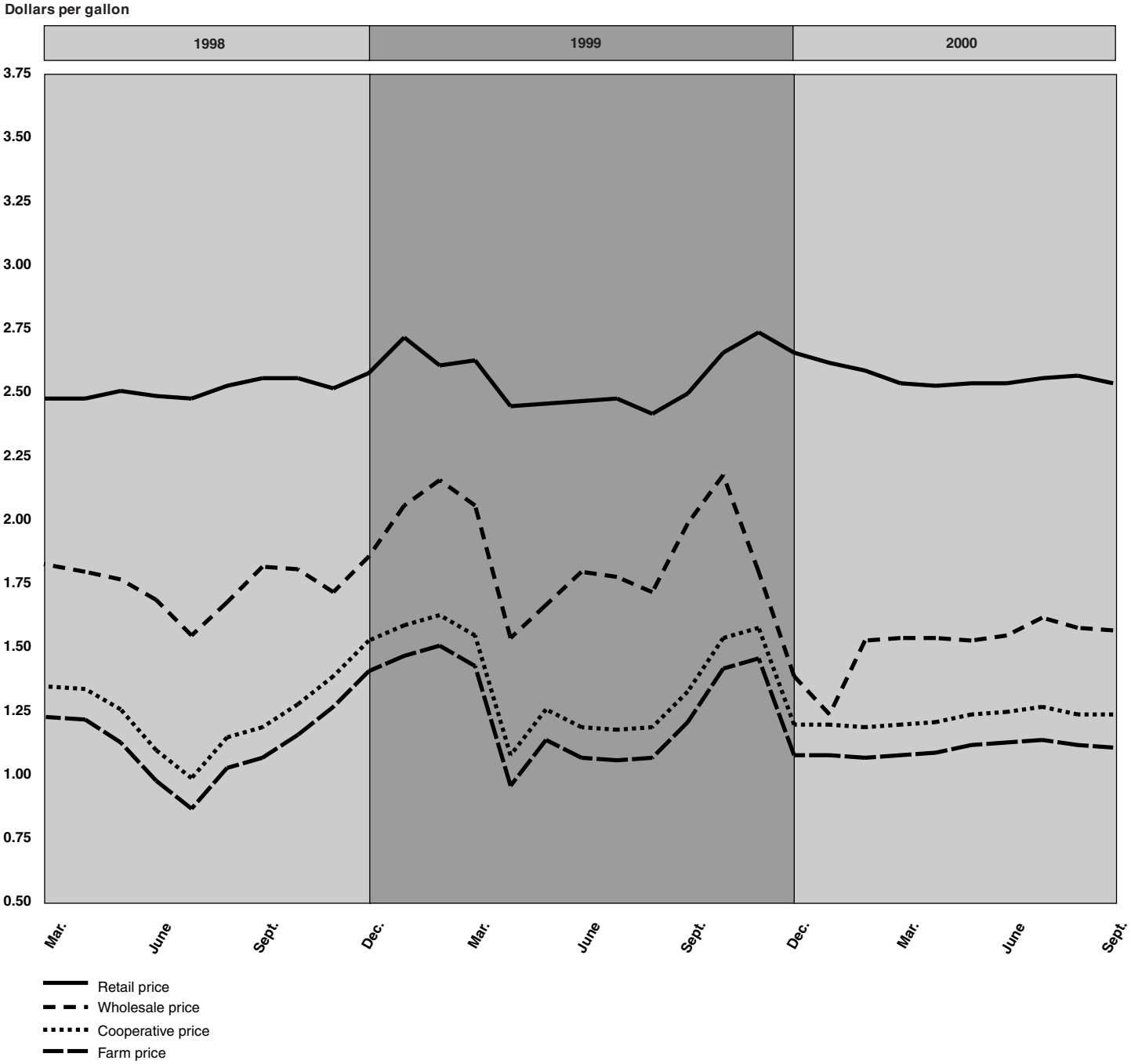
Note: For the San Diego, California, market, the farm price is the California mailbox price adjusted to 2-percent milkfat content; the cooperative price is the Southern California Class I price adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the San Diego Naval Station; and the retail price is the A.C. Nielsen price for the San Diego market.

Figure 17: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Seattle, Washington, Market



Note: For the Seattle, Washington, market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Seattle adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the Everett Naval Station; and the retail price is the A.C. Nielsen price for the Seattle market. Gaps in any of the lines are the result of unavailable data.

Figure 18: Farm, Cooperative, Wholesale, and Retail Prices for a Gallon of 2-Percent Fluid Milk for the Washington, D.C., Market

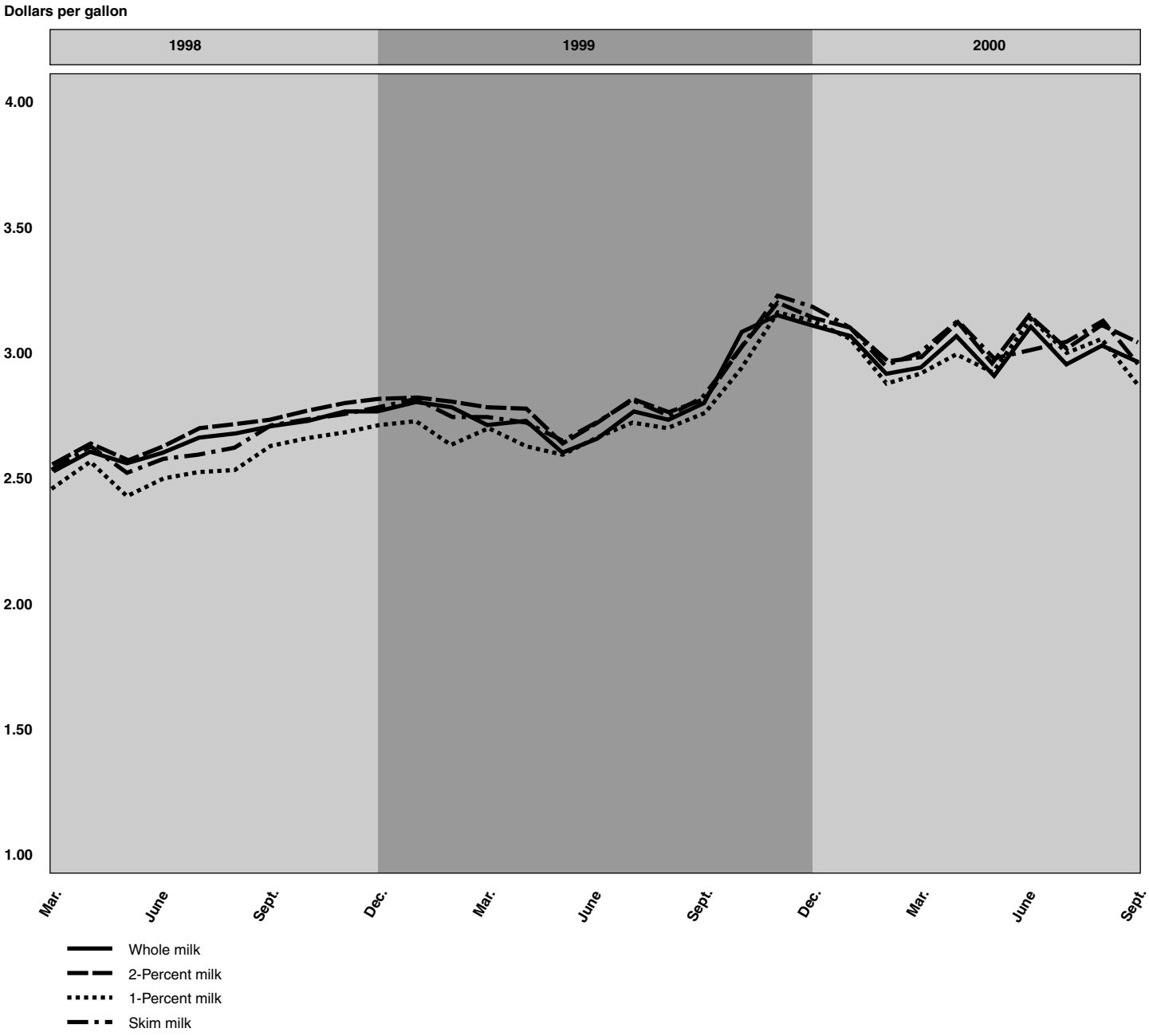


Note: For the Washington, D.C., market, the farm price is the USDA estimated farm level Class I price adjusted to 2-percent milkfat content; the cooperative price is the announced cooperative Class I price for Washington, D.C. adjusted to 2-percent milkfat content; the wholesale price is the price paid by the commissary at the Bolling Air Force Base; and the retail price is the A.C. Nielsen price for the Washington, D.C. market.

Appendix IV: Retail Prices for Four Kinds of Fluid Milk in Selected Markets

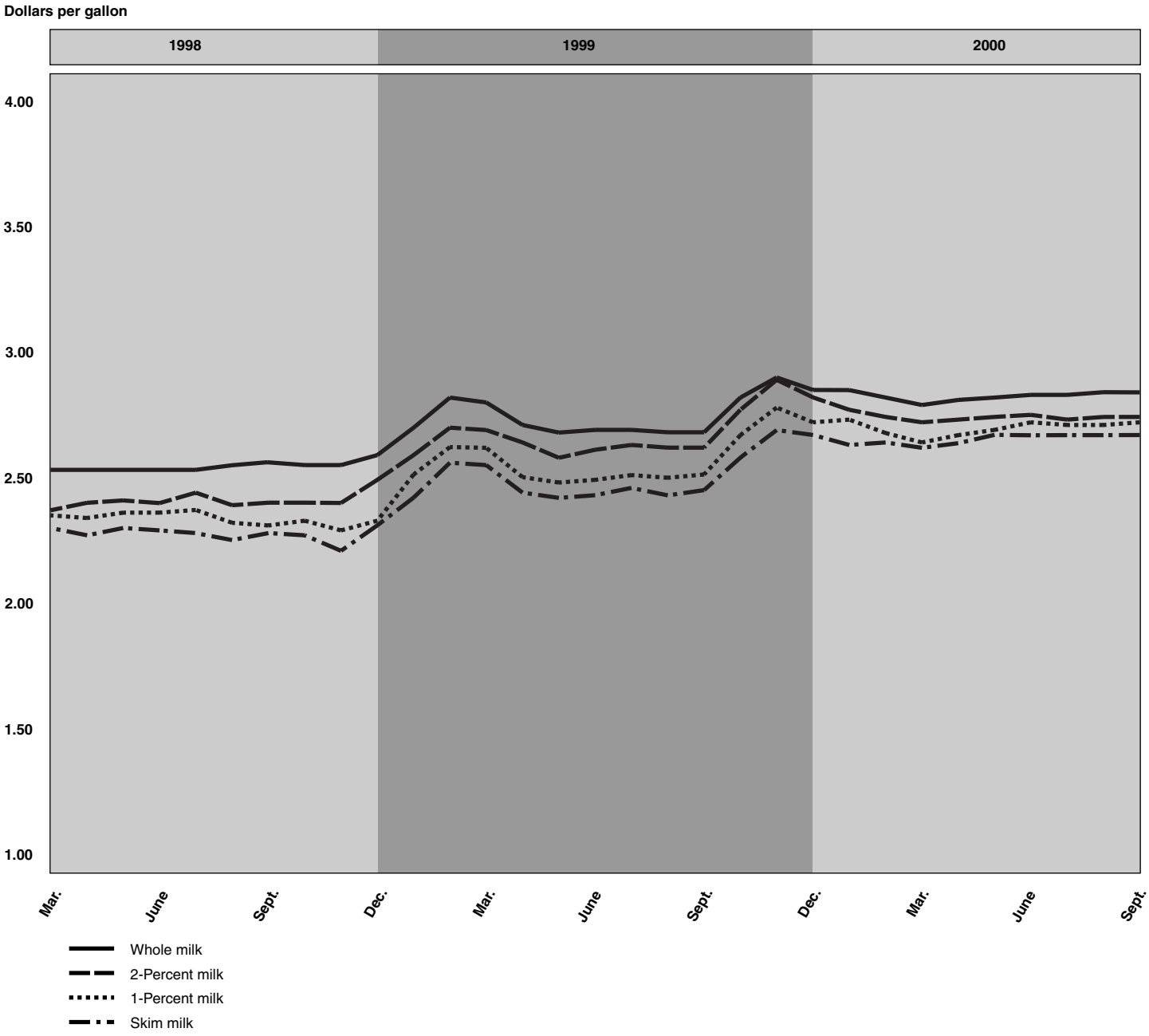
This appendix provides information on the average retail price for whole, 2-percent, 1-percent, and skim milk in 15 selected markets for the period of March 1998 through September 2000. We found that the retail pricing patterns varied significantly in the markets we analyzed. For example, in the Seattle market from March 1998 through September 2000, the average price for 2-percent milk was generally lower than the average price for whole, 1-percent, or skim milk. On the other hand, for this period in the Minneapolis market, the average price of skim milk was generally lower than the price of whole, 2-percent, or 1-percent milk. In other markets, such as San Diego, the lowest-priced milk shifted among 2-percent, 1-percent, and skim over the same period. Figures 19 through 33 provide information on the average retail price for each of the four kinds of milk for the 15 markets for the period of March 1998 through September 2000.

Figure 19: Atlanta, Georgia, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



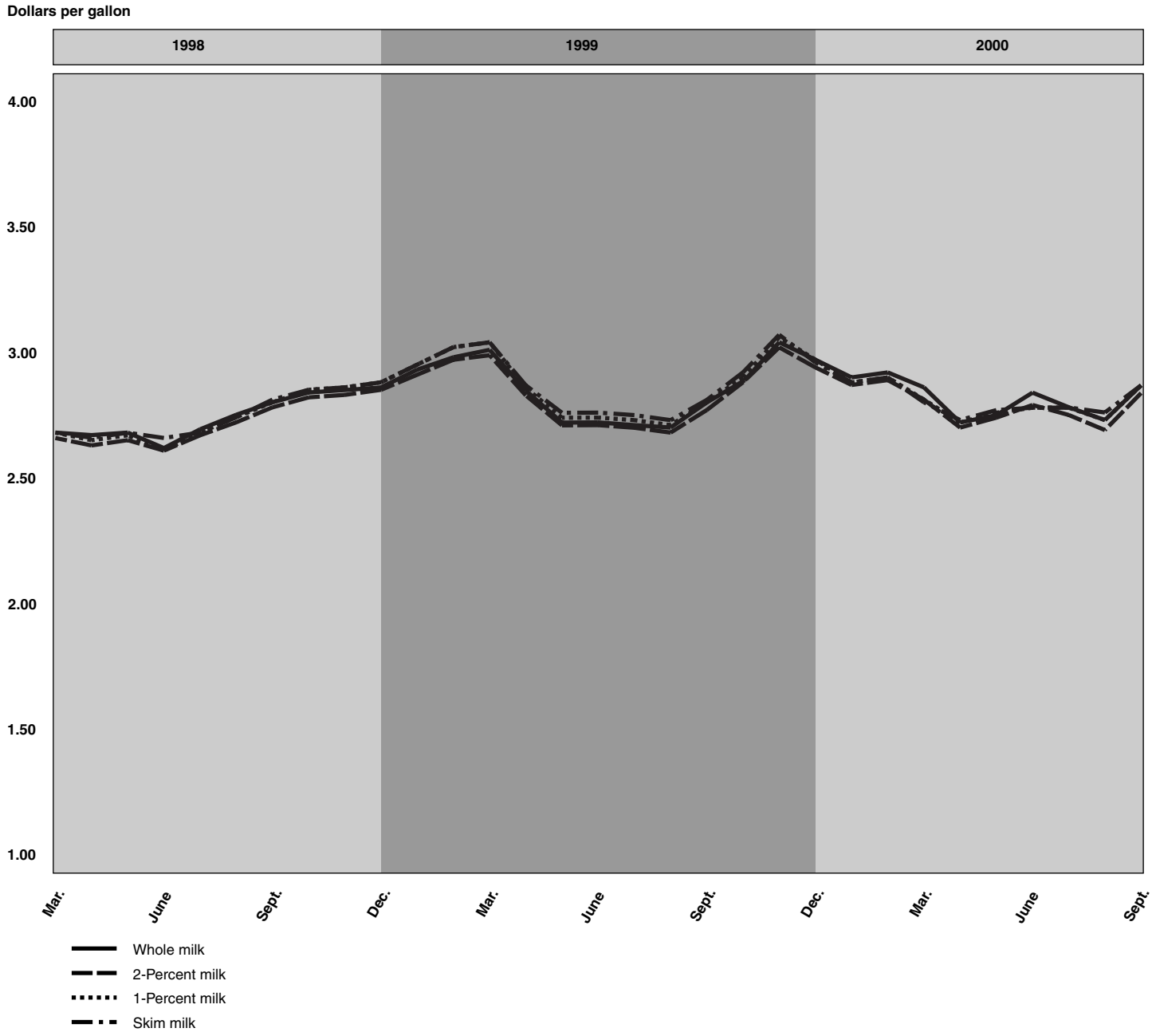
Note: The retail price is the A.C. Nielsen price for the Atlanta market.

Figure 20: Boston, Massachusetts, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



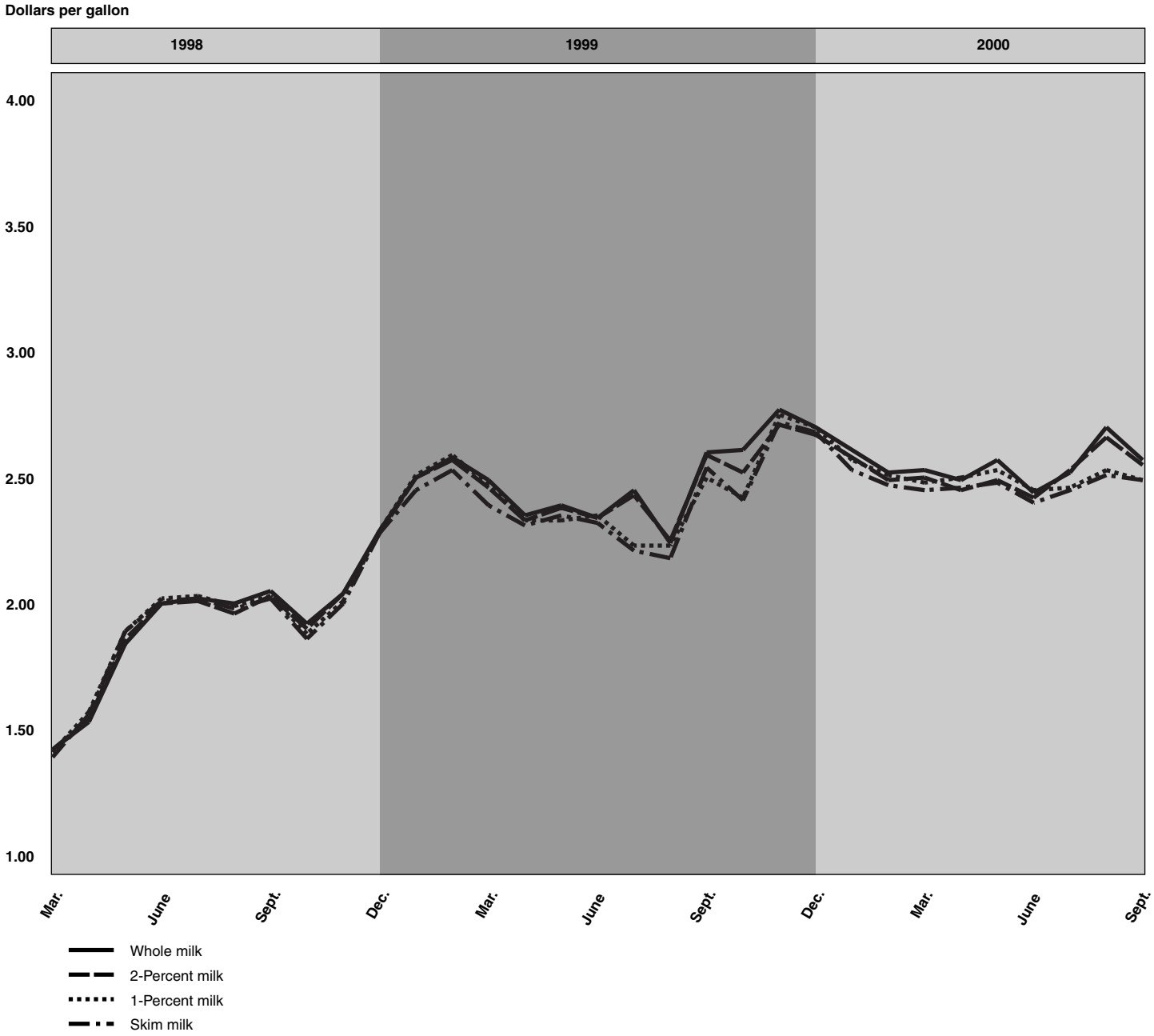
Note: The retail price is the A.C. Nielsen price for the Boston market.

Figure 21: Charlotte, North Carolina, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



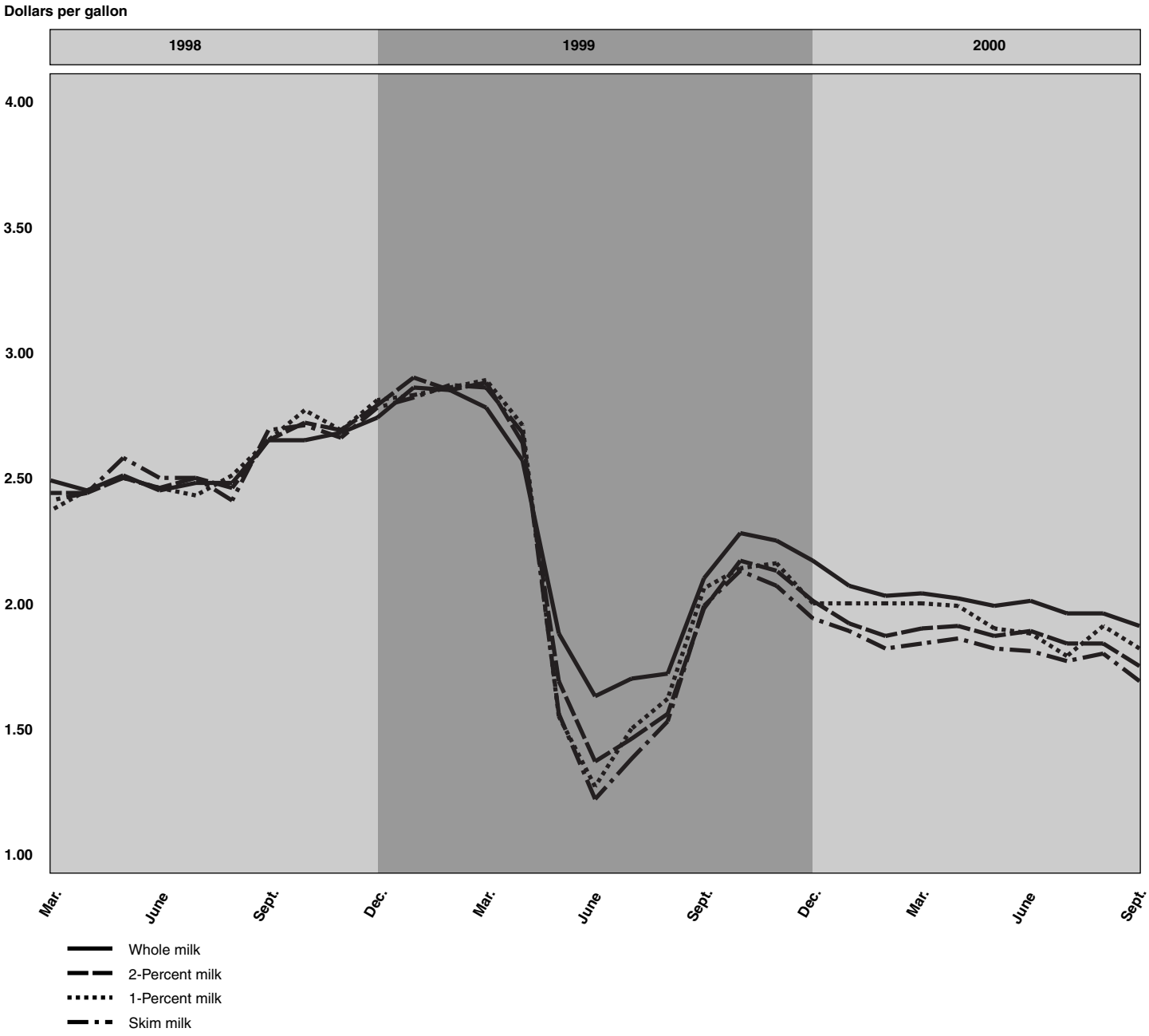
Note: The retail price is the A.C. Nielsen price for the Charlotte market.

Figure 22: Cincinnati, Ohio, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



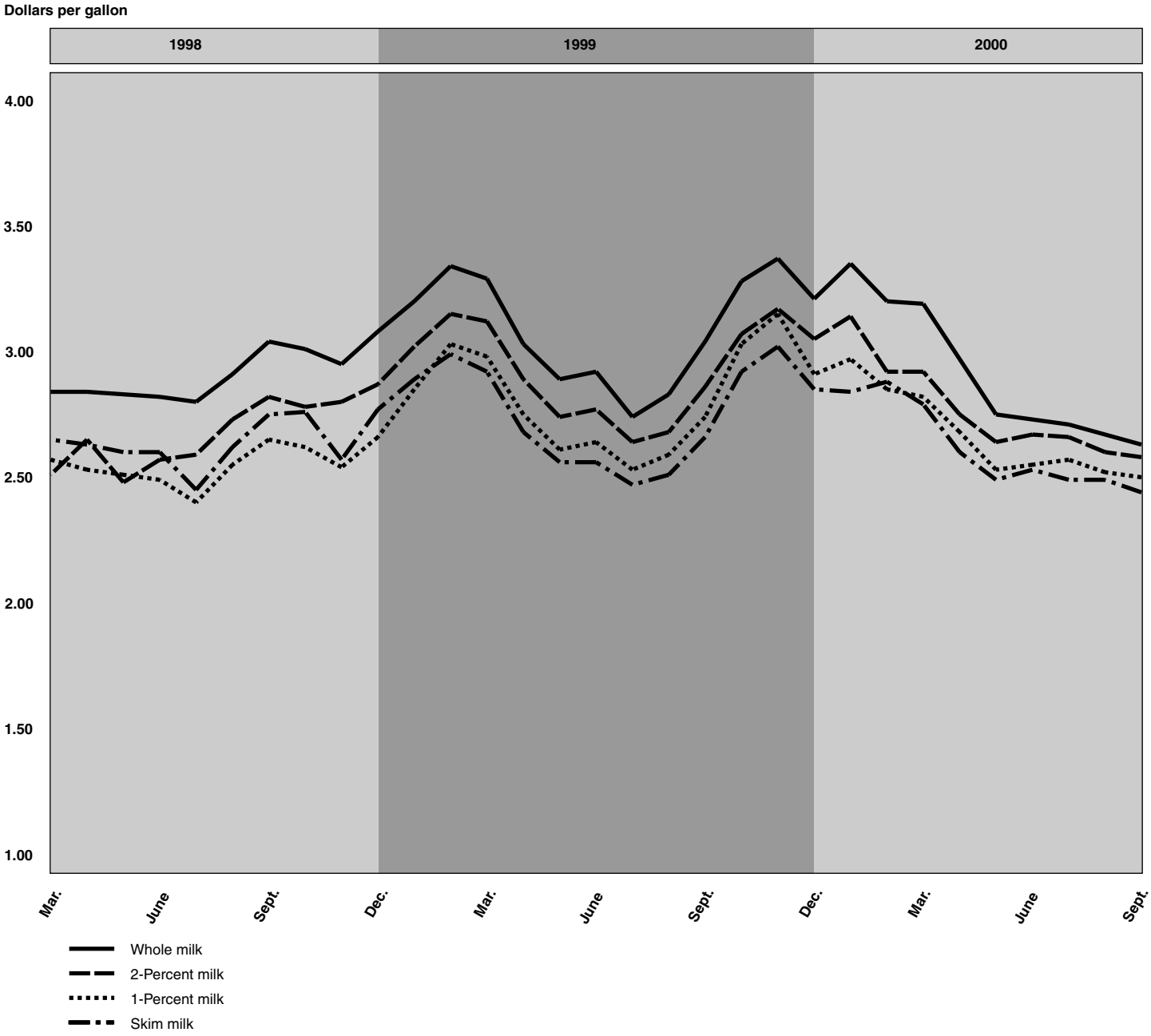
Note: The retail price is the A.C. Nielsen price for the Cincinnati market.

Figure 23: Dallas, Texas, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



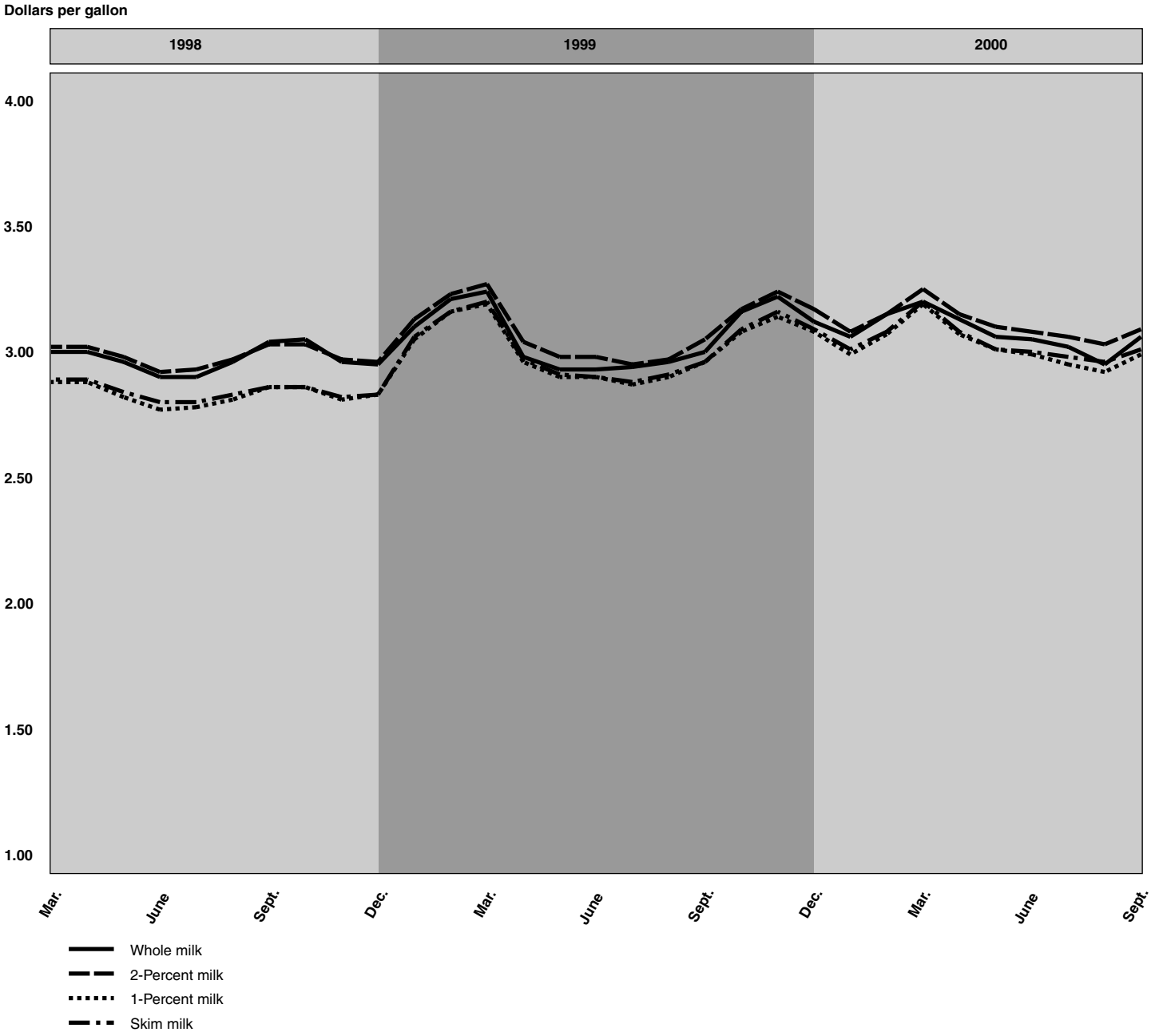
Note: The retail price is the A.C. Nielsen price for the Dallas market.

Figure 24: Denver, Colorado, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



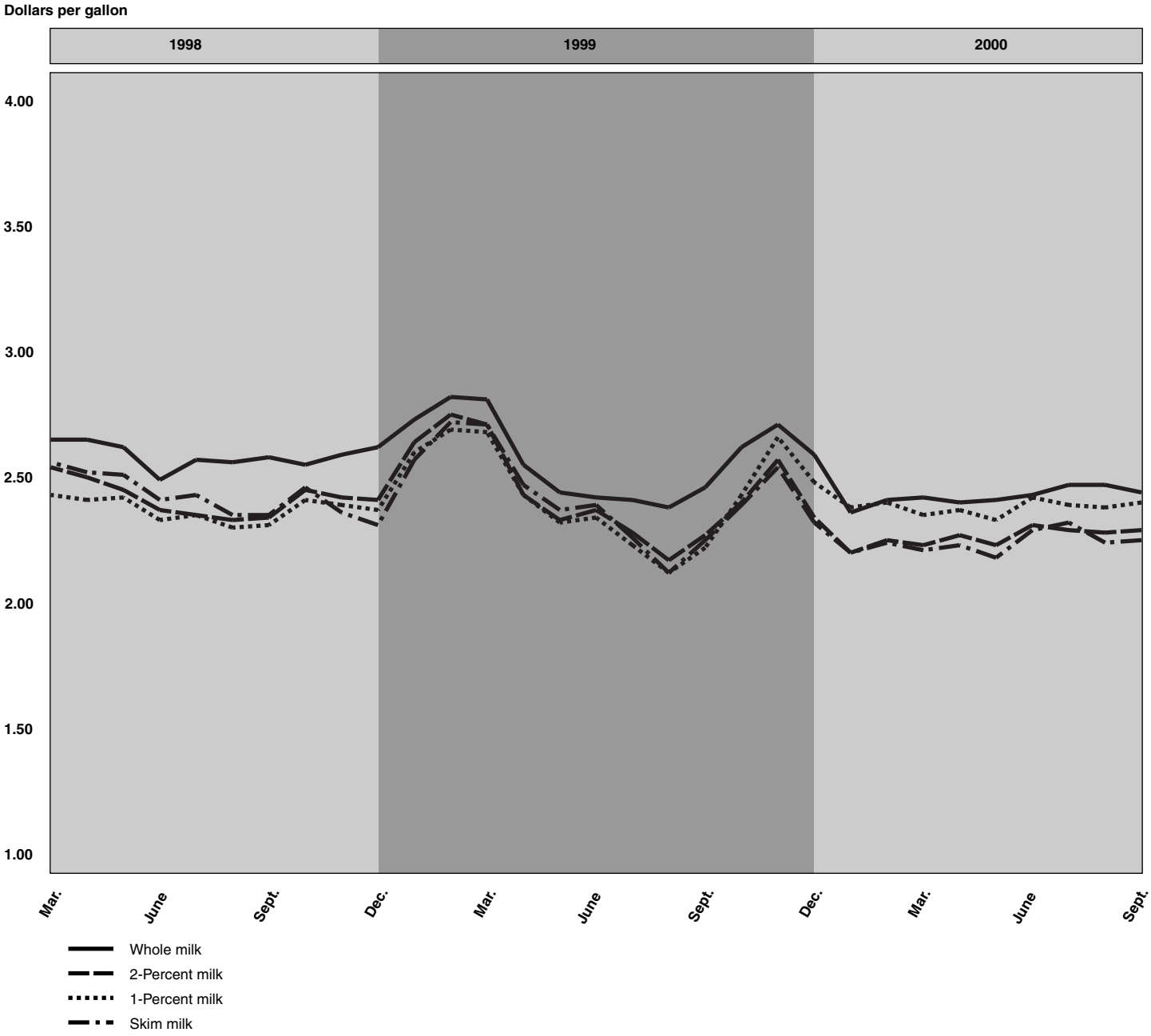
Note: The retail price is the A.C. Nielsen price for the Denver market.

Figure 25: Miami, Florida, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



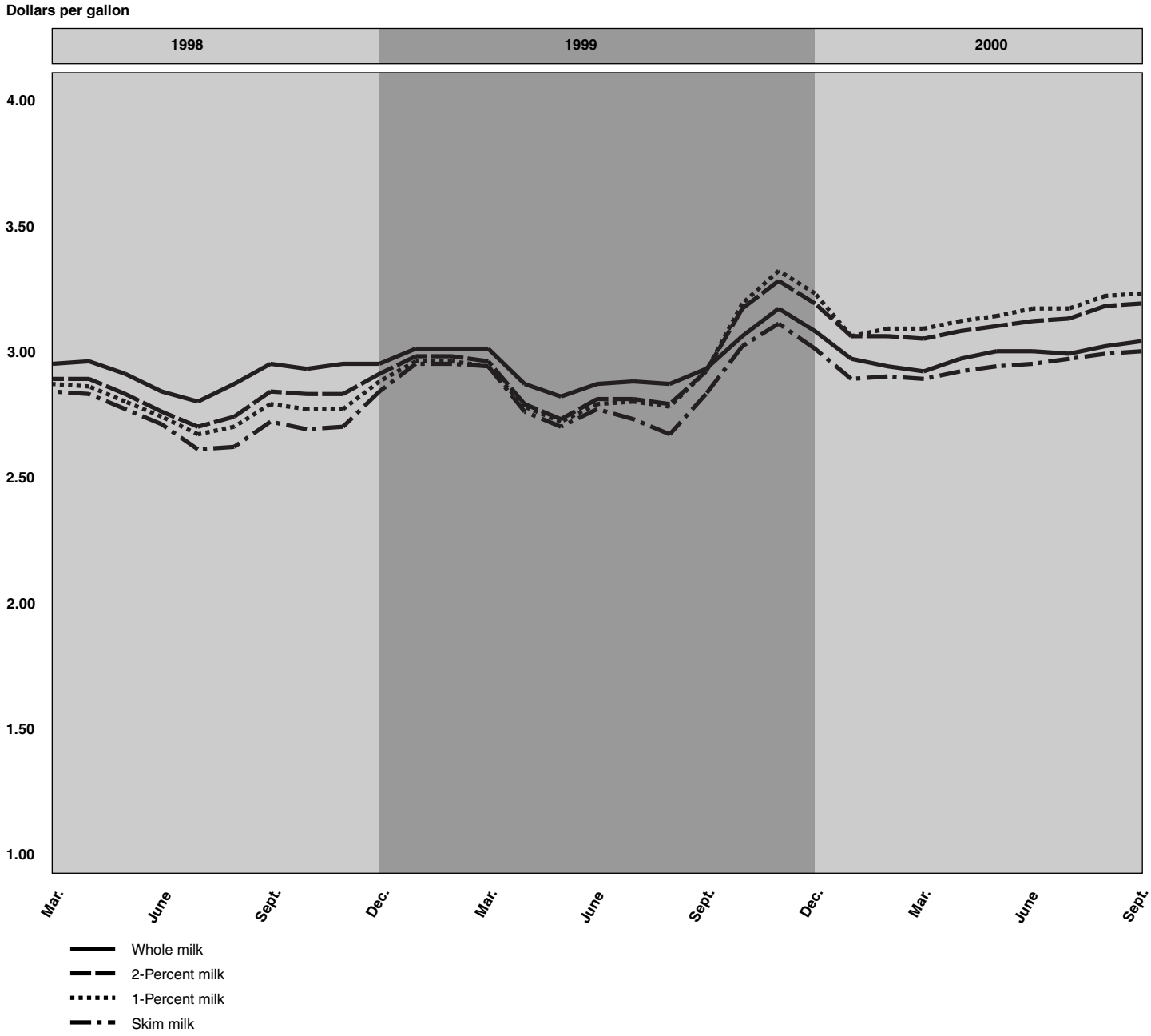
Note: The retail price is the A.C. Nielsen price for the Miami market.

Figure 26: Milwaukee, Wisconsin, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



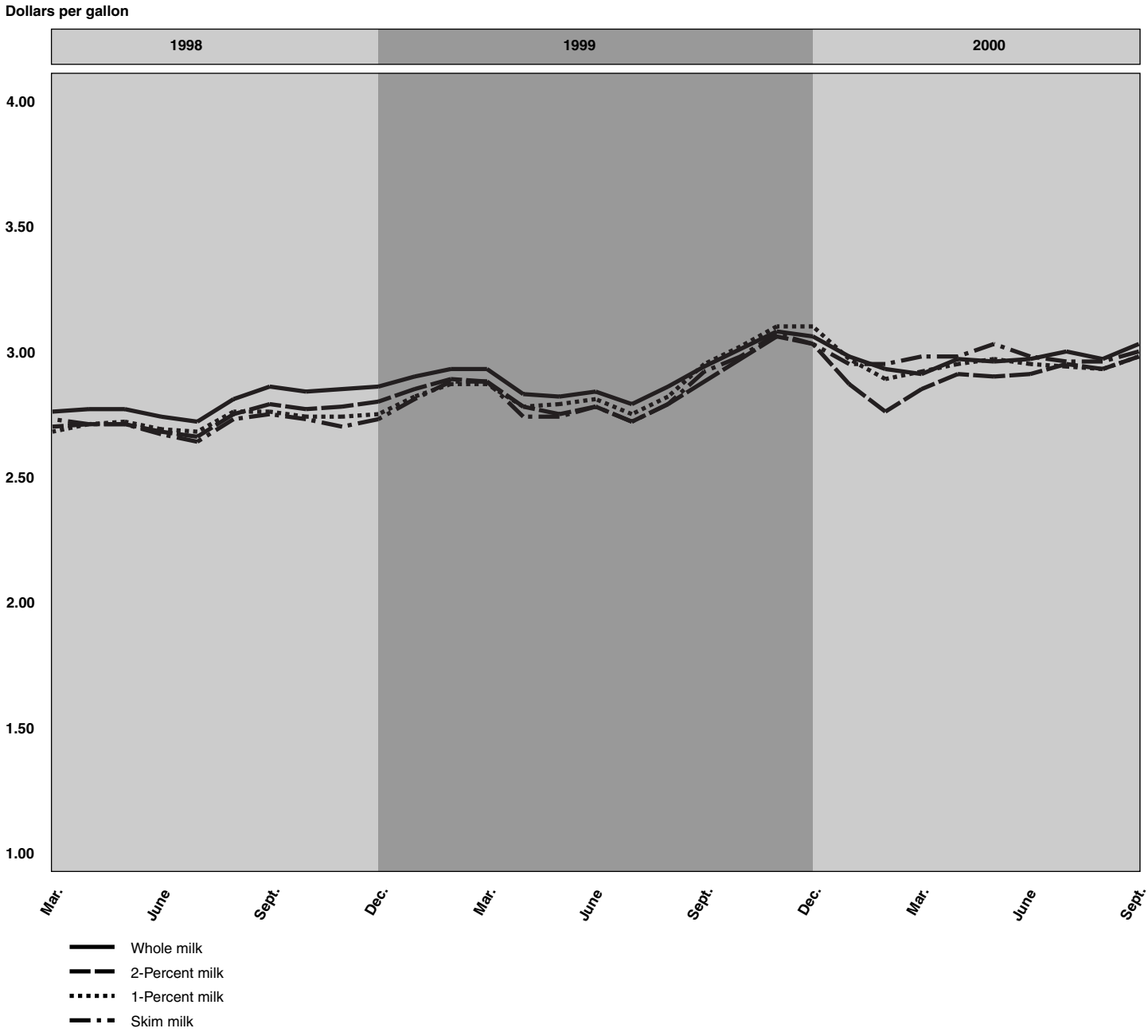
Note: The retail price is the A.C. Nielsen price for the Milwaukee market.

Figure 27: Minneapolis, Minnesota, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



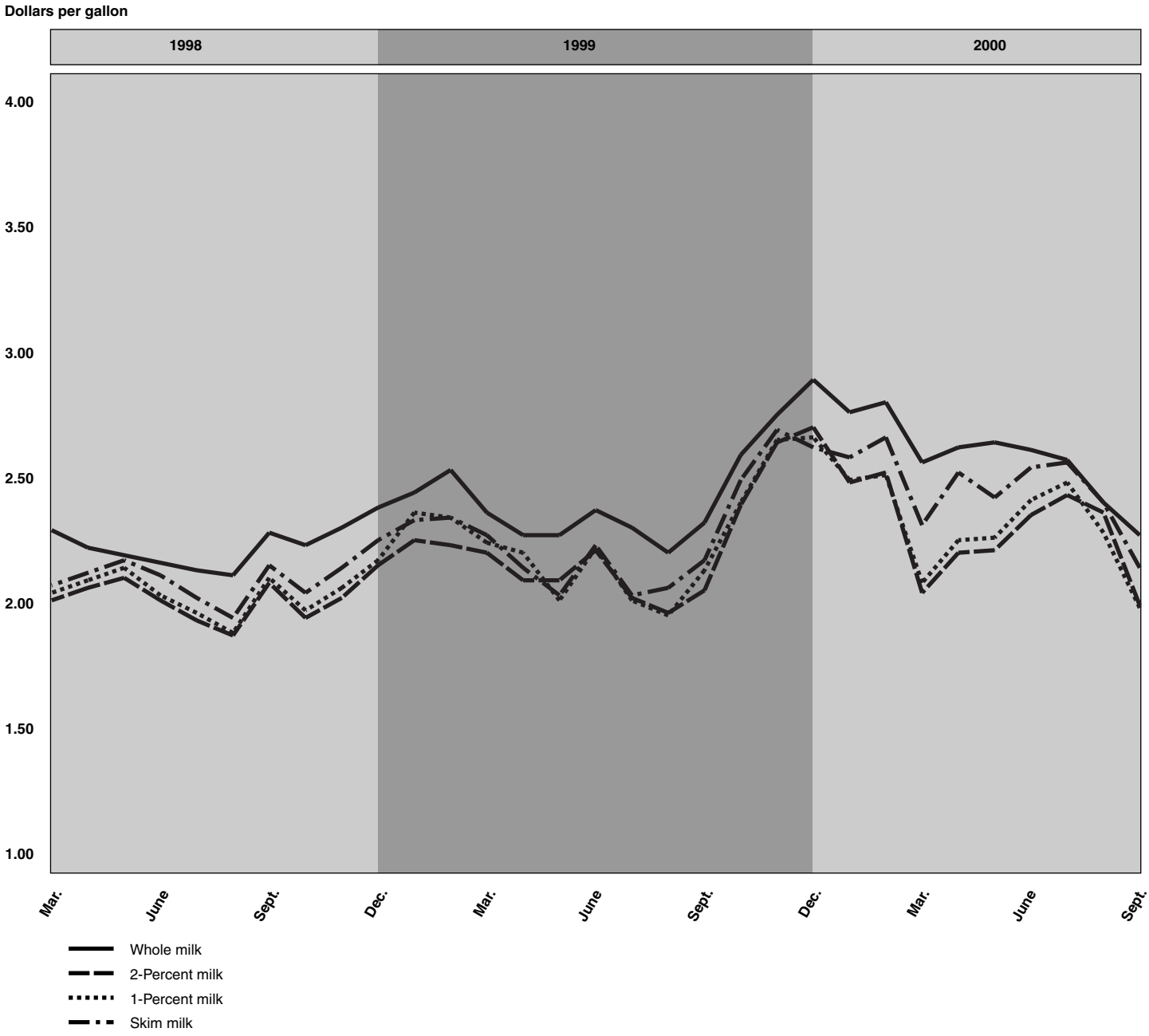
Note: The retail price is the A.C. Nielsen price for the Minneapolis market.

Figure 28: New Orleans, Louisiana, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



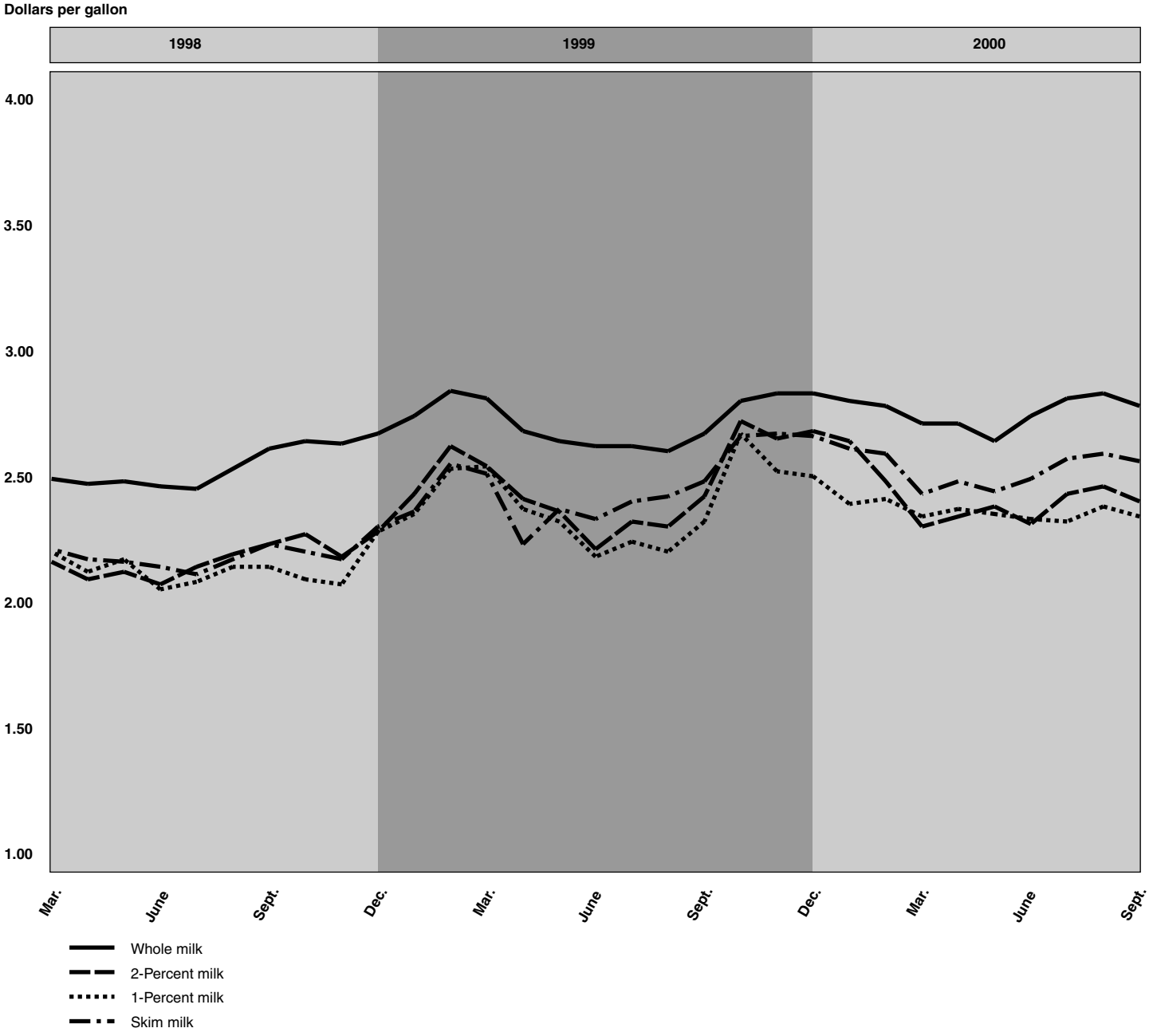
Note: The retail price is the A.C. Nielsen price for the New Orleans-Mobile market.

Figure 29: Phoenix, Arizona, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



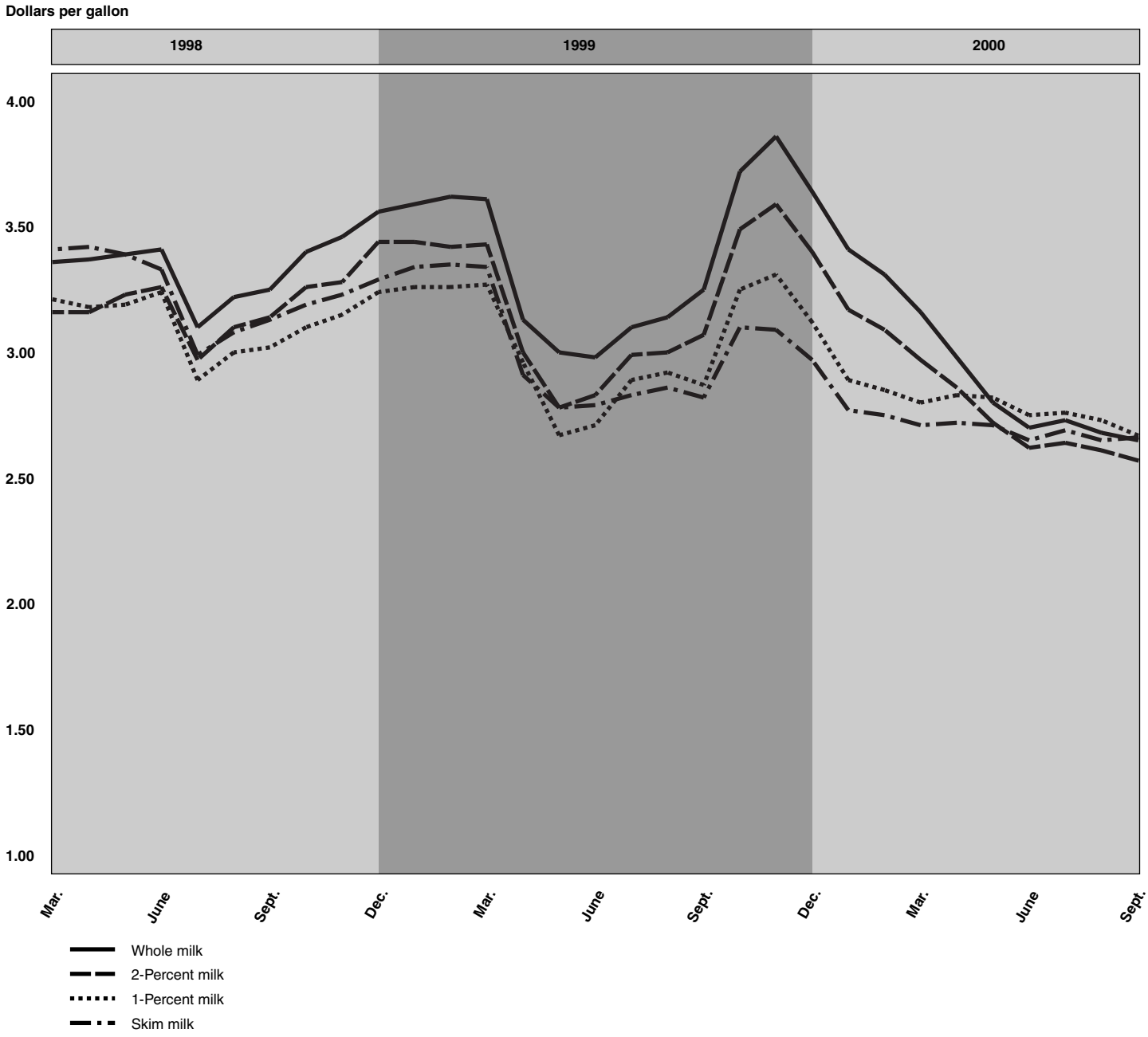
Note: The retail price is the A.C. Nielsen price for the Phoenix market.

Figure 30: Salt Lake City, Utah, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



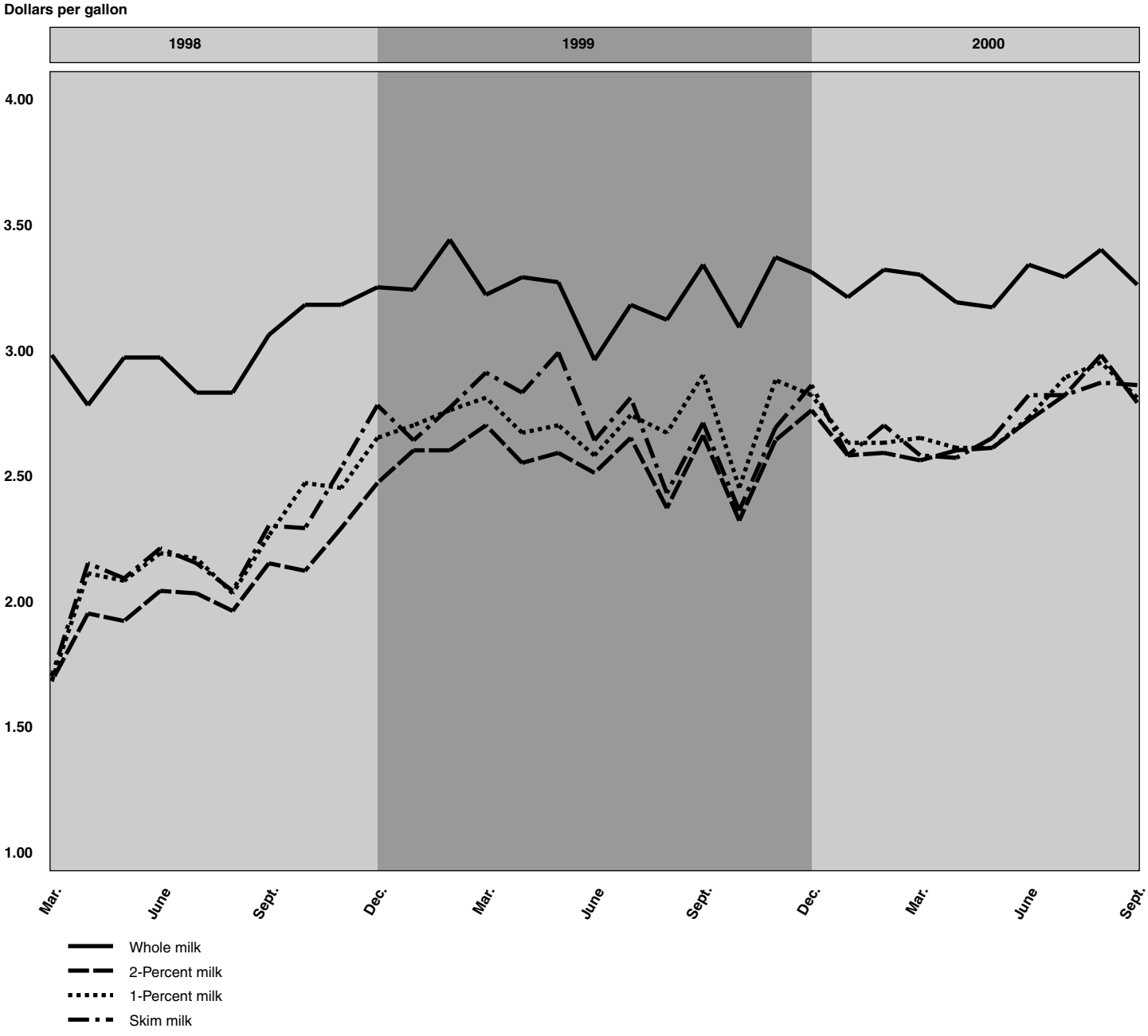
Note: The retail price is the A.C. Nielsen price for the Salt Lake City-Boise market.

Figure 31: San Diego, California, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



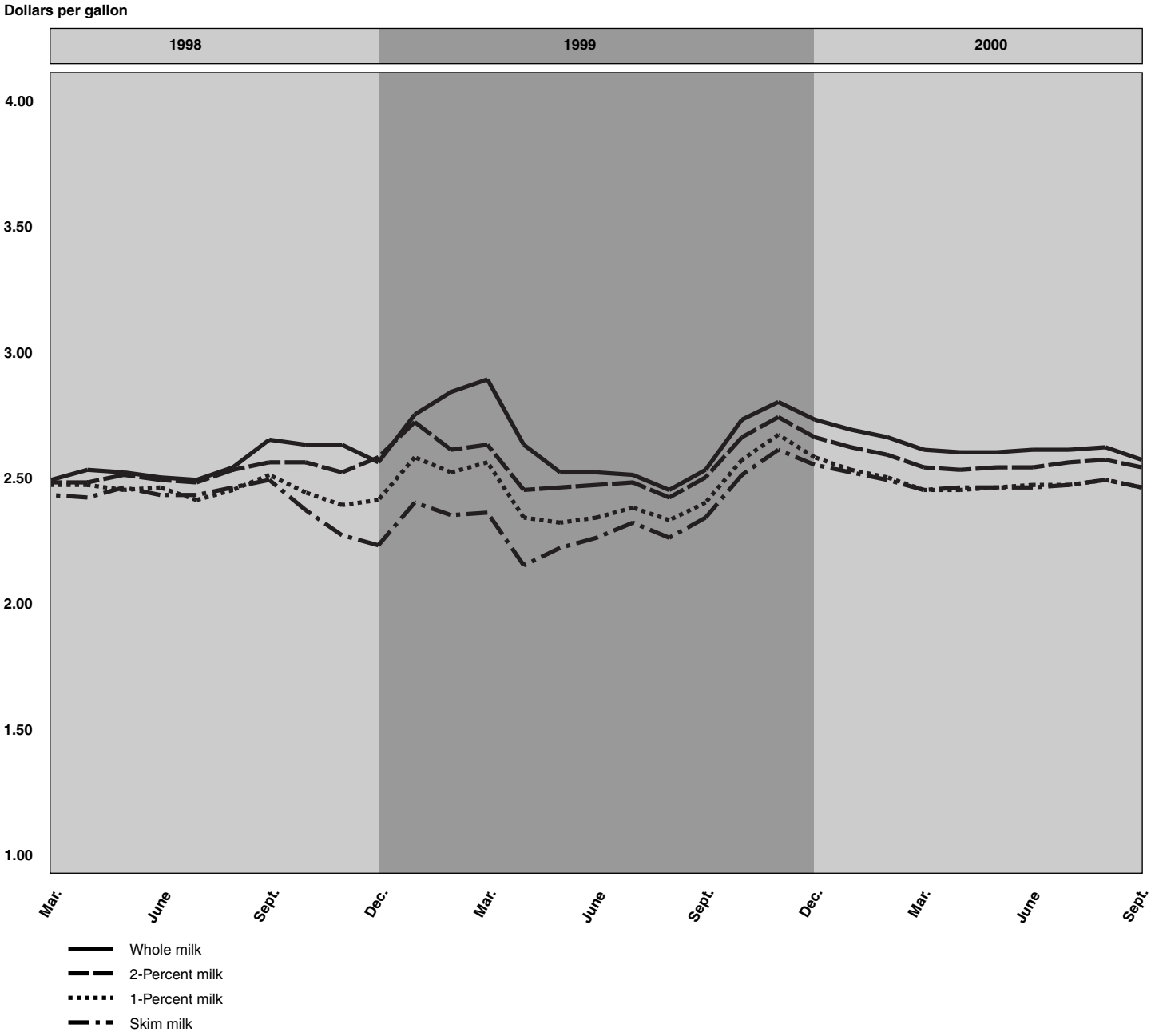
Note: The retail price is the A.C. Nielsen price for the San Diego market.

Figure 32: Seattle, Washington, Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



Note: The retail price is the A.C. Nielsen price for the Seattle market.

Figure 33: Washington, D.C., Market, Retail Prices for Whole, 2-Percent, 1-Percent, and Skim Milk



Note: The retail price is the A.C. Nielsen price for the Washington, D.C. market.

Appendix V: Monthly Retail, Wholesale-, Cooperative-, and Farm-Level Prices for Four Kinds of Fluid Milk in Selected Markets

This appendix provides data for the period March 1998 through September 2000 on the average monthly retail- and wholesale-level prices for a gallon of whole, 2-percent, 1-percent, and skim milk, and cooperative- and farm-level prices for a gallon of unprocessed milk, for 15 selected markets. These data are presented in tables 9 through 23.

Table 9: Atlanta, Georgia, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.32	$1.49	$2.27	$2.20	$2.15	$2.12	$2.54	$2.58	$2.47	$2.56
	Apr.	1.32	1.50	2.27	2.18	2.12	2.08	2.62	2.66	2.59	2.65
	May	1.29	1.45	2.23	2.15	2.09	2.05	2.57	2.60	2.45	2.55
	June	1.25	1.41	2.23	2.15	2.09	2.05	2.61	2.65	2.51	2.60
	July	1.15	1.31	2.13	2.12	1.93	1.87	2.67	2.72	2.54	2.61
	Aug.	1.32	1.50	2.24	2.15	2.04	1.95	2.70	2.74	2.55	2.64
	Sept.	1.45	1.63	2.24	2.15	2.10	2.06	2.73	2.76	2.65	2.73
	Oct.	1.47	1.65	2.39	2.28	2.13	2.02	2.75	2.79	2.69	2.76
	Nov.	1.48	1.66	2.28	2.01	2.13	1.95	2.79	2.81	2.70	2.77
	Dec.	1.59	1.74	2.29	2.29	2.28	2.19	2.79	2.84	2.73	2.80
	Avg.	1.36	1.54	2.26	2.17	2.11	2.03	2.68	2.71	2.59	2.67
1999	Jan.	1.65	1.81	2.43	2.43	2.43	2.42	2.81	2.85	2.75	2.83
	Feb.	1.68	1.85	2.43	2.43	2.43	2.43	2.80	2.83	2.66	2.78
	Mar.	1.59	1.76	2.43	2.43	2.43	2.43	2.73	2.80	2.71	2.78
	Apr.	1.12	1.29	2.11	2.04	2.03	1.99	2.75	2.80	2.65	2.75
	May	1.19	1.36	2.24	2.18	2.15	2.14	2.62	2.67	2.61	2.68
	June	1.21	1.38	2.27	2.20	2.15	2.15	2.68	2.74	2.67	2.73
	July	1.19	1.37	2.25	2.20	2.15	2.15	2.78	2.84	2.75	2.82
	Aug.	1.20	1.38	2.25	2.18	2.12	2.12	2.76	2.79	2.72	2.78
	Sept.	1.34	1.53	2.25	2.18	2.12	2.12	2.81	2.84	2.79	2.85
	Oct.	1.48	1.67	2.30	2.20	2.15	2.15	3.00	3.05	2.96	3.04
	Nov.	1.52	1.71	2.30	2.20	2.15	2.15	3.17	3.21	3.19	3.25
	Dec.	1.21	1.38	2.25	2.20	2.15	2.05	3.12	3.17	3.16	3.20
	Avg.	1.36	1.54	2.29	2.24	2.21	2.19	2.84	2.88	2.80	2.87
2000	Jan.	1.18	1.35	2.25	2.20	2.15	2.15	3.09	3.12	3.09	3.13
	Feb.	1.14	1.34	2.24	2.16	2.10	1.95	2.94	2.99	2.90	2.97
	Mar.	1.15	1.35	2.24	2.21	2.20	2.09	2.96	3.00	2.94	3.01
	Apr.	1.17	1.36	2.24	2.21	2.20	2.09	3.09	3.13	3.10	3.15
	May	1.20	1.39	2.24	2.21	2.20	2.09	2.92	2.98	2.95	3.00
	June	1.20	1.39	2.24	2.21	2.20	2.09	3.11	3.17	3.16	3.20
	July	1.23	1.43	2.24	2.21	2.20	2.09	2.97	3.05	3.02	3.08
	Aug.	1.19	1.41	2.30	2.25	2.18	2.07	3.05	3.13	3.09	3.14
	Sept.	1.18	1.40	2.30	2.12	2.09	2.06	2.99	3.07	2.90	2.99
	Avg.	1.18	1.38	2.25	2.20	2.17	2.08	3.01	3.07	3.02	3.07

Note: For the Atlanta, Georgia, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Atlanta for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at the Athens Naval Supply Corps School; and the retail price is the A.C. Nielsen price for the Atlanta market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 10: Boston, Massachusetts, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.36	$1.51	$1.61	$1.66	$1.65	$1.60	$2.53	$2.37	$2.35	$2.30
	Apr.	1.36	1.50	1.61	1.66	1.65	1.60	2.53	2.40	2.34	2.27
	May	1.36	1.50	1.61	1.66	1.65	1.60	2.53	2.41	2.36	2.30
	June	1.36	1.50	1.61	1.66	1.65	1.60	2.53	2.40	2.36	2.29
	July	1.36	1.50	1.86	1.91	1.90	1.85	2.53	2.44	2.37	2.28
	Aug.	1.36	1.50	1.86	1.91	1.90	1.85	2.55	2.39	2.32	2.25
	Sept.	1.45	1.59	1.86	1.91	1.90	1.85	2.56	2.40	2.31	2.28
	Oct.	1.47	1.61	1.86	1.91	1.90	1.85	2.55	2.40	2.33	2.27
	Nov.	1.48	1.62	1.86	1.91	1.90	1.85	2.55	2.40	2.29	2.21
	Dec.	1.56	1.70	2.06	2.11	2.10	2.05	2.59	2.49	2.33	2.31
	Avg.	1.41	1.55	1.78	1.83	1.82	1.77	2.55	2.41	2.34	2.28
1999	Jan.	1.63	1.77	2.13	2.18	2.17	2.12	2.70	2.59	2.51	2.42
	Feb.	1.67	1.81	2.17	2.22	2.21	2.16	2.82	2.70	2.62	2.56
	Mar.	1.58	1.72	2.08	2.13	2.12	2.07	2.80	2.69	2.62	2.55
	Apr.	1.36	1.50	1.86	1.91	1.90	1.85	2.71	2.64	2.50	2.44
	May	1.36	1.50	1.86	1.91	1.90	1.85	2.68	2.58	2.48	2.42
	June	1.36	1.50	1.86	1.91	1.90	1.85	2.69	2.61	2.49	2.43
	July	1.36	1.50	1.86	1.91	1.90	1.85	2.69	2.63	2.51	2.46
	Aug.	1.36	1.50	1.86	1.91	1.90	1.85	2.68	2.62	2.50	2.43
	Sept.	1.36	1.50	1.86	1.91	1.90	1.85	2.68	2.62	2.51	2.45
	Oct.	1.54	1.68	2.05	2.01	2.09	2.04	2.82	2.77	2.67	2.58
	Nov.	1.58	1.72	2.29	2.25	2.21	2.20	2.90	2.89	2.78	2.69
	Dec.	1.36	1.50	2.07	2.03	1.99	1.98	2.85	2.82	2.72	2.67
	Avg.	1.46	1.60	2.00	2.02	2.02	1.97	2.75	2.68	2.58	2.51
2000	Jan.	1.36	1.50	2.07	2.03	1.99	1.98	2.85	2.77	2.73	2.63
	Feb.	1.36	1.50	2.07	2.03	1.99	1.98	2.82	2.74	2.68	2.64
	Mar.	1.36	1.50	2.07	2.03	1.99	1.98	2.79	2.72	2.64	2.62
	Apr.	1.36	1.50	2.07	2.03	1.99	1.98	2.81	2.73	2.67	2.64
	May	1.36	1.50	2.07	2.03	1.99	1.98	2.82	2.74	2.69	2.67
	June	1.36	1.50	2.07	2.03	1.99	1.98	2.83	2.75	2.72	2.67
	July	1.36	1.50	2.07	2.03	1.99	1.98	2.83	2.73	2.71	2.67
	Aug.	1.36	1.50	2.07	2.03	1.99	1.98	2.84	2.74	2.71	2.67
	Sept.	1.36	1.50	2.07	2.03	1.99	1.98	2.84	2.74	2.72	2.67
	Avg.	1.36	1.50	2.07	2.03	1.99	1.98	2.83	2.74	2.70	2.65

Note: For the Boston, Massachusetts, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the effective cooperative Class I price for Boston for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at the Hanscom Air Force Base; and the retail price is the A.C. Nielsen price for the Boston market which includes Rhode Island and parts of New Hampshire. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 11: Charlotte, North Carolina, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.37	$1.49	$2.30	$2.21	$2.22	$2.15	$2.68	$2.66	$2.68	$2.68
	Apr.	1.38	1.50	2.30	2.21	2.22	2.15	2.67	2.63	2.65	2.66
	May	1.33	1.45	2.14	2.11	2.13	2.05	2.68	2.65	2.67	2.68
	June	1.30	1.41	2.08	2.05	2.07	1.99	2.62	2.61	2.61	2.66
	July	1.19	1.31	1.97	1.95	1.95	1.89	2.69	2.67	2.68	2.68
	Aug.	1.36	1.50	2.16	2.07	2.02	1.95	2.75	2.72	2.74	2.74
	Sept.	1.50	1.63	2.28	2.19	2.14	2.07	2.80	2.78	2.80	2.81
	Oct.	1.51	1.65	2.28	2.17	2.12	2.04	2.84	2.82	2.85	2.85
	Nov.	1.53	1.66	2.24	2.15	2.10	2.02	2.85	2.83	2.86	2.86
	Dec.	1.61	1.74	2.30	2.23	2.18	2.10	2.86	2.85	2.88	2.88
	Avg.	1.41	1.54	2.21	2.13	2.12	2.04	2.74	2.72	2.74	2.75
1999	Jan.	1.68	1.81	2.40	2.35	2.32	2.30	2.93	2.91	2.95	2.95
	Feb.	1.72	1.85	2.43	2.43	2.43	2.43	2.98	2.97	3.02	3.02
	Mar.	1.63	1.76	2.34	2.32	2.30	2.29	3.01	2.99	3.04	3.04
	Apr.	1.15	1.29	1.99	1.97	1.95	1.93	2.85	2.83	2.86	2.87
	May	1.22	1.36	2.05	2.04	2.02	2.00	2.72	2.71	2.74	2.76
	June	1.24	1.38	2.13	2.12	2.10	2.08	2.72	2.71	2.74	2.76
	July	1.23	1.37	2.09	2.08	2.05	2.03	2.71	2.70	2.73	2.75
	Aug.	1.23	1.38	2.05	2.06	2.05	2.20	2.70	2.68	2.71	2.73
	Sept.	1.38	1.53	2.20	2.20	2.20	2.20	2.80	2.77	2.80	2.81
	Oct.	1.52	1.67	2.30	2.28	2.28	2.24	2.88	2.88	2.90	2.92
	Nov.	1.57	1.71	2.32	2.30	2.30	2.26	3.04	3.02	3.06	3.07
	Dec.	1.24	1.38	2.02	2.00	2.00	1.98	2.97	2.94	2.97	2.96
	Avg.	1.40	1.54	2.19	2.18	2.17	2.16	2.86	2.84	2.88	2.89
2000	Jan.	1.21	1.35	2.02	2.00	2.00	1.98	2.90	2.87	2.88	2.88
	Feb.	1.19	1.34	2.02	2.00	2.00	1.98	2.92	2.89	2.90	2.90
	Mar.	1.20	1.35	2.02	2.00	2.00	1.98	2.86	2.81	2.81	2.80
	Apr.	1.22	1.36	2.02	2.00	2.00	1.98	2.72	2.70	2.72	2.73
	May	1.24	1.39	2.02	2.00	2.00	1.98	2.75	2.74	2.76	2.77
	June	1.24	1.39	2.02	2.00	2.00	1.98	2.84	2.79	2.78	2.78
	July	1.28	1.43	2.02	2.00	2.00	1.98	2.78	2.75	2.78	2.78
	Aug.	1.24	1.41	2.02	2.00	2.00	1.98	2.73	2.69	2.73	2.76
	Sept.	1.24	1.40	2.02	2.00	2.00	1.98	2.87	2.84	2.87	2.87
	Avg.	1.23	1.38	2.02	2.00	2.00	1.98	2.82	2.79	2.80	2.81

Note: For the Charlotte, North Carolina, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Charlotte for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at Fort Bragg; and the retail price is the A.C. Nielsen price for the Charlotte market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 12: Cincinnati, Ohio, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.35	$1.47	$2.15	$1.89	$1.89	$1.85	$1.42	$1.42	$1.41	$1.39
	Apr.	1.35	1.48	2.15	1.89	1.89	1.85	1.53	1.54	1.57	1.56
	May	1.31	1.43	2.15	1.89	1.89	1.85	1.84	1.86	1.89	1.89
	June	1.24	1.36	2.15	1.89	1.89	1.85	2.00	2.00	2.02	2.01
	July	1.14	1.27	2.09	1.89	1.89	1.80	2.02	2.01	2.03	2.02
	Aug.	1.33	1.46	1.99	1.85	1.80	1.75	2.00	1.96	1.99	1.98
	Sept.	1.48	1.60	2.09	1.89	1.89	1.80	2.05	2.03	2.03	2.02
	Oct.	1.50	1.62	2.09	1.89	1.89	1.80	1.92	1.90	1.88	1.86
	Nov.	1.51	1.63	2.09	1.89	1.89	1.80	2.04	2.04	2.01	2.00
	Dec.	1.59	1.71	2.09	1.89	1.89	1.80	2.29	2.28	2.29	2.28
	Avg.	1.38	1.50	2.10	1.89	1.88	1.82	1.91	1.91	1.91	1.90
1999	Jan.	1.66	1.78	2.43	2.27	2.03	1.88	2.50	2.50	2.51	2.45
	Feb.	1.70	1.82	2.49	2.34	2.20	2.10	2.58	2.57	2.59	2.53
	Mar.	1.61	1.73	2.49	2.34	2.20	2.10	2.49	2.46	2.47	2.39
	Apr.	1.10	1.22	2.19	1.99	1.90	1.95	2.35	2.33	2.33	2.31
	May	1.20	1.33	2.19	1.99	1.90	1.80	2.39	2.38	2.33	2.35
	June	1.22	1.34	2.19	1.99	1.90	1.80	2.34	2.34	2.35	2.32
	July	1.17	1.30	2.29	2.22	2.17	2.06	2.45	2.43	2.23	2.21
	Aug.	1.18	1.31	2.29	2.22	2.17	2.06	2.24	2.25	2.23	2.18
	Sept.	1.39	1.51	2.29	2.22	2.17	2.06	2.60	2.59	2.50	2.54
	Oct.	1.56	1.69	2.48	2.37	2.29	2.23	2.61	2.52	2.42	2.41
	Nov.	1.61	1.73	2.73	2.62	2.53	2.39	2.77	2.71	2.75	2.72
	Dec.	1.20	1.32	2.32	2.21	2.12	1.98	2.70	2.67	2.70	2.68
	Avg.	1.38	1.51	2.37	2.23	2.13	2.03	2.50	2.48	2.45	2.42
2000	Jan.	1.16	1.27	2.17	2.06	1.97	1.83	2.61	2.58	2.57	2.53
	Feb.	1.13	1.25	2.17	2.06	1.97	1.83	2.52	2.49	2.51	2.47
	Mar.	1.16	1.28	2.20	2.09	2.00	1.86	2.53	2.50	2.48	2.45
	Apr.	1.17	1.29	2.20	2.09	2.00	1.86	2.49	2.45	2.50	2.46
	May	1.22	1.34	2.26	2.14	2.03	1.88	2.57	2.49	2.53	2.48
	June	1.22	1.34	2.25	2.12	2.01	1.85	2.44	2.42	2.45	2.40
	July	1.29	1.41	2.32	2.17	2.03	1.87	2.52	2.53	2.46	2.45
	Aug.	1.26	1.38	2.32	2.17	2.03	1.87	2.70	2.66	2.53	2.51
	Sept.	1.25	1.37	2.32	2.17	2.03	1.87	2.57	2.55	2.49	2.49
	Avg.	1.21	1.32	2.25	2.12	2.01	1.86	2.55	2.52	2.50	2.47

Note: For the Cincinnati, Ohio, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Cincinnati for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at Wright Patterson Air Force Base; and the retail price is the A.C. Nielsen price for the Cincinnati market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 13: Dallas, Texas, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	**Month**			**Whole**	**2%**	**1%**	**Skim**	**Whole**	**2%**	**1%**	**Skim**
1998	Mar.	$1.34	$1.43	$2.14	$2.14[a]	$2.15	$1.98	$2.49	$2.44	$2.37	$2.41
	Apr.	1.34	1.44	2.14	2.14[a]	2.15	1.98	2.45	2.44	2.45	2.44
	May	1.30	1.39	2.14	2.14[a]	2.15	1.98	2.51	2.50	2.50	2.58
	June	1.24	1.33	2.14	2.14[a]	2.15	1.98	2.45	2.46	2.46	2.50
	July	1.17	1.25	2.14	2.14[a]	2.15	1.98	2.48	2.50	2.43	2.50
	Aug.	1.33	1.42	2.46	2.46[a]	2.46	2.36	2.48	2.46	2.51	2.41
	Sept.	1.48	1.56	2.59	2.59[a]	2.59	2.49	2.65	2.65	2.65	2.69
	Oct.	1.50	1.58	2.59	2.59[a]	2.59	2.49	2.65	2.72	2.77	2.71
	Nov.	1.50	1.59	2.59	2.59[a]	2.59	2.49	2.68	2.69	2.69	2.66
	Dec.	1.59	1.67	2.49	2.49[a]	2.49	2.43	2.74	2.79	2.81	2.78
	Avg.	1.38	1.47	2.34	2.34	2.35	2.22	2.56	2.57	2.56	2.57
1999	Jan.	1.65	1.74	2.49	2.49[a]	2.49	2.43	2.86	2.90	2.83	2.82
	Feb.	1.69	1.78	2.59	2.59[a]	2.59	2.53	2.85	2.85	2.86	2.87
	Mar.	1.60	1.69	2.67	2.67[a]	2.67	2.67	2.78	2.88	2.89	2.86
	Apr.	1.09	1.18	2.67	2.67[a]	2.67	2.67	2.57	2.64	2.71	2.68
	May	1.20	1.29	2.67	2.67[a]	2.67	2.67	1.88	1.69	1.55	1.56
	June	1.22	1.31	2.79	2.79[a]	2.79	2.79	1.63	1.37	1.27	1.22
	July	1.23	1.33	2.79	2.79[a]	2.79	2.79	1.70	1.46	1.50	1.38
	Aug.	1.23	1.34	2.79	2.79[a]	2.79	2.79	1.72	1.56	1.62	1.53
	Sept.	1.38	1.49	2.79	2.79[a]	2.79	2.79	2.10	1.98	2.06	1.99
	Oct.	1.53	1.63	2.99	2.99[a]	2.99	2.99	2.28	2.17	2.14	2.13
	Nov.	1.57	1.67	2.99	2.99[a]	2.99	2.99	2.25	2.13	2.16	2.07
	Dec.	1.25	1.35	2.99	2.99[a]	2.99	2.99	2.17	2.01	2.00	1.94
	Avg.	1.39	1.48	2.77	2.77	2.77	2.76	2.23	2.14	2.13	2.09
2000	Jan.	1.21	1.31	2.89	2.89[a]	2.89	2.89	2.07	1.92	2.00	1.89
	Feb.	1.19	1.29	2.89	2.89[a]	2.89	2.89	2.03	1.87	2.00	1.82
	Mar.	1.19	1.30	2.89	2.89[a]	2.89	2.89	2.04	1.90	2.00	1.84
	Apr.	1.21	1.31	2.89	2.89[a]	2.89	2.89	2.02	1.91	1.99	1.86
	May	1.23	1.34	2.89	2.89[a]	2.89	2.89	1.99	1.87	1.90	1.82
	June	1.24	1.33	2.89	2.89[a]	2.89	2.89	2.01	1.89	1.88	1.81
	July	1.28	1.38	2.89	2.89[a]	2.89	2.89	1.96	1.84	1.79	1.77
	Aug.	1.25	1.35	2.89	2.89[a]	2.89	2.89	1.96	1.84	1.91	1.80
	Sept.	1.23	1.34	2.89	2.89	2.89	2.89	1.91	1.75	1.82	1.69
	Avg.	1.23	1.33	2.89	2.89	2.89	2.89	2.00	1.86	1.92	1.81

[a]Because data were not available for all wholesale 2-percent prices except Sept. 2000, we estimated these prices as equal to the lower of the whole milk prices or the 1-percent milk prices.

Note: For the Dallas, Texas, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Dallas for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at Kelly Air Force Base; and the retail price is the A.C. Nielsen price for the Dallas market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 14: Denver, Colorado, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.28	$1.39	$1.96	$1.80	$1.69	$1.68	$2.84	$2.51	$2.57	$2.65
	Apr.	1.29	1.39	1.88	1.72	1.60	1.60	2.84	2.65	2.53	2.63
	May	1.24	1.35	1.88	1.72	1.60	1.60	2.83	2.48	2.51	2.60
	June	1.18	1.29	1.88	1.72	1.60	1.60	2.82	2.57	2.49	2.60
	July	1.09	1.19	1.77	1.55	1.38	1.32	2.80	2.59	2.40	2.45
	Aug.	1.28	1.38	1.96	1.68	1.47	1.38	2.91	2.73	2.55	2.62
	Sept.	1.42	1.53	2.11	1.84	1.62	1.53	3.04	2.82	2.65	2.75
	Oct.	1.44	1.55	2.14	1.85	1.57	1.50	3.01	2.78	2.62	2.76
	Nov.	1.45	1.55	2.14	1.77	1.40	1.30	2.95	2.80	2.54	2.57
	Dec.	1.53	1.64	2.24	1.93	1.62	1.55	3.08	2.87	2.66	2.77
	Avg.	1.32	1.43	2.00	1.76	1.56	1.51	2.91	2.68	2.55	2.64
1999	Jan.	1.60	1.70	2.35	2.15	1.95	1.93	3.20	3.02	2.85	2.89
	Feb.	1.63	1.75	2.43	2.28	2.15	2.15	3.34	3.15	3.03	2.99
	Mar.	1.55	1.66	2.35	2.19	2.07	2.07	3.29	3.12	2.98	2.92
	Apr.	1.04	1.17	1.88	1.72	1.60	1.60	3.03	2.89	2.75	2.68
	May	1.16	1.29	2.08	1.93	1.82	1.82	2.89	2.74	2.61	2.56
	June	1.18	1.31	2.13	2.06	2.01	1.97	2.92	2.77	2.64	2.56
	July	1.13	1.26	2.09	1.99	1.94	1.89	2.74	2.64	2.53	2.47
	Aug.	1.14	1.27	2.11	1.95	1.86	1.77	2.83	2.68	2.59	2.51
	Sept.	1.33	1.46	2.32	2.19	2.13	2.07	3.04	2.86	2.74	2.66
	Oct.	1.52	1.65	[a]	[a]	[a]	[a]	3.28	3.07	3.03	2.92
	Nov.	1.56	1.69	2.54	2.42	2.37	2.32	3.37	3.17	3.15	3.02
	Dec.	1.15	1.28	1.94	1.75	1.66	1.60	3.21	3.05	2.91	2.85
	Avg.	1.33	1.46	2.20	2.06	1.96	1.93	3.09	2.93	2.82	2.75
2000	Jan.	1.09	1.22	1.94	1.75	1.66	1.60	3.35	3.14	2.97	2.84
	Feb.	1.06	1.19	1.92	1.74	1.66	1.60	3.20	2.92	2.85	2.88
	Mar.	1.08	1.21	1.93	1.75	1.66	1.60	3.19	2.92	2.82	2.79
	Apr.	1.09	1.21	1.94	1.75	1.66	1.60	2.97	2.75	2.68	2.60
	May	1.13	1.26	1.99	1.78	1.68	1.60	2.75	2.64	2.53	2.49
	June	1.15	1.28	1.99	1.77	1.66	1.58	2.73	2.67	2.55	2.53
	July	1.22	1.35	2.06	1.83	1.70	1.60	2.71	2.66	2.57	2.49
	Aug.	1.17	1.30	2.02	1.79	1.66	1.60	2.67	2.60	2.52	2.49
	Sept.	1.16	1.29	2.01	1.79	1.69	1.60	2.63	2.58	2.50	2.44
	Avg.	1.13	1.26	1.98	1.77	1.67	1.60	2.91	2.77	2.67	2.62

[a]Data not available.

Note: For the Denver, Colorado, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Denver for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at Fitzsimons U.S. Army Garrison; and the retail price is the A.C. Nielsen price for the Denver market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 15: Miami, Florida, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.51	$1.71	$2.56	$2.56	[a]	$2.56	$3.00	$3.02	$2.88	$2.89
	Apr.	1.51	1.70	2.56	2.56	[a]	2.56	3.00	3.02	2.88	2.89
	May	1.47	1.65	2.56	2.56	[a]	2.56	2.96	2.98	2.82	2.84
	June	1.44	1.63	2.56	2.56	[a]	2.56	2.90	2.92	2.77	2.80
	July	1.36	1.55	2.56	2.56	[a]	2.56	2.90	2.93	2.78	2.80
	Aug.	1.53	1.74	2.56	2.56	[a]	2.56	2.96	2.97	2.81	2.83
	Sept.	1.66	1.87	2.56	2.56	[a]	2.56	3.04	3.03	2.86	2.86
	Oct.	1.68	1.89	2.56	2.56	[a]	2.56	3.05	3.03	2.86	2.86
	Nov.	1.68	1.89	2.56	2.56	[a]	2.56	2.96	2.97	2.81	2.82
	Dec.	1.77	1.96	2.56	2.56	[a]	2.56	2.95	2.96	2.83	2.83
	Avg.	1.56	1.76	2.56	2.56	[a]	2.56	2.97	2.98	2.83	2.84
1999	Jan.	1.82	2.01	2.56	2.56	[a]	2.56	3.10	3.13	3.05	3.06
	Feb.	1.86	2.05	2.56	2.56	[a]	2.56	3.21	3.23	3.16	3.16
	Mar.	1.76	1.96	2.56	2.56	[a]	2.56	3.24	3.27	3.19	3.20
	Apr.	1.30	1.49	2.56	2.56	[a]	2.56	2.98	3.04	2.96	2.97
	May	1.37	1.56	2.56	2.56	[a]	2.56	2.93	2.98	2.90	2.91
	June	1.39	1.58	2.56	2.56	[a]	2.56	2.93	2.98	2.90	2.90
	July	1.37	1.58	2.56	2.56	[a]	2.56	2.94	2.95	2.87	2.88
	Aug.	1.39	1.62	2.56	2.56	[a]	2.56	2.96	2.97	2.90	2.91
	Sept.	1.53	1.77	2.56	2.56	[a]	2.56	3.00	3.05	2.96	2.96
	Oct.	1.66	1.89	2.56	2.56	[a]	2.56	3.16	3.17	3.08	3.09
	Nov.	1.70	1.93	2.56	2.56	[a]	2.56	3.22	3.24	3.14	3.16
	Dec.	1.40	1.60	2.56	2.56	[a]	2.56	3.12	3.17	3.08	3.09
	Avg.	1.55	1.75	2.56	2.56	[a]	2.56	3.07	3.10	3.02	3.02
2000	Jan.	1.35	1.58	2.56	2.56	[a]	2.56	3.06	3.08	2.99	3.01
	Feb.	1.33	1.55	2.56	2.56	[a]	2.56	3.15	3.15	3.07	3.08
	Mar.	1.34	1.56	2.56	2.56	[a]	2.56	3.20	3.25	3.19	3.20
	Apr.	1.37	1.58	2.56	2.56	[a]	2.56	3.13	3.15	3.07	3.08
	May	1.40	1.61	2.56	2.56	[a]	2.56	3.06	3.10	3.01	3.01
	June	1.39	1.60	2.56	2.56	[a]	2.56	3.05	3.08	2.99	3.00
	July	1.42	1.65	2.56	2.56	[a]	2.56	3.02	3.06	2.95	2.98
	Aug.	1.37	1.62	2.56	2.56	[a]	2.56	2.95	3.03	2.92	2.96
	Sept.	1.36	1.61	2.56	2.56	[a]	2.56	3.06	3.09	2.99	3.01
	Avg.	1.37	1.60	2.56	2.56	[a]	2.56	3.07	3.11	3.02	3.04

[a]Data not available.

Note: For the Miami, Florida, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Miami for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at the Key West Naval Air Station; and the retail price is the A.C. Nielsen price for the Miami market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 16: Milwaukee, Wisconsin, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.31	$1.43	$1.85	$1.75	$1.75	$1.75	$2.65	$2.54	$2.43	$2.56
	Apr.	1.27	1.39	1.85	1.75	1.75	1.75	2.65	2.50	2.41	2.52
	May	1.23	1.35	1.85	1.75	1.75	1.75	2.62	2.45	2.42	2.51
	June	1.16	1.28	1.85	1.75	1.75	1.75	2.49	2.37	2.33	2.41
	July	1.06	1.18	1.85	1.75	1.75	1.75	2.57	2.35	2.35	2.43
	Aug.	1.26	1.38	1.85	1.75	1.75	1.75	2.56	2.33	2.30	2.35
	Sept.	1.40	1.52	1.85	1.75	1.75	1.75	2.58	2.34	2.31	2.35
	Oct.	1.42	1.54	1.95	1.85	1.85	1.85	2.55	2.45	2.41	2.46
	Nov.	1.46	1.58	1.95	1.85	1.85	1.85	2.59	2.42	2.39	2.36
	Dec.	1.54	1.66	1.95	1.85	1.85	1.85	2.62	2.41	2.37	2.31
	Avg.	1.31	1.43	1.88	1.78	1.78	1.78	2.59	2.42	2.37	2.43
1999	Jan.	1.60	1.73	1.95	1.85	1.85	1.85	2.73	2.64	2.60	2.57
	Feb.	1.65	1.77	1.95	1.85	1.85	1.85	2.82	2.75	2.69	2.72
	Mar.	1.56	1.68	1.95	1.85	1.85	1.85	2.81	2.71	2.68	2.71
	Apr.	1.04	1.16	1.95	1.85	1.85	1.85	2.55	2.43	2.43	2.47
	May	1.16	1.28	1.95	1.85	1.85	1.85	2.44	2.33	2.32	2.37
	June	1.17	1.29	1.95	1.85	1.85	1.85	2.42	2.37	2.34	2.39
	July	1.12	1.24	1.95	1.85	1.85	1.85	2.41	2.28	2.23	2.26
	Aug.	1.13	1.24	1.95	1.85	1.85	1.85	2.38	2.17	2.12	2.12
	Sept.	1.32	1.43	1.95	1.85	1.85	1.85	2.46	2.27	2.22	2.25
	Oct.	1.51	1.63	1.95	1.85	1.85	1.85	2.62	2.40	2.43	2.39
	Nov.	1.55	1.67	1.95	1.85	1.85	1.85	2.71	2.57	2.66	2.54
	Dec.	1.14	1.26	1.66	1.62	1.63	1.64	2.59	2.34	2.48	2.32
	Avg.	1.33	1.45	1.93	1.83	1.83	1.83	2.58	2.44	2.43	2.43
2000	Jan.	1.13	1.26	1.93	1.88	1.48	1.88	2.36	2.20	2.38	2.20
	Feb.	1.09	1.22	2.05	2.05	2.07	2.07	2.41	2.25	2.40	2.24
	Mar.	1.12	1.24	2.08	2.08	2.08	2.08	2.42	2.23	2.35	2.21
	Apr.	1.13	1.26	2.08	2.08	2.08	2.08	2.40	2.27	2.37	2.23
	May	1.18	1.30	2.12	2.11	2.09	2.08	2.41	2.23	2.33	2.18
	June	1.17	1.30	2.12	2.11	2.09	2.08	2.43	2.31	2.42	2.29
	July	1.25	1.38	2.19	2.16	2.12	2.09	2.47	2.29	2.39	2.32
	Aug.	1.20	1.33	2.15	2.13	2.11	2.09	2.47	2.28	2.38	2.24
	Sept.	1.19	1.32	2.15	2.13	2.11	2.09	2.44	2.29	2.40	2.25
	Avg.	1.16	1.29	2.10	2.08	2.03	2.06	2.42	2.26	2.38	2.24

Note: For the Milwaukee, Wisconsin, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Milwaukee for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at the Great Lakes Naval Training Center; and the retail price is the A.C. Nielsen price for the Milwaukee market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 17: Minneapolis, Minnesota, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.25	$1.36	$2.10	$2.06	$2.02	$1.99	$2.95	$2.89	$2.87	$2.84
	Apr.	1.20	1.30	2.10	2.06	2.02	1.99	2.96	2.89	2.86	2.83
	May	1.15	1.26	2.10	2.04	1.98	1.94	2.91	2.83	2.80	2.77
	June	1.08	1.19	2.07	2.02	1.96	1.92	2.84	2.76	2.74	2.71
	July	0.99	1.09	2.00	1.94	1.88	1.83	2.80	2.70	2.67	2.61
	Aug.	1.19	1.29	1.89	1.80	1.71	1.63	2.87	2.74	2.70	2.62
	Sept.	1.33	1.44	2.08	1.94	1.81	1.70	2.95	2.84	2.79	2.72
	Oct.	1.36	1.46	2.22	2.07	1.94	1.83	2.93	2.83	2.77	2.69
	Nov.	1.36	1.47	2.23	2.06	1.91	1.79	2.95	2.83	2.77	2.70
	Dec.	1.45	1.55	2.25	2.01	1.79	1.62	2.95	2.91	2.88	2.84
	Avg.	1.24	1.34	2.10	2.00	1.90	1.82	2.91	2.82	2.79	2.73
1999	Jan.	1.51	1.62	2.34	2.16	1.99	1.86	3.01	2.98	2.96	2.95
	Feb.	1.56	1.67	2.43	2.36	2.27	2.21	3.01	2.98	2.96	2.95
	Mar.	1.47	1.57	2.48	2.46	2.41	2.38	3.01	2.96	2.94	2.94
	Apr.	1.01	1.12	2.39	2.36	2.31	2.28	2.87	2.79	2.78	2.76
	May	1.06	1.17	1.87	1.83	1.78	1.75	2.82	2.73	2.72	2.70
	June	1.09	1.20	2.00	1.96	1.92	1.89	2.87	2.81	2.79	2.77
	July	1.06	1.18	2.03	2.02	2.02	2.01	2.88	2.81	2.80	2.73
	Aug.	1.08	1.19	1.99	1.96	1.95	1.92	2.87	2.79	2.78	2.67
	Sept.	1.26	1.38	1.99	1.92	1.87	1.80	2.93	2.92	2.92	2.83
	Oct.	1.45	1.57	2.19	2.15	2.12	2.07	3.06	3.17	3.19	3.02
	Nov.	1.49	1.61	2.50	2.46	2.43	2.38	3.17	3.28	3.32	3.11
	Dec.	1.09	1.20	1.66	1.62	1.63	1.64	3.08	3.19	3.23	3.01
	Avg.	1.26	1.37	2.16	2.11	2.06	2.02	2.96	2.95	2.95	2.87
2000	Jan.	1.08	1.20	2.08	2.03	2.03	2.03	2.97	3.06	3.06	2.89
	Feb.	1.05	1.16	2.05	2.05	2.07	2.07	2.94	3.06	3.09	2.90
	Mar.	1.07	1.18	2.08	2.08	2.08	2.08	2.92	3.05	3.09	2.89
	Apr.	1.09	1.20	2.08	2.11	2.08	2.08	2.97	3.08	3.12	2.92
	May	1.13	1.25	2.12	2.11	2.09	2.08	3.00	3.10	3.14	2.94
	June	1.13	1.24	2.12	2.11	2.09	2.08	3.00	3.12	3.17	2.95
	July	1.21	1.32	2.19	2.16	2.12	2.09	2.99	3.13	3.17	2.97
	Aug.	1.17	1.28	2.15	2.13	2.11	2.09	3.02	3.18	3.22	2.99
	Sept.	1.13	1.25	2.15	2.13	2.11	2.09	3.04	3.19	3.23	3.00
	Avg.	1.12	1.23	2.11	2.10	2.09	2.08	2.98	3.11	3.14	2.94

Note: For the Minneapolis, Minnesota, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Minneapolis for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at Fort McCoy; and the retail price is the A.C. Nielsen price for the Minneapolis market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 18: New Orleans, Louisiana, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.31	$1.48	$2.59	$2.59	$2.59	$2.59	$2.76	$2.70	$2.68	$2.73
	Apr.	1.31	1.49	2.59	2.59	2.59	2.59	2.77	2.71	2.71	2.71
	May	1.29	1.45	2.59	2.59	2.59	2.59	2.77	2.71	2.72	2.71
	June	1.24	1.40	2.53	2.53	2.53	2.53	2.74	2.68	2.69	2.67
	July	1.13	1.30	2.45	2.45	2.45	2.45	2.72	2.66	2.68	2.64
	Aug.	1.31	1.49	2.61	2.61	2.61	2.61	2.81	2.75	2.76	2.73
	Sept.	1.43	1.61	2.81	2.81	2.81	2.81	2.86	2.79	2.76	2.75
	Oct.	1.45	1.63	2.81	2.81	2.81	2.81	2.84	2.77	2.74	2.73
	Nov.	1.47	1.65	2.81	2.81	2.81	2.81	2.85	2.78	2.74	2.70
	Dec.	1.58	1.73	2.96	2.96	2.96	2.96	2.86	2.80	2.75	2.73
	Avg.	1.35	1.52	2.68	2.68	2.68	2.68	2.80	2.74	2.72	2.71
1999	Jan.	1.64	1.80	2.96	2.96	2.96	2.96	2.90	2.85	2.82	2.81
	Feb.	1.67	1.84	2.96	2.96	2.96	2.96	2.93	2.89	2.87	2.88
	Mar.	1.57	1.75	2.96	2.96	2.96	2.96	2.93	2.88	2.87	2.88
	Apr.	1.06	1.24	2.66	2.66	2.66	2.66	2.83	2.78	2.78	2.74
	May	1.18	1.35	2.66	2.66	2.66	2.66	2.82	2.75	2.79	2.74
	June	1.20	1.37	2.79	2.79	2.79	2.79	2.84	2.78	2.81	2.78
	July	1.20	1.38	2.79	2.79	2.79	2.79	2.79	2.72	2.75	2.72
	Aug.	1.21	1.39	2.75	2.75	2.75	2.75	2.86	2.79	2.82	2.79
	Sept.	1.35	1.54	2.75	2.75	2.75	2.75	2.94	2.88	2.95	2.92
	Oct.	1.50	1.69	2.95	2.95	2.95	2.95	3.01	2.97	3.02	2.98
	Nov.	1.55	1.73	3.10	3.10	3.10	3.10	3.08	3.06	3.10	3.07
	Dec.	1.23	1.40	2.85	2.85	2.85	2.85	3.06	3.03	3.10	3.03
	Avg.	1.36	1.54	2.85	2.85	2.85	2.85	2.91	2.87	2.89	2.86
2000	Jan.	1.19	1.37	2.75	2.75	2.75	2.75	2.98	2.87	2.97	2.95
	Feb.	1.16	1.35	2.75	2.75	2.75	2.75	2.93	2.76	2.89	2.95
	Mar.	1.17	1.36	2.75	2.75	2.75	2.75	2.91	2.85	2.92	2.98
	Apr.	1.18	1.38	2.81	2.81	2.81	2.81	2.97	2.91	2.95	2.98
	May	1.22	1.40	2.81	2.81	2.81	2.81	2.96	2.90	2.97	3.03
	June	1.21	1.40	2.85	2.85	2.85	2.85	2.97	2.91	2.95	2.98
	July	1.25	1.44	2.85	2.85	2.85	2.85	3.00	2.95	2.94	2.96
	Aug.	1.20	1.42	2.85	2.85	2.85	2.85	2.97	2.93	2.93	2.96
	Sept.	1.19	1.41	2.85	2.85	2.85	2.85	3.03	2.98	2.98	3.00
	Avg.	1.20	1.39	2.81	2.81	2.81	2.81	2.97	2.90	2.94	2.98

Note: For the New Orleans, Louisiana, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for New Orleans for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at the New Orleans Naval Air Station; and the retail price is the A.C. Nielsen price for the New Orleans market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 19: Phoenix, Arizona, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.29	$1.36	$1.95	$1.88	$1.90	$1.86	$2.29	$2.01	$2.04	$2.07
	Apr.	1.30	1.36	1.96	1.86	1.82	1.79	2.22	2.06	2.09	2.12
	May	1.26	1.32	1.92	1.82	1.79	1.76	2.19	2.10	2.14	2.17
	June	1.19	1.25	1.85	1.75	1.71	1.68	2.16	2.01	2.03	2.11
	July	1.09	1.15	1.75	1.61	1.54	1.49	2.13	1.93	1.96	2.02
	Aug.	1.28	1.34	1.93	1.75	1.64	1.56	2.11	1.87	1.88	1.94
	Sept.	1.42	1.49	2.07	1.89	1.77	1.63	2.28	2.08	2.10	2.15
	Oct.	1.44	1.51	2.07	1.89	1.77	1.63	2.23	1.94	1.97	2.04
	Nov.	1.45	1.52	2.07	1.89	1.77	1.63	2.30	2.02	2.06	2.14
	Dec.	1.53	1.60	2.16	1.98	1.86	1.72	2.38	2.15	2.17	2.25
	Avg.	1.33	1.39	1.97	1.83	1.76	1.68	2.23	2.02	2.05	2.10
1999	Jan.	1.60	1.66	2.25	2.17	2.14	2.07	2.44	2.25	2.36	2.33
	Feb.	1.64	1.71	2.30	2.27	2.28	2.25	2.53	2.23	2.34	2.34
	Mar.	1.55	1.62	2.21	2.18	2.17	2.15	2.36	2.20	2.24	2.27
	Apr.	1.03	1.10	1.73	1.70	1.69	1.67	2.27	2.09	2.20	2.14
	May	1.15	1.22	1.84	1.82	1.82	1.80	2.27	2.09	2.01	2.03
	June	1.17	1.23	1.86	1.89	1.92	1.93	2.37	2.21	2.22	2.23
	July	1.12	1.18	1.81	1.82	1.84	1.84	2.30	2.02	2.01	2.03
	Aug.	1.13	1.20	1.82	1.77	1.75	1.71	2.20	1.96	1.95	2.06
	Sept.	1.32	1.39	2.01	2.00	2.00	1.98	2.32	2.05	2.13	2.17
	Oct.	1.51	1.57	2.20	2.19	2.19	2.17	2.59	2.39	2.40	2.49
	Nov.	1.55	1.61	2.24	2.24	2.25	2.24	2.75	2.64	2.65	2.69
	Dec.	1.17	1.26	1.83	1.85	1.87	1.81	2.89	2.70	2.66	2.62
	Avg.	1.33	1.40	2.01	1.99	1.99	1.97	2.44	2.24	2.26	2.28
2000	Jan.	1.10	1.19	2.33	2.32	2.32	2.23	2.76	2.48	2.49	2.58
	Feb.	1.07	1.18	2.17	2.02	1.91	1.81	2.80	2.52	2.51	2.66
	Mar.	1.08	1.19	2.17	2.02	1.91	1.81	2.56	2.04	2.08	2.31
	Apr.	1.08	1.19	1.99	1.88	1.79	1.72	2.62	2.20	2.25	2.52
	May	1.13	1.24	1.99	1.83	1.79	1.72	2.64	2.21	2.26	2.42
	June	1.15	1.26	2.04	1.91	1.81	1.72	2.61	2.35	2.41	2.54
	July	1.22	1.33	2.04	1.91	1.81	1.72	2.57	2.43	2.48	2.56
	Aug.	1.17	1.24	2.08	1.92	1.81	1.69	2.40	2.36	2.28	2.40
	Sept.	1.16	1.23	2.04	1.90	1.80	1.69	2.27	1.99	1.98	2.14
	Avg.	1.13	1.23	2.09	1.97	1.88	1.79	2.58	2.29	2.31	2.46

Note: For the Phoenix, Arizona, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Phoenix for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at Luke Air Force Base; and the retail price is the A.C. Nielsen price for the Phoenix market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 20: Salt Lake City, Utah, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.21	$1.32	$2.00	$1.90	$1.84	$1.79	$2.49	$2.16	$2.20	$2.21
	Apr.	1.21	1.32	2.00	1.89	1.82	1.76	2.47	2.09	2.12	2.17
	May	1.17	1.28	[a]	[a]	[a]	[a]	2.48	2.12	2.17	2.16
	June	1.10	1.21	[a]	[a]	[a]	[a]	2.46	2.07	2.05	2.14
	July	1.00	1.11	1.90	1.77	1.68	1.61	2.45	2.14	2.08	2.11
	Aug.	1.19	1.30	1.80	1.63	1.52	1.42	2.53	2.19	2.14	2.17
	Sept.	1.34	1.45	1.99	1.78	1.64	1.51	2.61	2.23	2.14	2.23
	Oct.	1.36	1.47	2.15	1.86	1.65	1.47	2.64	2.27	2.09	2.20
	Nov.	1.37	1.48	2.15	1.86	1.65	1.47	2.63	2.18	2.07	2.17
	Dec.	1.45	1.56	2.26	2.06	1.93	1.81	2.67	2.28	2.28	2.30
	Avg.	1.24	1.35	2.03	1.84	1.72	1.61	2.54	2.17	2.13	2.19
1999	Jan.	1.54	1.63	2.26	2.06	1.93	1.81	2.74	2.43	2.35	2.36
	Feb.	1.58	1.68	2.34	2.22	2.14	2.07	2.84	2.62	2.53	2.55
	Mar.	1.49	1.58	2.39	2.27	2.19	2.11	2.81	2.54	2.54	2.51
	Apr.	0.97	1.07	2.31	2.19	2.11	2.03	2.68	2.41	2.37	2.23
	May	1.09	1.18	1.88	1.75	1.67	1.59	2.64	2.36	2.32	2.37
	June	1.10	1.20	2.00	1.91	1.85	1.79	2.62	2.21	2.18	2.33
	July	1.05	1.15	2.02	1.93	1.87	1.81	2.62	2.32	2.24	2.40
	Aug.	1.06	1.17	1.97	1.87	1.79	1.72	2.60	2.30	2.20	2.42
	Sept.	1.26	1.35	1.98	1.87	1.77	1.69	2.67	2.42	2.32	2.48
	Oct.	1.44	1.57	2.18	2.08	1.99	1.92	2.80	2.72	2.67	2.66
	Nov.	1.48	1.58	2.42	2.32	2.23	2.16	2.83	2.65	2.52	2.67
	Dec.	1.08	1.17	2.43	2.35	2.27	2.23	2.83	2.68	2.50	2.66
	Avg.	1.26	1.36	2.18	2.07	1.98	1.91	2.72	2.47	2.39	2.47
2000	Jan.	1.02	1.12	2.03	1.95	1.87	1.83	2.80	2.64	2.39	2.61
	Feb.	1.01	1.11	1.98	1.92	1.85	1.83	2.78	2.48	2.41	2.59
	Mar.	1.02	1.12	1.96	1.91	1.85	1.83	2.71	2.30	2.34	2.43
	Apr.	1.03	1.12	1.97	1.92	1.85	1.83	2.71	2.34	2.37	2.48
	May	1.08	1.17	1.99	1.94	1.86	1.84	2.64	2.38	2.35	2.44
	June	1.10	1.19	2.04	1.97	1.88	1.84	2.74	2.31	2.33	2.49
	July	1.15	1.26	2.09	2.01	1.91	1.87	2.81	2.43	2.32	2.57
	Aug.	1.11	1.21	2.15	2.05	1.93	1.87	2.83	2.46	2.38	2.59
	Sept.	1.11	1.20	[a]	[a]	[a]	[a]	2.78	2.40	2.34	2.56
	Avg.	1.07	1.17	2.03	1.96	1.88	1.84	2.76	2.41	2.36	2.53

[a]Data not available.

Note: For the Salt Lake City, Utah, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Salt Lake City for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at Hill Air Force Base; and the retail price is the A.C. Nielsen price for the Salt Lake City market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 21: San Diego, California, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.13	$1.33	$2.11	$2.08	$2.08	$1.84	$3.36	$3.16	$3.21	$3.41
	Apr.	1.11	1.33	2.11	2.08	2.08	1.84	3.37	3.16	3.18	3.42
	May	1.10	1.33	2.11	2.08	2.08	1.84	3.39	3.23	3.19	3.39
	June	1.19	1.21	2.00	1.98	2.00	1.77	3.41	3.26	3.24	3.33
	July	1.22	1.21	2.00	1.98	2.00	1.77	3.10	2.97	2.89	2.99
	Aug.	1.33	1.38	2.20	2.16	2.16	1.90	3.22	3.10	3.00	3.08
	Sept.	1.43	1.38	2.20	2.16	2.16	1.90	3.25	3.14	3.02	3.13
	Oct.	1.55	1.54	2.36	2.30	2.30	2.00	3.40	3.26	3.10	3.19
	Nov.	1.48	1.54	2.36	2.30	2.30	2.00	3.46	3.28	3.15	3.23
	Dec.	1.48	1.67	2.49	2.42	2.42	2.09	3.56	3.44	3.24	3.29
	Avg.	1.30	1.39	2.19	2.15	2.16	1.90	3.35	3.20	3.12	3.24
1999	Jan.	1.37	1.67	2.49	2.42	2.42	2.09	3.59	3.44	3.26	3.34
	Feb.	1.22	1.72	2.53	2.47	2.47	2.13	3.62	3.42	3.26	3.35
	Mar.	1.20	1.72	2.53	2.47	2.47	2.13	3.61	3.43	3.27	3.34
	Apr.	1.05	1.22	2.09	2.08	2.08	1.85	3.13	3.00	2.96	2.91
	May	1.04	1.22	2.09	2.08	2.08	1.85	3.00	2.78	2.67	2.78
	June	1.09	1.24	2.09	2.08	2.08	1.85	2.98	2.83	2.71	2.79
	July	1.13	1.24	2.09	2.08	2.08	1.85	3.10	2.99	2.89	2.83
	Aug.	1.29	1.28	2.13	2.12	2.12	1.89	3.14	3.00	2.92	2.86
	Sept.	1.24	1.28	2.13	2.12	2.12	1.89	3.25	3.07	2.87	2.82
	Oct.	1.18	1.70	2.55	2.49	2.47	2.16	3.72	3.49	3.25	3.10
	Nov.	1.12	1.70	2.55	2.49	2.47	2.16	3.86	3.59	3.31	3.09
	Dec.	0.98	1.20	2.12	2.11	2.11	1.89	3.64	3.40	3.12	2.97
	Avg.	1.16	1.43	2.28	2.25	2.25	1.98	3.39	3.20	3.04	3.02
2000	Jan.	0.94	1.05	1.97	1.96	1.96	1.75	3.41	3.17	2.89	2.77
	Feb.	0.92	1.03	1.95	1.97	1.98	1.79	3.31	3.09	2.85	2.75
	Mar.	0.93	1.02	1.88	1.90	1.90	1.74	3.16	2.97	2.80	2.71
	Apr.	0.95	1.14	1.94	1.95	1.94	1.77	2.98	2.86	2.83	2.72
	May	0.96	1.18	1.97	1.96	1.95	1.77	2.80	2.72	2.82	2.71
	June	1.00	1.20	1.97	1.95	1.95	1.77	2.70	2.62	2.75	2.65
	July	1.02	1.27	1.97	1.95	1.95	1.77	2.73	2.64	2.76	2.69
	Aug.	1.03	1.22	1.97	1.95	1.95	1.77	2.68	2.61	2.73	2.65
	Sept.	1.06	1.21	1.97	1.95	1.95	1.77	2.65	2.57	2.67	2.66
	Avg.	0.98	1.15	1.95	1.95	1.95	1.77	2.93	2.81	2.79	2.70

Note: For the San Diego, California, market, the farm level price is the California mailbox price; the cooperative price is the Southern California Class I price for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at the San Diego Naval Station; and the retail price is the A.C. Nielsen price for the San Diego market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by the California Department of Food and Agriculture, the Defense Commissary Agency, and A.C. Nielsen.

Table 22: Seattle, Washington, Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.25	$1.34	$1.83	$1.65	$1.52	$1.37	$2.98	$1.68	$1.68	$1.70
	Apr.	1.26	1.35	1.84	1.66	1.53	1.38	2.78	1.95	2.11	2.15
	May	1.23	1.32	1.80	1.62	1.49	1.34	2.97	1.92	2.08	2.09
	June	1.23	1.32	1.73	1.55	1.42	1.27	2.97	2.04	2.19	2.21
	July	1.23	1.32	1.63	1.45	1.32	1.17	2.83	2.03	2.17	2.15
	Aug.	1.23	1.32	1.82	1.64	1.51	1.36	2.83	1.96	2.03	2.04
	Sept.	1.38	1.47	1.96	1.78	1.65	1.50	3.06	2.15	2.26	2.30
	Oct.	1.40	1.48	1.98	1.80	1.67	1.51	3.18	2.12	2.47	2.29
	Nov.	1.40	1.49	1.99	1.81	1.68	1.53	3.18	2.29	2.45	2.53
	Dec.	1.49	1.58	2.07	1.89	1.76	1.61	3.25	2.47	2.65	2.78
	Avg.	1.31	1.40	1.87	1.69	1.56	1.40	3.00	2.06	2.21	2.22
1999	Jan.	1.55	1.64	2.14	1.96	1.83	1.68	3.24	2.60	2.70	2.64
	Feb.	1.60	1.69	2.18	2.00	1.87	1.72	3.44	2.60	2.76	2.77
	Mar.	1.50	1.60	2.09	1.91	1.78	1.63	3.22	2.70	2.81	2.91
	Apr.	1.14	1.23	1.57	1.39	1.26	1.11	3.29	2.55	2.67	2.83
	May	1.23	1.32	1.69	1.51	1.38	1.23	3.27	2.59	2.70	2.99
	June	1.23	1.32	1.71	1.53	1.40	1.25	2.96	2.51	2.58	2.64
	July	1.22	1.31	1.66	1.48	1.35	1.20	3.18	2.65	2.74	2.81
	Aug.	1.23	1.32	1.67	1.49	1.36	1.21	3.12	2.37	2.67	2.43
	Sept.	1.27	1.36	1.86	1.68	1.55	1.40	3.34	2.66	2.90	2.71
	Oct.	1.46	1.55	2.01	1.83	1.70	1.55	3.09	2.32	2.45	2.36
	Nov.	1.50	1.59	2.05	1.87	1.74	1.57	3.37	2.64	2.88	2.69
	Dec.	1.23	1.32	1.71	1.58	1.49	1.42	3.31	2.76	2.82	2.86
	Avg.	1.35	1.44	1.86	1.69	1.56	1.41	3.23	2.58	2.72	2.72
2000	Jan.	1.19	1.28	1.56	1.43	1.34	1.27	3.21	2.58	2.63	2.58
	Feb.	1.18	1.27	1.54	1.41	1.32	1.25	3.32	2.59	2.63	2.70
	Mar.	1.19	1.28	1.55	1.42	1.33	1.26	3.30	2.56	2.65	2.58
	Apr.	1.20	1.29	1.56	1.43	1.34	1.27	3.19	2.60	2.61	2.57
	May	1.09	1.18	1.61	1.48	1.39	1.32	3.17	2.61	2.61	2.65
	June	1.12	1.21	1.63	1.50	1.41	1.34	3.34	2.72	2.73	2.82
	July	1.18	1.28	1.70	1.57	1.48	1.41	3.29	2.82	2.89	2.82
	Aug.	1.14	1.23	1.66	1.53	1.44	1.37	3.40	2.98	2.95	2.87
	Sept.	1.13	1.22	[a]	[a]	[a]	[a]	3.26	2.79	2.81	2.86
	Avg.	1.16	1.25	1.60	1.47	1.38	1.31	3.27	2.70	2.72	2.72

[a]Data not available.

Note: For the Seattle, Washington, market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Seattle for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at the Everett Naval Station; and the retail price is the A.C. Nielsen price for the Seattle market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Table 23: Washington, D.C., Market, Per Gallon Milk Prices, March 1998 Through September 2000

		Farm	Cooperative	Wholesale				Retail			
Year	Month			Whole	2%	1%	Skim	Whole	2%	1%	Skim
1998	Mar.	$1.40	$1.52	$1.96	$1.83	$1.75	$1.67	$2.49	$2.48	$2.47	$2.43
	Apr.	1.41	1.53	1.97	1.80	1.70	1.60	2.53	2.48	2.47	2.42
	May	1.36	1.49	1.92	1.77	1.67	1.57	2.52	2.51	2.45	2.46
	June	1.26	1.38	1.85	1.69	1.58	1.48	2.50	2.49	2.46	2.43
	July	1.16	1.29	1.75	1.55	1.42	1.29	2.49	2.48	2.41	2.43
	Aug.	1.36	1.48	1.93	1.68	1.52	1.36	2.54	2.53	2.45	2.46
	Sept.	1.50	1.62	2.07	1.82	1.65	1.48	2.65	2.56	2.51	2.49
	Oct.	1.52	1.64	2.09	1.81	1.62	1.44	2.63	2.56	2.44	2.37
	Nov.	1.50	1.62	2.08	1.72	1.46	1.21	2.63	2.52	2.39	2.27
	Dec.	1.58	1.70	2.17	1.86	1.65	1.44	2.56	2.58	2.41	2.23
	Avg.	1.41	1.53	1.98	1.75	1.60	1.45	2.55	2.52	2.45	2.40
1999	Jan.	1.65	1.77	2.26	2.06	1.92	1.79	2.75	2.72	2.58	2.40
	Feb.	1.70	1.82	2.31	2.16	2.06	1.96	2.84	2.61	2.52	2.35
	Mar.	1.60	1.72	2.22	2.06	1.96	1.85	2.89	2.63	2.56	2.36
	Apr.	1.09	1.21	1.70	1.54	1.44	1.33	2.63	2.45	2.34	2.15
	May	1.29	1.41	1.82	1.67	1.57	1.47	2.52	2.46	2.32	2.22
	June	1.28	1.41	1.91	1.80	1.73	1.66	2.52	2.47	2.34	2.26
	July	1.24	1.36	1.91	1.78	1.70	1.61	2.51	2.48	2.38	2.32
	Aug.	1.25	1.37	1.91	1.72	1.60	1.48	2.45	2.42	2.33	2.26
	Sept.	1.37	1.49	2.15	1.99	1.90	1.79	2.53	2.50	2.40	2.34
	Oct.	1.56	1.68	2.34	2.18	2.08	1.97	2.73	2.66	2.57	2.51
	Nov.	1.60	1.72	1.93	1.80	1.72	1.68	2.80	2.74	2.67	2.61
	Dec.	1.19	1.31	1.52	1.39	1.31	1.27	2.73	2.66	2.58	2.55
	Avg.	1.40	1.52	2.00	1.85	1.75	1.66	2.66	2.57	2.47	2.36
2000	Jan.	1.20	1.32	1.37	1.24	1.16	1.12	2.69	2.62	2.53	2.52
	Feb.	1.18	1.30	1.63	1.53	1.37	1.31	2.66	2.59	2.50	2.49
	Mar.	1.19	1.31	1.64	1.54	1.38	1.32	2.61	2.54	2.45	2.45
	Apr.	1.21	1.33	1.64	1.54	1.38	1.32	2.60	2.53	2.45	2.46
	May	1.26	1.38	1.69	1.53	1.43	1.37	2.60	2.54	2.46	2.46
	June	1.28	1.40	1.71	1.55	1.45	1.39	2.61	2.54	2.47	2.46
	July	1.32	1.45	1.78	1.62	1.52	1.46	2.61	2.56	2.47	2.47
	Aug.	1.28	1.40	1.74	1.58	1.48	1.42	2.62	2.57	2.49	2.49
	Sept.	1.27	1.39	1.73	1.57	1.47	1.41	2.57	2.54	2.46	2.46
	Avg.	1.24	1.36	1.66	1.52	1.40	1.35	2.62	2.56	2.47	2.47

Note: For the Washington, D.C., market, the farm level price is the USDA estimated farm level Class I price for 3.5 percent milkfat content; the cooperative price is the announced cooperative Class I price for Washington, D.C. for 3.5 percent milkfat content; the wholesale price is the price paid by the commissary at Bolling Air Force Base; and the retail price is the A.C. Nielsen price for the Washington, D.C., market. Prices may not average due to rounding.

Source: GAO's analysis of price data provided by USDA, the Defense Commissary Agency, and A.C. Nielsen.

Appendix VI: Consolidation Trends and the Degree of Concentration in the Dairy Industry

During the last decade, the dairy industry, like much of the agricultural sector, has experienced increasing consolidation. At each level of the marketing chain, including dairy farms, cooperatives, wholesale milk processors, and retail grocery stores, there are fewer, but larger, players in the industry. Increased consolidation has in turn led to a greater degree of concentration in the industry (measured by the market share of the top four players in a given market). This appendix provides information on the trends in consolidation at each level of the milk marketing chain and the level of concentration that exists at the cooperative, wholesale, and retail levels for the markets included in our review. It also describes some of the key factors that federal agencies consider along with the degree of concentration in an industry when making antitrust determinations.

Consolidation of Dairy Farms

The number of dairy farms in the United States has steadily decreased since the mid-1960s, according to the 1997 Census of Agriculture. While dairy farms are not unique in this regard, the decrease in number of dairy farms has been significant. For example, between 1987 and 1997, the number of dairy farms declined from 202,068 to 116,874, or about 42 percent. The American Farm Bureau Federation recently reported that the number of dairy farms had further declined to 83,025 in 2000, a one-year decrease of 4,502 farms. In addition, the number of dairy cows in the United States has also declined. According to the National Agricultural Statistics Service, the number of dairy cows decreased from 9.68 million to 9.16 million, or about 5 percent, from 1992 to 1999. Furthermore, small dairy farms are being replaced by larger operations. Although the average dairy farm size for the nation is about 82 dairy cows, it can vary greatly by region. For example, in California, more than 40 percent of the dairy farms have 500 or more dairy cows.

While the total number of dairy farms and cows in the United States has declined during the 1990s, average milk production per cow has increased significantly due to technological and genetic advancements. The result has been an overall increase in the nation's milk production. From 1992 through 1999, average milk production per cow increased by about 14 percent, from 15,570 pounds in 1992 to 17,771 pounds in 1999. Total U.S. milk production increased from 150.8 billion pounds to 162.7 billion pounds, or about 8 percent, between 1992 and 1999; and for 2000, it is estimated to reach about 167.7 billion pounds.

According to an industry analysis, these trends in numbers and size of dairy farms are expected to continue because larger farms are associated with lower costs of production and greater economies of scale. Given

similar management practices, larger farms tend to be more cost-effective because fixed costs like machinery and land are spread over more units of production. In addition, larger farms may receive volume premiums and hauling discounts because they can market greater volumes of milk more efficiently.

Unification of Dairy Cooperatives

Dairy cooperative unification activities[1] in the 1960s and 1970s led to the emergence of regional cooperatives, however, in recent years, unification among dairy cooperatives has resulted in the creation of multi-regional cooperatives. These multi-regional cooperatives in many cases market a significant percentage of the total milk produced in the United States. For example, in January 1998, four major dairy cooperatives—Mid-America Dairymen, Inc., the Southern Region of Associated Milk Producers, Inc., Milk Marketing, Inc., and Western Dairymen Cooperative—combined to form Dairy Farmers of America, the largest dairy cooperative in the country. In 1999, this newly created cooperative had over 24,000 farmer members in 43 states and marketed almost 35 billion pounds of milk or about 21 percent of all the milk produced in the country.

As dairy cooperatives continue to unify, the level of concentration at the cooperative-level—as measured by the market share of the top dairy cooperatives—has also increased. In 1999, the nation's top four dairy cooperatives marketed about 40 percent of all the milk produced in the United States, or about 23 percent more than in 1990.[2] The level of concentration is significantly higher at the local level. We analyzed data collected by USDA to determine the market share of dairy cooperatives in 11 of the 14 federally regulated markets selected for our review. We did not include three federally regulated markets—Denver, Miami, and Phoenix—in our analysis because of confidentiality reasons. Our analysis indicated that the percentage of milk marketed by the four largest cooperatives in each of the 11 markets was significantly higher than the national average, and ranged from 59 to 97 percent in December 1997 and from 64 to 97 percent in December 1999. In all of the 11 markets, the market share of the four largest cooperatives increased or remained the

[1] Unification activities include mergers, acquisitions, or consolidations.

[2] Hoard's Dairyman, Oct. 10, 2000. The top four dairy cooperatives in 1999 were Dairy Farmers of America; California Dairies, Inc.; Land O'Lakes, Inc.; and Northwest Dairy Association and in 1990 were Associated Milk Producers, Inc.; Mid-America Dairymen, Inc.; Farmers Union Milk Marketing Cooperative; and California Milk Producers Association.

same between 1997 and 1999. Table 24 shows the market share of the top four cooperatives in each of the 11 federally regulated markets included in our review for the month of December 1997 through 1999. (Please see appendix I for a detailed description of our analysis and the geographic area covered by each of these markets.)

According to industry experts, the increased unification activities of dairy cooperatives has occurred for a variety of reasons and is expected to continue. Specifically, general consolidation trends in the rest of the dairy industry are causing cooperatives to turn to unification as a means of maintaining or acquiring market prominence and enhancing the bargaining position of their members. Unification allows cooperatives to integrate their operations both horizontally and vertically, as well as reap economies of size and scale, and more efficiently use available manufacturing capacity. Unification also often leads to more streamlined operations and reduced costs. For example, reductions in administrative overhead and hauling costs, and gains in bargaining strength in the marketplace were some of the primary reasons cited for combining four major dairy cooperatives into one cooperative—the Dairy Farmers of America. In addition, dairy cooperatives are participating in a variety of joint ventures with other entities in the dairy industry to ensure an outlet for the milk they market for their members. For example, Dairy Farmers of America is involved in joint ventures with other dairy cooperatives as well as large proprietary firms such as Suiza Foods Corporation.

Table 24: Share of Milk Delivered By the Four Largest Dairy Cooperatives in Selected Markets for the Month of December, 1997-1999

		Market share of top four cooperatives[a] (percent)		
Selected market area	Federal Milk Marketing Order	December 1997	December 1998	December 1999
Atlanta, GA	Southeast	61.5	69.9	71.5
Boston, MA	New England	68.5	70.4	69.6
Charlotte, NC	Carolina	77.6	79.5	85.2
Cincinnati, OH	Ohio Valley	61.6	63.9	63.8
Dallas, TX	Texas	96.5	98.2	97.1
Denver, CO	Eastern Colorado	[b]	[b]	[b]
Miami, FL	Southeastern Florida	[b]	[b]	[b]
Milwaukee, WI	Chicago Regional	63.1	62.7	64.7
Minneapolis, MN	Upper Midwest	59.3	57.0	63.5
New Orleans, LA	Southeast	61.5	69.9	71.5
Phoenix, AZ	Central Arizona	[b]	[b]	[b]
Salt Lake City, UT	Great Basin	85.4	89.0	93.2
Seattle, WA	Pacific Northwest	84.8	84.2	85.0
Washington, DC	Middle Atlantic	77.1	77.0	76.8
Average for the 11 markets		72.4	74.7	76.5

Note: To determine the level of concentration in 11 of the 14 federally regulated marketing areas included in this report, we obtained proprietary data from USDA for the month of December for 1997 through 1999. Appendix I provides additional details on our analysis of these data and the geographic area covered by the 14 markets.

[a]In some of the markets the number of cooperatives marketing milk was less than four. Consequently, the market share data for some of the markets included in this table represent fewer than four cooperatives. We have not disclosed which markets had fewer than four cooperatives for confidentiality reasons.

[b]Data not available for the market because of confidentiality reasons.

Concentration at the Wholesale Level

Through aggressive acquisitions of independent dairy processing plants, a handful of fluid milk processing firms in recent years have become dominant players in the dairy industry at the wholesale level. These companies have generally pursued the business strategy of acquiring strong regional dairy processing plants so that they can strengthen their presence in existing markets, while expanding their geographic coverage to a national level. According to industry sources, Suiza Foods Corporation and Dean Foods Company—currently the two leading wholesale fluid milk processors in the nation—have attained their status primarily through acquisitions of other dairy processing firms. Together Suiza and Dean Foods have acquired about 50 dairy processors during the period from 1997 to 2000. Table 25 shows some of the major acquisitions made by these companies between 1997 and 2000. On April 5, 2001, Suiza announced that it was acquiring Dean Foods. If this merger is approved by

federal regulators, the combined company will process about one-third of the U.S. fluid milk market. Industry sources are concerned about the impact that this merger may have on the competitiveness of the fluid milk sector.

Table 25: Recent Major Acquisitions of Dairy Processors in the United States by Suiza Foods Corporation and Dean Foods Company

Acquisitions by Suiza Foods Corporation		
Year	**Company Acquired**	**Value of Annual Sales at Time of Acquisition**
2000	Valley of Virginia Cooperative Milk Producers Association	$209 million
	Southern Foods Group	$1.3 billion
1999	Adohr Farms	$148 million
	Broughton Foods Company	$202 million
1998	Land-O-Sun Dairies	$464 million
	Tuscan Farms/Lehigh Valley Dairies	$523 million
1997	Garelick Farms and Franklin Plastics	$370 million
	Dairy Fresh	$125 million
Acquisitions by Dean Foods Company		
Year	**Company Acquired**	**Value of Annual Sales at Time of Acquisition**
2000	Land O' Lakes (upper Midwest fluid milk operations)	$310 million
	Dairy Express, Inc.	$13 million
1999	Alta-Dena Certified Dairy	$200 million
	Berkeley Farms, Inc.	$160 million
	U.C. Milk Company	$35 million
	Barber Dairies	$200 million
	Hillside Dairy	$30 million
1998	Purity Dairies	$100 million
	Coburg Dairy	$70 million
	Wengert's Dairy	$40 million
	American Stores Co. (dairy operations)	$250 million
	Sani-Dairy Division of The Penn Traffic Company	$65 million
	Maplehurst Dairy	$70 million
	H. Meyer Dairy	$70 million
1997	Tri-State Dairy, Inc.	NA

Source: GAO's analysis of various industry publications.

The acquisition and consolidation trend at the wholesale level has led to higher concentration ratios for fluid milk processors in some markets. According to the 1997 Census of Manufacturers, the market share for the

top four fluid milk processors in the nation was about 21 percent. However, the market share for fluid milk processors at the local level was significantly higher. We analyzed milk marketing data collected by USDA for December 1997, 1998, and 1999 to determine changes in wholesale-level concentration for 14 of the federally regulated markets that are included in our review. Our analysis found that, in all but 4 of the 14 markets, the level of concentration had increased between December 1997 and December 1999. For example, in Boston, Massachusetts, the market share of the top four fluid milk processors increased from 66 percent in December 1997 to 88 percent in December 1999. Moreover, in December 1997, in 6 of the 14 markets the top four fluid milk processors had a market share of greater than 70 percent, yet by December 1999, the top four fluid milk processors in 9 of the 14 markets had more than 70 percent of the market share. Table 26 shows the market share of the top four fluid milk processors in each of the 14 federally regulated markets included in our review for December 1997, December 1998, and December 1999. (Please see appendix I for a detailed description of our analysis and the geographic area covered by each of these markets.)

Table 26: Percentage of Fluid Milk Marketed by the Top Four Fluid Milk Processors in 14 Selected Markets, for the Month of December, 1997-1999

		Market share of top four fluid milk processors (percent)		
Selected market area	**Federal Milk Marketing Order**	**December 1997**	**December 1998**	**December 1999**
Atlanta, GA	Southeast	38.5	47.8	52.4
Boston, MA	New England	66.2	85.4	88.1
Charlotte, NC	Carolina	64.4	74.7	73.9
Cincinnati, OH	Ohio Valley	66.8	79.3	81.9
Dallas, TX	Texas	85.0	84.3	79.4
Denver, CO	Eastern Colorado	69.3	68.1	66.9
Miami, FL	Southeastern Florida	89.4	96.5	96.3
Milwaukee, WI	Chicago Regional	81.6	80.3	75.9
Minneapolis, MN	Upper Midwest	84.0	89.3	83.4
New Orleans, LA	Southeast	38.5	47.8	52.4
Phoenix, AZ	Central Arizona	90.3	87.6	97.4
Salt Lake City, UT	Great Basin	87.7	90.4	92.5
Seattle, WA	Pacific Northwest	59.0	63.4	63.3
Washington, DC	Middle Atlantic	45.7	43.7	54.5
Average for the 14 markets		69.0	74.2	75.6

Note: To determine the level of concentration in the 14 federally regulated marketing areas covered in this report, we obtained proprietary data from USDA for the month of December in successive years 1997 through 1999.

According to industry sources, consolidation at the wholesale level in the dairy industry has increased in response to on-going consolidation at the retail level. The wave of supermarket mergers in the 1990's has provided fluid milk processors incentives to acquire other processors to supply private label (store brand) milk to the growing supermarket chains. Both Suiza and Dean Foods have been active in this regard. Wholesalers contend that they can meet the increasing demands and requirements of large retail accounts only through consolidation. Moreover, industry officials cite decreasing demand for fluid milk and fragmentation of the dairy industry as additional reasons that are driving the need for wholesale-level consolidation. By following a strategy of integrating regional dairies and consolidating their operations (often by closing some dairy plants in an area), these companies hope to raise the efficiency and profitability of the sector that historically has had low profit margins.

Concentration at the Retail Level

U.S. supermarkets, which account for approximately 76 percent of national fluid milk retail sales, have undergone unprecedented consolidation and structural change in recent years. According to a recent Economic Research Service analysis, large retailers have acquired almost 3,500 supermarkets nationwide since 1996, representing annual sales of more than $67 billion. Two of the largest food retailing combinations in history were announced in 1998: the acquisition of Fred Meyer—the nation's sixth largest food retailer—by top-ranked Kroger Company; and the merger of Albertson's—the fourth largest U.S. food retailer—with second-ranked American Stores. The magnitude of these mergers and acquisitions has resulted in the emergence of multiregional food retailing operations that are approaching an almost nationwide scope. For example, after the Kroger Company acquired Fred Meyer, the combined firm operated 2,288 supermarkets in 31 states and had sales of about $45 billion in 1999 which made up 10.4 percent of total grocery store sales nationwide.

The increase in mergers and acquisitions among large food retailers has led to an increase in retail-level concentration at the national level and in many local markets. In 1992, the top four grocery retailers in the country accounted for almost 16 percent of total grocery sales nationwide. In 1998, the top four grocery retailers accounted for almost 29 percent of total

sales.[3] The impact of consolidation on retail concentration at the local level is even more pronounced. For the 100 largest U.S. cities (defined by the U.S. Census Bureau as Metropolitan Statistical Areas), the concentration levels for the top four firms had increased from 68.6 percent in 1992 to 72.3 percent in 1998.[4] We found comparable increases in the level of concentration at the retail level for the 15 markets included in our review. The average percentage of sales controlled by the top four grocery retailers in these 15 markets increased from 71.5 percent in 1992 to 74 percent in 1998. Moreover, in 1998 the level of concentration varied significantly from 57.2 percent in Milwaukee, Wisconsin, to 89.5 percent in Denver, Colorado, with 10 of the 15 markets experiencing concentration levels of greater than 70 percent.

Table 27: Market Share of the Top Four Supermarkets in Selected Markets in 1992 and 1998

Selected market area	Market share of the top four supermarkets (percent)	
	1992	1998
Atlanta, GA	66.9	69.1
Boston, MA	55.0	70.3
Charlotte, NC	84.7	83.0
Cincinnati, OH	72.9	79.4
Dallas, TX	74.1	67.9
Denver, CO	88.8	89.5
Miami, FL	73.3	83.0
Milwaukee, WI	69.1	57.2
Minneapolis, MN	55.9	66.7
New Orleans, LA	72.2	76.1
Phoenix, AZ	63.5	71.2
Salt Lake City, UT	73.9	67.3
San Diego, CA	79.9	77.6
Seattle, WA	60.8	72.4
Washington, DC	81.3	79.6
Average for the 15 selected markets	71.5	74.0

Source: Economic Research Service, USDA

[3] Ronald W. Cotterill, *Continuing Concentration in Food Industries Globally: Strategic Challenges to an Unstable Status Quo*, Food Marketing Policy Center, Research Report No. 49, Oct. 1999.

[4] "Consolidation in Food Retailing: Prospects for Consumers & Grocery Suppliers," *Agricultural Outlook*, ERS, Aug. 2000.

According to industry experts, consolidation is expected to continue at the food retail level for a number of reasons. In particular, retail food stores are responding to the slowing growth in grocery store sales and increased competition from nontraditional retailers, such as mass-merchandisers and warehouse club operators, by becoming larger and offering a greater variety of goods and services to their customers. In addition, food retailers involved in recent mergers and acquisitions have cited lower costs and efficiency gains as the primary benefits of consolidation. These retailers believe they can lower procurement, marketing, and distribution costs through consolidation and increased size. Efficiency gains can also help offset the cost of providing more variety and services to customers. Another contributing factor to growth through mergers and acquisitions is the greater capital expenditure required to build new stores compared with the cost of purchasing existing stores. Considering the time necessary to achieve positive store profitability, the financial risk of building a new store is often greater than purchasing an existing store.

Federal Response to Increased Concentration Levels

In 2000, concerned about the increasing level of market concentration in the dairy industry, several congressional leaders from both the House and Senate requested the Department of Justice and the Federal Trade Commission (FTC) to investigate possible market abuses by dairy processors and food retailers. Market concentration is a useful indicator of the likely potential competitive effect of a merger or consolidation and is a factor the Department of Justice and the FTC consider in reviewing mergers and consolidations for potential violations of antitrust laws.

While concentration levels play an important role in federal reviews of a proposed consolidation, other factors are also important to regulators in making antitrust determinations. High concentration levels may be indicative of noncompetitive circumstances where buyers or sellers can exercise some degree of market power.[5] In addition, federal regulators are more likely to challenge a consolidation that results in a substantial increase in concentration levels for a market that is already highly concentrated. However, federal regulators also consider the following as part of their review of proposed consolidations:

[5] Market power is the ability of buyers or sellers to influence prices above or below the prices that would have been set in a competitive market.

- whether anti-competitive effects, such as unilateral price increases or elimination of competition, are likely to occur because of the merger;
- the ease of entry into a given market after the merger; and
- whether the efficiencies being claimed from the merger can be verified and attributed to the merger and not to reductions in competition.

If the results of a federal review indicate that a proposed consolidation may substantially lessen competition in a market—amounting to a violation of the antitrust laws—regulators may require the divestiture of one or more of the merging firms' holdings to an independent third party. This will help preserve competition in the affected market. Examples of recent federal interventions relating to dairy or retail food industry mergers that required divestiture to preserve competition in a market include the following:

- In 1997, the Department of Justice sued to block the acquisition of Borden/Meadows Gold Dairies Holdings, Inc. by Mid-America Dairymen, Inc.—the largest dairy cooperative in the nation at the time. The Department was concerned that the acquisition would substantially lessen competition for milk sales to public schools throughout eastern Texas and Louisiana. The final decree allowed the acquisition, but required the divestiture of nine plants—five in Texas, three in Louisiana, and one in New Mexico. A newly created firm was allowed to purchase the divested plants.
- In 1998, the Department of Justice approved Dean Foods Company's acquisition of Barber Dairies, Inc. only after the parties agreed to sell a Barber Dairies plant in Huntsville, Alabama. The Department was concerned that the original proposed acquisition would have lessened competition in bidding for milk supplied to school districts in at least 18 counties in Alabama.
- In 1999, the Department of Justice sued to block Suiza Foods Corporation's acquisition of the Broughton Foods Company, because it was believed that the merger would result in higher prices for milk sold to school districts in Kentucky. The final judgment (which approved an agreement by the parties) allowed the acquisition, but required the divestiture of Southern Belle Dairy—a holding of Broughton Foods Company—before the acquisition could proceed.
- In 1999, FTC opposed Albertson's Inc.'s proposed acquisition of American Stores Company because it would lessen supermarket competition in California, Nevada, and New Mexico. It was believed that the proposed acquisition could result in higher prices, or reduced quality and selection for consumers. The FTC ultimately allowed the acquisition, but only after

the companies agreed to divest 144 supermarkets and five supermarket sites in 57 local markets to respond to these concerns.

- In 2000, FTC opposed Delhaize America, Inc.'s proposed merger with Hannaford Bros. Co. because it was alleged that the proposed merger would have resulted in reduced competition in the relevant markets through the elimination of direct competition and increased likelihood of Delhaize exercising unilateral market power and increasing prices for consumers. The FTC ultimately allowed the merger, but only after the companies agreed to divest 37 Hannaford stores and one supermarket site in a number of markets in Virginia and North Carolina.

Appendix VII: Research Measuring the Impact of Concentration and Market Power on the Dairy Industry and Fluid Milk Sector

As a result of increased consolidation in many agricultural markets, economists have recently attempted to estimate the degree of market power in these industries. In general, market power refers to the ability of buyers or sellers to influence prices above or below the prices that would have been set in a competitive market. According to economic theory, there is a strong link between the structure of an industry, in particular the degree of concentration, and the power firms exert over prices in the market. Notable recent examples of studies measuring the degree of market power have been primarily from the beef and meatpacking industries [Schroeter, (1988)[1]; Schroeter and Azzam (1990)[2]; Azzam and Pagoulatos, (1990)[3]; Muth and Wohlgenant (1999) [4]; Morrison Paul, (2000);[5] and others]. As we described in appendix VI, the fluid milk market and the dairy industry have also experienced an increase in both consolidation and concentration. However, fewer empirical studies have been conducted to measure the effects of concentration and market power in this sector because certain characteristics make economic modeling more difficult for this industry. In this appendix, we examine the various difficulties that researchers face when they try to measure market power in the dairy industry, and we summarize those economic studies that we identified that have tried to measure the impact of concentration and market power on the dairy industry and/or fluid milk market.

[1] J.R. Schroeter, "Estimating the Degree of Market Power in the Beef Packing Industry," *The Review of Economics and Statistics* 70 (February 1988): 158-62.

[2] J.R. Schroeter, and A. Azzam, "Measuring Market Power in Multi-Product Oligopolies: The U.S. Meat Industry," *Applied Economics* 22 (October 1990): 1365-76.

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Difficulties in Measuring Market Power in the Dairy Industry

Economists use economic models to help explain how a market behaves based on certain market parameters and assumptions. One standard model assumption has typically been that of perfect competition in a market—that is, many small buyers and sellers, a standardized product, free entry and exit, and perfect knowledge. However, when there is a departure from perfect competition, for example in a highly concentrated market, certain modeling complications arise. In more concentrated markets, firms make strategic decisions that can lead to different price and production outcomes than would occur in a perfectly competitive model. This could happen because large and dominant firms in the market may exert some power over the selling and/or buying price. While measuring these outcomes is complex in any market, the nature of the U.S. dairy industry leads to further analytical complications. Some of these complications include (1) the diversity of the dairy market structure from one region of the country to another, (2) the presence of market power at successive stages of the dairy industry, (3) layers of federal price intervention, (4) a variety of vertical and horizontal arrangements such as joint ventures between the various levels of the market, and (5) a lack of actual price data at the wholesale level. These difficulties are described in greater detail below.

First, because there is no single prototype that describes all of the fluid milk markets that exist across the country, it would be difficult, if not impossible, for one type of economic model to capture market power effects nationally or in all regions of the country. Although the trend in the fluid milk industry is toward increasing concentration at all levels, there is nevertheless significant diversity in market structure from one region of the country to another. For example, in one region of the country the market structure consists of a few cooperatives bargaining with one large processor. In another region, a few cooperatives bargain with a few processors that are, in turn, bargaining with a few large retailers, while in another part of the country, there is only one large cooperative bargaining with one large processor—which is known as a "bilateral monopoly" situation. Therefore, any generalizations made about market power from a particular economic model may not be entirely applicable or representative of the entire country or all regional markets.

Second, because market power may exist at each successive level of the fluid milk marketing chain, capturing these effects with any one economic model becomes problematic. For example, in this sector, there may be situations in which retailers exercise an oligopoly power over consumers; processors exercise an oligopsony power over farmers; and at the same time, there is imperfect competition between processors and retailers.

While theoretical models exist that capture these successive market power effects, they have rarely been applied to actual agricultural markets, such as fluid milk. In general, while a variety of approaches measure market power, most empirical models deal with only one side of the market, either the seller side (oligopoly power) or the buyer side (oligopsony power). In these models, there is an assumption that on one side of the market, price is taken as a given, while on the other side, buyers and/or sellers may or may not exercise some market power. Some analysts have applied the theory of "bilateral oligopoly" (high levels of market power on both the buyer and seller sides of the market) to the U.S. wholesale market for beef (Schroeter et al., 2000).[6] This type of analysis has not yet been conducted for the fluid milk market. More recently however, Dhar (2001)[7] has applied a two-stage oligopoly model (two-stage seller market power) to the processing and retailing sectors of the fluid milk market for the Boston milk market (See below).

Third, market power models are not well suited to those agricultural sectors that contain layers of government intervention in the price formation process, such as the dairy markets. Because government programs, such as the federal milk marketing order program and the dairy price support program, set a floor under farm prices, it is difficult to incorporate the effects of market power from dominant buyers and/or sellers. For example, in such markets, estimating the effect of buyer market power would be limited to the extent that a buyer could reduce over-order premiums, because prices could not fall below the floor set by the government programs.

Fourth, developing realistic models of market power in the dairy and fluid milk industry is difficult because many of the dairy processors and cooperatives are involved in other horizontal and vertical arrangements, which do not fit well into the typical conceptual framework. For example, both Dairy Farmers of America, Inc. (DFA) and Suiza Foods make extensive use of joint ventures with other entities. DFA, for example, is involved in joint ventures with other dairy cooperatives as well as large proprietary firms such as Suiza Foods. At the same time, Suiza Foods has

[6] John R. Schroeter, Azzedine M. Azzam, and Mingxia Zhang, "Measuring Market Power in Bilateral Oligopoly: The Wholesale Market for Beef." *Southern Economic Journal* 66 (3) (2000): 526-47.

[7] Tirtha P. Dhar, "Two-Stage Oligopoly Pricing with Differentiated Products: The Boston Fluid Milk Market," Ph.D dissertation, University of Connecticut, 2001.

vertical supply arrangements with Ahold USA, which has as its subsidiaries the retail grocery outlets of Stop & Shop, Giant Foods, Bi-Lo, and Tops Markets.

Last, developing a model of market power for fluid milk is difficult because of a lack of data at the wholesale level in most dairy markets. Actual wholesale price data from dairy processors are proprietary and are not obtainable in the public domain. Without a good series of data at this level, it is difficult for researchers to accurately measure the extent of power that buyers and sellers can exert on the market.

Review of Recent Studies Measuring the Effect of Market Power in the Fluid Milk Market

Economic studies that model issues of market power in agricultural and other industries have evolved in recent years. First, there were the structure-conduct-performance (SCP) studies,[8] which assumed that market power was a function of several structural variables such as market concentration, product differentiation, or entry barriers. In these studies, markets were assumed to display a certain behavior or "conduct" (collusion or strategic behavior) from their structure, leading to a certain performance variable, such as profitability or efficiency. One weakness of these types of models, however, is that concentration ratios (a structural variable that is often used to explain conduct) are actually endogenous variables. Over the last two decades, the New Empirical Industrial Organization (NEIO) approach to measuring market power became popular. The NEIO studies base their inferences of market power on econometric models that measure firm conduct. One of the main strengths of this approach is that it is grounded in microeconomic theory. More recently, researchers have developed models estimating market power based on cointegration techniques,[9] as well as experimental economic designs.

We identified several academic studies that measure market power in the dairy industry or fluid milk market, representing a wide variety of different types of economic models. These studies differ according to geographic

[8] In its simplest, linear version, the structure, conduct, performance paradigm consists of the following linear framework: market structure determines the behavior of firms in a market and the behavior of firms in a market determines various aspects of market performance. However, this paradigm has been found to also have many interactive as well as feedback effects.

[9] Studies of cointegration are concerned with methods of econometric estimation that preserve the information about forms of covariation between series.

scope, stage of the marketing chain, and different time period. Moreover, except for the Dhar dissertation, most of these studies did not take into account the effects of market concentration at successive levels of the milk marketing chain. When taken together, we found that these studies had mixed results when estimating the effects of market power on seller and/or buyer price in the dairy industry and/or fluid milk market.

Suzuki et al., (1994)—Imperfect Competition Model of the U.S. Milk Market

Suzuki et al., (1994)[10] developed an imperfect competition model of the U.S. dairy market for the purposes of analyzing dairy policy deregulation. In order to do this, they use the theory that Bresnahan[11] developed to solve for a parameter that they consider an aggregate indicator of the degree of competition in this market. While the authors do not explicitly break out the oligopsonistic power of processors, they assume that their indicator reflects the combined effects of both cooperatives' as well as processors' market power. In their model, the market power parameter equals one under monopoly or collusion, and zero under perfect competition or price-taking behavior. To empirically estimate the model, the authors specify equations for raw milk production and demand for fluid milk and manufactured dairy products. They then solve for the market power parameter using estimated prices, quantities, and demand elasticities for fluid milk and manufactured dairy products. The authors also test the validity of their imperfectly competitive model for the analysis of milk market deregulation by using a dynamic simulation approach for the period 1980 to 1990.

The authors found that their derived annual average estimates of the degree-of-competition parameter implied neither perfect competition nor pure monopoly, but implied a certain degree of market imperfection that had been steadily declining from 1977 to 1990. They explained this degree of imperfect competition as the consequences of a shift in the balance of power caused by the unification of dairy cooperatives, consolidation of manufacturing firms, and the consolidation of the federal milk marketing orders. Moreover, the authors did not find significant differences between the results of their imperfectly competitive model and the conventional

[10] Nobuhiro Suzuki, Harry M. Kaiser, John E. Lenz, and Olan K. Forker, "An Analysis of U.S. Dairy Policy Deregulation using an Imperfect Competition Model," *Agricultural and Resource Economics Review*, 23 (1994): 84-93.

[11] T.B. Bresnahan, "The Oligopoly Solution Concept is Identified," *Economic Letters* 10 (1982): 87-92.

model assuming perfect competition, assuming the fluid price differential was exogenous, in estimating the effects of milk market deregulation.

Madhavan et al., (1994)—A Study of Market Power by a Cooperative

The Madhavan study (1994)[12] examined empirically the price-setting behavior of the Associated Milk Producers, Inc. (AMPI), a large cooperative with more than 30,000 members in the 1970s. The cooperative consolidated power in the 1960s through numerous mergers and was involved in a Department of Justice antitrust suit in which it was charged with "predatory and exclusionary" practices. The mergers, which were protected under the Capper-Volstead Act,[13] were not challenged. However, AMPI did lose that part of the antitrust suit charging it with conspiracy to monopolize. The authors developed a model of spatial limit pricing to test for market power in 14 AMPI markets during the period from 1972 to 1980 (the AMPI Southern regional markets). They tested the model using the method of Seemingly Unrelated Regressions,[14] adjusting for serial correlation.

The authors of the study found that AMPI successfully obtained and used seller market power, and that its market power was proportional to its market share. During this period, price-cost margins averaged about 33 cents. However, after the antitrust decree, margins fell significantly to about 4 cents and were no longer related to market share. These results were robust to several specifications of the model as well as under different industry trends.

[12] Ananth Madhavan, Robert T. Masson, and William H. Lesser, "Cooperation for Monopolization? An Empirical Analysis of Cartelization," *The Review of Economics and Statistics 76 (1994): 161-75.*

[13] The Capper-Volstead Act grants agricultural cooperatives an antitrust exemption.

[14] The method of seemingly unrelated regression technique provides a gain in efficiency by using information on the explanatory variables that are included in the system of equations but are excluded from the i^{th} equation.

Liu et al., (1995)—A Study of Seller Market Power in Fluid and Manufactured Milk Markets

The Liu et al., study (1995)[15] uses the NEIO approach to estimate the degree of seller market power exercised by U.S. fluid and manufactured dairy processors. This approach, based on the seminal article by Applebaum (1982),[16] estimates (rather than assumes) econometrically a conduct parameter called a "conjectural variation"--an index of the degree of market power. This conduct parameter can range between zero and one, with zero representing perfect competition and a value of one implying the monopoly, or perfect cartel, solution. The Liu study also incorporates government price supports on manufactured milk products. Under this type of model, it is assumed that milk processing at the wholesale level follows a fixed proportions technology between farm milk and other inputs. The model uses quarterly data from 1976 to 1992 on USDA's Dairy Situation and Outlook series for wholesale supply and demand quantities; Class I and II federal marketing order minimum prices and price differentials; and input wage and energy price indices from the Department of Labor. Liu proceeds by using a two-stage, nonlinear least squares estimation method with instrumental variables.[17]

The average industry conduct parameters of this study show that the processing markets for fluid milk and manufactured dairy products were somewhat noncompetitive. Over this time period, Liu's analysis showed that the conduct parameters were statistically significant and averaged 0.176 for fluid milk processors and 0.100 for manufactured product processors, both estimates closer to the perfectly competitive result (zero) than the monopolistic result (one). The authors explained these results by saying that fluid milk processors behave in a less competitive manner than manufactured product processors because markets for fluid milk are less national in scope than markets for manufactured dairy products. The authors also noted that both parameters did not seem to increase over time and that this was reassuring because the industry had become more concentrated over the sample period from 1976 to 1992.

[15] Donald J. Liu, Shin-Hwa Sun, and Harry Kaiser, "Market Conduct under Government Price Intervention in the U.S. Dairy Industry," *Journal of Agricultural and Resource Economics* 20 (2) (1995): 301-15.

[16] E. Appelbaum, "The Estimation of the Degree of Oligopoly Power," *Journal of Econometrics* 19 (1982): 287-99.

[17] The instrumental variable technique is a general estimation procedure applicable to situations in which the independent variable is not independent of the disturbance term. The two-stage least square technique is a special case of the instrumental variable technique in which the "best" instrumental variables are used in the regression.

Lopez et al., (2000)—A Study of the Trade Off Between Oligopoly Power and Cost Effects of Industrial Concentration in Food Processing

A study by Lopez, Azzam, and Liron-Espana (2000)[18] addresses the unresolved issue of the tradeoff between market power and cost efficiency in U.S. food industries, including the fluid milk processing industry. The importance of this study stems from one of the main questions in antitrust cases—whether the increased cost efficiency from greater concentration outweighs the effects of increased prices due to greater market power. To address this question, the study provides estimates of oligopoly power and economies of size for 32 food processing industries using the 4-digit Standard Industrial Classification (SIC) of the U.S. Department of Commerce. The authors develop a NEIO empirical model that separates the impacts of concentration on oligopoly power and cost-efficiency, and, hence, on output prices as well as input use. In addition to measuring conjectural variation elasticities (a measure of collusive market conduct which implies market power), this paper also measures the amount that price is above the marginal cost (the oligopoly Lerner index)—a somewhat more direct measure of market power. In the specification of the theoretical model, the authors identify an expression that separates the change in output price of an industry with respect to a change in the level of concentration as measured by the Herfindahl-Hirschman index.[19] This expression is divided into (1) a term that measures the oligopoly-power effect (consisting of one plus a weighted industry conjectural elasticity term divided by the industry demand elasticity) and (2) a cost-efficiency term that includes input prices and output quantity.

The econometric model adapts the oligopsony model of Azzam (1997) to the oligopoly power case. Specifically, the model consists of five equations: the pricing equation, three input demand equations, and an output demand equation. The model was estimated with a system of five equations with non-linear 3-stage least squares regression analysis.[20] Principal data sources for the study included the National Bureau of

[18] Rigoberto A. Lopez, Azzedine M. Azzam, and Carmen Liron-Espana, "Oligopoly Power and Cost Effects of Industrial Concentration in U.S. Food Processing," Working Paper, Storrs Agricultural Experiment Station, University of Connecticut, Storrs, Connecticut, October, 2000.

[19] The Herfindahl-Hirschman index is a measure of firm concentration that describes the size-distribution, or the relative importance of both large and small firms in an industry. It is defined as the sum of the squares of the market shares of the firms in an industry.

[20] The three-stage least squares regression estimation technique is the systems counterpart to two-stage least squares (as defined in footnote 17 above). This estimator is statistically consistent and asymptotically more efficient than the two-stage least squares estimator.

Economic Research (NBER) of Bartelsman, Becker, and Gray (2000)[21] database for index prices of inputs and panel data. As mentioned above, data are used at the 4-digit SIC level.

An overall result of this study contradicts the results of other analyses, which showed that increases in technical efficiencies offset any losses to consumers from increased concentration. In particular, in the fluid milk industry (SIC 2026), these results show that a very strong tradeoff exists between cost efficiency and increased oligopoly power. In other words, while the results show significant gains in cost efficiency, there are also significant and positive effects on output price in the fluid milk industry due to market power. Moreover, at the wholesale level for fluid milk, while there are cost efficiencies, they may not be passed on because of the oligopoly-power effects.

U.S. Department of Agriculture, Economic Research Service (2000)—Study of Structural Change and Competition in Seven U.S. Food Markets

The USDA study (2000)[22] examines market power at the national level for seven food categories: beef, pork, poultry, eggs, dairy, fresh fruit, and fresh vegetables. The authors use a cointegrated[23] model of quasi-reduced form retail and farm price equations, a general market-clearing condition for final industry output, and a general market-clearing condition for farm inputs. The critical feature of the model is that within the same industry, one firm's production function may be different from other firms' production functions.[24] Therefore, the authors argue that, unlike the NEIO market power models, this model does not depend upon the restriction of identical firms or fixed production technologies across firms. The model suggests that one can test for oligopsony and oligopoly power based on the acceptance or rejection of the testable restriction of symmetry, as implied by the theory of profit functions under perfect competition. All retail prices in the model were constructed from annual average Consumer Price Index data, U.S. city averages from 1958 to 1997. Farm

[21] E.J. Bartelsmen, R.A. Becher, and W.B. Gray. *The NBER-CES Manufacturing Industry Database*, (http://www.nber.org/productivity.html), June 2000.

[22] A.J. Reed and J.S. Clark, U.S. Department of Agriculture. *Structural Change and Competition in Seven U.S. Food Markets.* Food and Rural Economics Division, Economic Research Service, Technical Bulletin Number 1881, February 2000.

[23] A cointegrated model links trends across variables, and in this case, provides a market-clearing representation.

[24] A production function describes the technical relationship that transforms inputs (resources) into ouputs (commodities). For each level of input used, the function assigns a unique level of output.

level prices were constructed from non-seasonally adjusted annual Producer Price Index data for farm products.

Using this model, the authors find competitive markets on the buyer side as well as the seller side for all seven food markets, including the dairy market. They explain this result by suggesting that trends in concentration in agricultural markets may be efficient solutions to unpredictable trends in consumer demand for food.

Doyon Model (2001)—Experimental Simulation Model of Buyer Market Power of Fluid Milk

The Doyon Model (2001)[25] uses a totally different approach than the usual econometric methods for analyzing the effects of market power; in this case oligopsony or buyer market power, in the fluid milk industry. Laboratory market experiments are used to find evidence of deviations from the competitive equilibrium in the U.S. market for raw milk. A laboratory experiment allows for the collection of data in a controlled environment, such that the use of exogenous and subjective data in models is avoided. The experimental task was a 2 x 2-matrix laboratory game,[26] with the treatments being oligopsony and regulation. The experiment allows for variation in the number of buyers (oligopsony) and the presence or absence of regulation.

The results of the study indicated that when oligopsony is introduced, in the absence of regulation, buyers gain market power. The increase in market power is measured by a reduction in market price and quantity purchased relative to the competitive equilibrium. However, when price regulation is present, a reduction in the number of buyers has no statistically significant effect. From this evidence, the author draws the conclusion that regulation successfully neutralizes the oligopsony effects relative to the competitive equilibrium.

[25] Maurice A. Doyon, "The Effect of the Elimination of Federal Milk Marketing Orders on Farm Level Markets: A Laboratory Experiment," Department of Agri-Food and Consumer Science, Universite Laval, Quebec, Canada (2001).

[26] In game theory, a 2 x 2 game represents two players with two possible actions in their action sets.

Dhar Dissertation (2001)–Differentiated Products Oligopoly Model of the Boston Fluid Milk Market

A doctoral dissertation by Dhar (2001)[27] is one of the first attempts to apply to the U.S. fluid milk market a model of market power that considers successive rather than single stage oligopoly. Specifically, this analysis looks at the Boston fluid milk processor and retailer market channels in order to capture the horizontal and vertical channel relationships. Also, the author addresses the issue of modeling product differentiation at the fluid milk brand level within this oligopolistic framework. Throughout the analysis, the author uses this framework to examine the impact of the Northeast Dairy Compact (NEDC) on the Boston fluid milk market.

The dissertation consists of three separate, but related types of analysis. First, using the Panel Vector Auto Regression technique,[28] the author analyzes the dynamic nature of retail competition on fluid milk in the Boston and the New York markets. The author found that the retail price response is short in these markets—in most cases not more than two time periods. In addition, it was found that, during this time period, there was a much stronger "reacting" oligopolistic market structure in the Boston market.

Second, the author develops a comparative static, cost pass-through model under different market structure and conduct scenarios. This model consists of a two-stage vertical market system where there are two processors at the first stage and two retailers at the second stage. Within this vertical structure, the author assumes three different conduct or game-theoretic assumptions: (1) a complete vertical coordination game, (2) a vertical Nash model,[29] where retailers and processors both maximize profit by setting prices simultaneously, and (3) a vertical Stackelberg game,[30] where the retailer moves first and decides on price and the

[27] Tirtha P. Dhar, "Two-Stage Oligopoly Pricing with Differentiated Products: The Boston Fluid Milk Market," Ph.D dissertation, University of Connecticut, 2001.

[28] Vector Autoregression models are systems of linear regressions that have the advantage to better consider the interactions between variables as well as model a more complete dynamic scenario. Panel vector autoregression models are VAR models which use panel data.

[29] A Nash equilibrium is a situation in which economic actors interacting with one another each choose their best strategy given the strategies that all the other actors have chosen. A Bertrand equilibrium, which this model is implying, is simply a Nash equilibrium in prices rather than quantities.

[30] A Stackelberg game implies a move sequence, in which players select strategies in a given order. Each player's strategy is a best response to the fixed strategies of the players preceding him.

processor maximizes profit by taking into account the reaction of the retailer. Having defined these assumptions, the author then lays out the basic equations underlying the theoretical model and the cost pass-through derivations. To estimate this model, the author then specifies a simple linear demand system, a cost function, and first order conditions based on the profit functions for the processing and retailing sectors. A private data collection company's scanner data for monthly average fluid milk prices, the Boston Class I fluid milk price, price reduction activities, and package sizes for four retail chains are used in the estimation for the period 1996 through 1998. In addition, a binary variable was incorporated to account for the implementation of the Northeast Dairy Compact. The results of this part of the dissertation suggest that the total pass-through of a 1-percent raw milk price increase is almost 100 percent, while rates of pass-through at the wholesale and retail level are approximately 50 percent. For the total channel, the rate is near 25 percent, which is the retail monopoly level.

The third part of the dissertation is the most comprehensive part of the study. It incorporated recent developments in characteristics-based Nested Logit[31] demand systems as well as a flexible Generalized Leontief cost function.[32] In addition, this part of the study uses modeling techniques to account for product differentiation at the brand level. Data for this part of the study are also more comprehensive, providing marketing and retail price related information for the aggregate and top four supermarket chains in the Boston market from February 1996 to July 2000. The results from this portion of the dissertation suggest that retailers do have market power and that brand differentiation is the result of interaction between retailers and processors. Both the second and third part of the dissertation found a significant price enhancing effect of the Northeast Dairy Compact.

[31] A logit regression model is a type of qualitative dependent variable model in which the dependent variable is from a finite set of discrete alternatives, such as a (0,1) dummy variable. The logit model is one type of qualitative dependent variable model that follows the logistic probability function.

[32] A generalized Leontief cost function is one type of a flexible functional form of a dual cost function. These types of cost functions are "flexible" because they place little restrictions on the value of the function or its first or second derivatives. In general, less restrictive and more flexible forms are desirable, but require more information to specify such forms.

According to the author, due to focal point pricing,[33] competition between channel players was lessened due to the Compact.

[33] Focal point pricing or focal point signaling involves the use of publicly disclosed price and cost information (here such as a federal milk marketing order price or a Compact price) as a mechanism for tacit collusion in an oligopolistic market.

Appendix VIII: GAO Contacts and Staff Acknowledgments

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