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Research Report on Dairy Policy and Markets

August 2000 A.E. & R.S. 255

An Economic Analysis of Federal Order Reform: Implications for Pennsylvania and the Northeast

by
Ken Bailey and Jim Dunn

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EXECUTIVE SUMMARY

An Economic Analysis of Federal Order Reform: Implications for Pennsylvania and the Northeast

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Background

The Secretary of Agriculture was instructed in the 1996 Farm Bill to reform federal milk marketing orders. He responded by issuing a preliminary rule, followed later by a final rule. The final rule reflected consolidation in the number of federal milk marketing orders, new class price formulas, and a plan for pricing fluid milk that reflected revisions in existing Class I differentials (minimum fluid milk prices are equal to the Class I mover plus local Class I differentials). This plan for Class I differentials was dubbed Option 1B. It was controversial since it involved altering fluid milk prices.

USDA then held a national referendum on the final rule. It passed and was announced August 30, 1999. A month later, however, a federal injunction was issued which temporarily delayed implementation of the final rule by the Secretary of Agriculture. At issue was whether the final rule would cause irreparable economic harm to northeastern dairy producers.

In the meantime, Congress passed the Consolidated Appropriations Act of 2000. That legislation, which was signed into law by President Clinton on November 29, 1999, effectively overruled the federal injunction and required the Secretary of Agriculture to utilize Option 1A Class I differentials. Those differentials were more similar to the differentials that existed prior to order reform. Federal order reform was then implemented January 1, 2000.

Purpose of the Study

The purpose of this study is to provide an objective and comprehensive analysis of the major elements of federal order reform and its impact on farm milk prices and sales. This study is unique in that it isolates and analyzes the major components of federal order reform (change in class price formulas and Class I differentials, and elimination of the dairy price support program). A regional economic model that reflects federal milk marketing orders is used for the analysis. In addition, a Pennsylvania dairy model that reflects milk marketings and use, class prices and farm prices was developed to analyze the impact of federal order reform on the State. The study also compares changes in regional farm milk prices and sales under the Secretary's final rule and under Congress' final plan for federal order reform.

Four scenarios were developed to isolate and analyze the impact of federal order reform on regional milk prices and sales. The model developed for this study was modified to reflect these changes and was then used to calculate butter, cheese, nonfat dry milk and dry whey market-clearing prices. The results of the four scenarios were then compared to the baseline. The baseline reflected conditions prior to order reform. Changes relative to the baseline were analyzed to assess the impact of each of these scenarios.

Results of the Study

The results of this study show that the new class prices under order reform are much more dependent on the price of dairy commodities than the formulas used prior to order reform. Class prices under the old system varied mainly with changes in the price of cheese and, to a lesser extent, butter. Under the new system there is a direct linkage between changes in cash market prices for cheese, butter, nonfat dry milk and whey, and component prices for butterfat, protein and other solids. These component prices in turn drive the prices for Class I, II, III and IV milk.

This study shows that eliminating the dairy price support program ***prior to order reform*** reduced the wholesale price of nonfat dry milk by more than 13 cents per pound annually relative to the baseline. That in turn slightly lowers the wholesale price of cheese as more milk shifted away from Class IIIa uses and into Class III uses. Those lower prices resulted in lower class prices, lower pool values, and lower farm prices. U.S. farm milk sales declined by $236 million relative to the baseline. Elimination of the dairy price support program in the face of the new federal order reforms, however, resulted in a much greater economic impact (more later).

A simple historical comparison of class prices indicates that the Class I mover and Class II prices as defined under order reform are $0.39 and $0.30 per cwt, respectively, ***higher*** than under the old definition. Class III and IV prices as defined under order reform are $0.20 and $0.05 per cwt ***lower*** than the old definition. Using the more detailed dairy industry model developed for this report, the Class I mover increased $0.34 per cwt, the Class II price increased $0.27 per cwt, the Class III price ***fell*** $0.56 per cwt, and the Class IV price rose $0.20 per cwt under federal order reform when compared to the baseline.

The results in Tables 9 and 11 show that for the Northeast, the Consolidated Appropriations Act resulted in higher farm milk prices and sales than under the Secretary's final rule. The Northeast farm price increased $0.02 per cwt and farm milk sales rose $6 million under the Consolidated Appropriations Act when compared to the baseline. However, adoption of the Secretary's final rule would have resulted in a decline of $0.16 per cwt in the Northeast farm price and a reduction of $50 million in farm milk sales, both relative to the baseline. Much of this decline is attributable to the lower Class I differentials that would exist in the Northeast under the Secretary's Option 1B pricing plan.

For Pennsylvania, we estimate that the Secretary's final rule would have reduced the farm price of milk $0.03 per cwt and lowered farm milk sales by $4 million. This study shows a decline of $0.67 per cwt in the average Class I differential for the Northeast under Option 1B relative to the baseline. For Pennsylvania, this difference is $0.40 per cwt. Thus, the farm price impact of the Secretary's final rule was found to be less for Pennsylvania than for the Northeast federal order.

The results for Pennsylvania also suggest that the Consolidated Appropriations Act would increase Pennsylvania farm prices and milk sales relative to the baseline. The farm price increased $0.06 per cwt and farm milk sales rose $9 million under this scenario when compared to the baseline. The class I differentials in the modified Option 1A plan ultimately adopted by the Congress in the Consolidated Appropriations Act are very similar to those used in the baseline. Thus, for Pennsylvania, most of the increase in farm milk prices and sales under this scenario can be attributed to the higher Class I mover and higher Class II price that was defined in the final rule.

For the United States, the Consolidated Appropriations Act resulted in a slightly smaller decline in farm milk prices and sales when compared to the results under the Secretary's final rule. The U.S. average farm price and milk sales fell $0.05 per cwt and $104 million, respectively, relative to the baseline under the Consolidated Appropriations Act scenario. On the other hand, the U.S. average farm price and milk sales fell $0.07 per cwt and $150 million, respectively, relative to the baseline under the Secretary's final rule scenario. From a statistical perspective, the difference in economic impact between these two scenarios was not significant. However, there were large regional differences in the results of these alternative policy scenarios.

In conclusion, the results of this study suggest that regional farm milk sales are conditioned in part on the level of Class I differentials. Also, the new formulas for class prices adopted in the Secretary's final rule are much more sensitive to changes in dairy commodity prices than under the old system. Hence, major changes in the level of dairy commodity prices--such as a reduction in nonfat dry milk prices due to an elimination of the dairy price support program--would have significant economic consequences. For example, the economic model used in this study indicates that elimination of the dairy price support program in the face of federal order reform would result in a much greater reduction in farm milk sales than under the old system. The elimination of the dairy price support program in combination with the implementation of the Secretary's final rule resulted in a reduction in U.S. farm milk sales of $483 million relative to the baseline. The elimination of the dairy price support program in combination with the Consolidated Appropriations Act resulted in a decline in U.S. farm milk sales of $436 million.

The reason for the large reduction in milk sales due to the combined effects of elimination of the dairy price support program and federal order reform is because the new formulas for class prices under order reform, particularly the Class I and II prices, are highly dependent on the price of nonfat dry milk. Under the old system, any change in the nonfat dry milk price had little impact on the Class II price since the latter was equal to the old Basic Formula Price (BFP) plus $0.30 per cwt. The BFP was a function of the cheese price. Under federal order reform, the Class II price is driven by the Class IV skim milk price, which in turn is a function of the price of nonfat dry milk. Under the old system, a drop in the price of nonfat dry milk had little impact on the Class I mover since it was equal to the BFP lagged two periods. Under order reform, the Class I mover is a function of the higher of the Class III and IV skim milk prices. In the baseline used in this study, the Class IV skim milk price is higher than the Class III skim milk price, and the Class IV skim milk price is a function of the price of nonfat dry milk. Thus, elimination of the dairy price support program could have a significant impact on class prices under the new system of federal order reform if the price of nonfat dry milk is reduced.

It should be noted that this study also raises issues that were not directly analyzed. For example, this study finds that the new definition of the Class III price is $0.20 - $0.56 per cwt below what the BFP would have been. It also shows a significant reduction in farm milk prices and sales if the dairy price support program is eliminated. What is not addressed, however, is the long-term economic impact of reducing the make allowance for protein (i.e. raising the Class III price) from current levels. How will this affect processors? In addition, the study does not address broader issues associated with maintaining the dairy price support program. In particular, what is to be done with the surplus nonfat dry milk purchased under the price support program? Government stocks of nonfat dry milk are increasing in 2000 while exports of nonfat dry milk under the Dairy Export Incentive Program are being reduced due to our agreements under the WTO trade agreement. These are questions that deserve to be addressed, but were not analyzed in this report.

An Economic Analysis of Federal Order Reform: Implications for Pennsylvania and the Northeast

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Background and Introduction

The Secretary of Agriculture was instructed in Section 143 of the Federal Agricultural Improvement and Reform (FAIR) Act of 1996 (the 1996 Farm Bill) to consolidate the number of federal milk marketing orders to between 10 and 14, and to designate California as a federal milk order if California dairy producers petition for and approve such order. In addition, the Secretary was given the authority to address related issues regarding the price of fluid and manufacturing milk. Congress gave the Secretary a deadline and informal rulemaking procedures in order to carry out federal order reform in an expeditious manner.

In response to the FAIR Act, the Secretary issued a proposed rule in January 1998 that consolidated and reformed the federal milk marketing order program. USDA then solicited comments from interested parties on the proposed rule. Nearly 4,500 comments were submitted. These comments were taken into account in the preparation of the final rule, which was issued March 31, 1999 (see Bailey, April 1999a). USDA then held an individual referendum for each proposed federal order during August 2-6, 1999. On August 30, 1999 USDA announced the final rule was adopted by participating dairy farmers. The details of the new federal order regulations were announced in the Federal Register on September 1, 1999.

Congress could not reach a consensus on how to reform dairy policy during debate on the 1996 Farm Bill. It is for that reason they instructed the Secretary to carry out this responsibility. Congress also gave the Secretary the option of using multiple basing points and Class I utilization rates in setting new Class I prices across all federal orders. The Secretary used that authority to create a new plan for Class I differentials referred to as Option 1B. This aspect of the Secretary's final rule was the most controversial since it would alter the national map of Class I pricing differentials.

Judge William K. Sessions, III, U.S. District Judge of Burlington, Vermont issued a federal injunction on September 28, 1999, which temporarily delayed implementation of the final rule. The injunction stated that the plaintiffs in the case had a likelihood of success in claiming that the final rule violates the Agricultural Marketing Agreement Act of 1937. That law is the legal foundation for federal milk marketing order regulations. The injunction also noted that farmers in the Northeast would "suffer immediate and irreparable injury from implementation of the Secretary's Final Decision and Order on October 1, 1999."

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The purpose of the injunction was to issue a temporary restraining order to provide more time to review the facts of the case and prevent any possibility of economic harm in the meantime. According to Judge Sessions, "The Court finds that the public interest would be best served by maintaining the status quo for a more thorough review of the issue." In this case, the issue is the economic impact of implementing the Secretary's final rule for federal order reform.

The federal injunction effectively halted further implementation of federal order reform. In fact, it appeared likely that there would be no order reform in 2000. However, things began to change when Congress passed an omnibus spending bill (http://www.ams.usda.gov/fmor/hr3194.pdf). Deep inside the District of Columbia appropriations bill was language relevant to order reform (http://www.ams.usda.gov/fmor/hr3428.pdf). On November 29, 1999, President Clinton signed the Consolidated Appropriations Act of 2000 which allowed federal order reform to take place January 1, 2000. The legislation mandates that Class I milk be priced utilizing the Option 1A-Location Specific Class I Differentials contained in the proposed rule as corrected and modified through April 2, 1999. The legislation also requires USDA to conduct a hearing to reconsider the Class III and Class IV prices contained in the final rule, with new pricing formulas to be implemented by January 1, 2001. It also requires that USDA establish a dairy forward pricing pilot program within 90 days of enactment of the legislation.

The potential economic impact of the Secretary's final rule and of the revised federal order reform legislated by Congress is not well understood. Milk sales in the Northeast and Pennsylvania are sensitive to changes in dairy policy. The Secretary's final rule would have resulted in significant declines in Class I differentials. Furthermore, order reform has resulted in new formulas that define class prices. In addition, the dairy price support program, which is not related to order reform, is scheduled to be eliminated at the end of 2000.

The purpose of this study is to provide an objective and comprehensive analysis of the major elements of federal order reform and its impact on farm milk sales. This study is unique in that it isolates and analyzes the major components of order reform (change in class price formulas and Class I differentials, and elimination of the dairy price support program). A regional economic model that reflects federal milk marketing orders was used for the analysis. In addition, a Pennsylvania dairy model that reflects milk marketings and use, class prices and farm prices was developed to analyze the impact of order reform. In particular, this study compares changes in regional farm milk sales under the Secretary's final rule and Congress' final plan for order reform to the baseline.

Previous Research

There are a limited number of studies that have analyzed the economic impact of the Secretary's final rule on dairy farm income. The National Milk Producers Federation, a trade organization representing dairy farmers and their cooperatives, announced that the Secretary's final rule would lower dairy producer income by $196 million a year. Yet it is not clear from the press release how much of this would be due to changes in pricing formulas and how much to the new Class I differentials.

USDA issued a regulatory impact analysis of the final rule using a dynamic multi-region model of the U.S. dairy sector (USDA, March 1999). The model reflected 32 federal order marketing areas and 4 non-federal order marketing areas. It reflected pricing formulas, milk marketings and milk use by individual federal order. The model was designed to solve dynamically for equilibrium prices of cheese, butter, and nonfat dry milk. USDA used the model to compare the baseline to three scenarios: 1) the final rule, 2) modified Class 1A differentials, and 3) modified Class IB differentials. Order consolidation and an elimination of the dairy price support program were reflected in all three scenarios.

The USDA study used an interagency baseline of dairy market conditions for 1999-2008. Changes were made in model parameters to reflect the final rule. The regulatory impact study then reported the year-by-year changes in supply, demand and prices for each of the 32 federal orders and 4 unregulated markets. These changes were shown as a comparison to the baseline. As an example, the change $0.18 per cwt was reported in the study for the all-milk price in 2005 for the Chicago Regional order. That indicates changes in the final rule caused the all-milk price in that order for that year to rise $0.18 per cwt ***relative to the baseline***. All reported changes in the USDA study were made relative to the baseline.

The USDA study results indicate that the all-milk price in all federal orders over the period 2000-2005 will average $0.02 per cwt lower under the final decision when compared to the baseline. In other words, the average dairy farmer will not experience significant changes in farm prices due to the final rule. The USDA results for the Northeast, however, are mixed over this time period. The all-milk prices over the six-year study period changed as follows: New England order up $0.01 per cwt, New York-New Jersey order up $0.15 per cwt, Middle Atlantic order down $0.47 per cwt.

These results for the Northeast are questionable. Class I prices do not change until after 2000. The Class I differential for the New England order will decline $0.49 per cwt under the final rule. Yet, USDA's study shows Class I prices rising one penny per cwt in 2000, then declining $0.42-$0.48 thereafter relative to the baseline. The average decline in the Class I price over the period 2000-2005 is therefore only $0.38 per cwt. Yet despite this decline in Class I prices, the USDA results show the New England all-milk price increases by $0.01 per cwt over the study period. This would imply that dairy commodity prices and other class prices rose enough to offset the decline in Class I prices. Yet the all-milk price in the Upper Midwest order, a region highly dependent on commodity prices, actually declined an average $0.09 per cwt over the period 2000-2005. These results appear to be contradictory.

Another factor that may have an impact on the USDA results is the baseline used. The USDA interagency baseline (USDA, February1999) does not report dairy commodity prices, but does show the Basic Formula Price. That price rises from $11.90 in the 1999/2000 marketing year to $15.15 by 2005/2006. That would indicate a substantial rise in the cheese price. In the regulatory impact study USDA notes, "projected net returns from the production of butter and nonfat dry milk exceed those from the production of cheese until 2001." This would indicate strong growth in the prices of butter and nonfat dry milk in USDA's baseline over the period 1999-2005.

The choice of dairy commodity prices for the baseline can have a significant impact on an economic comparison of pricing formulas before and after federal order reform. This is particularly true since Class II and IV prices under federal order reform are heavily dependent on nonfat dry milk prices. It is likely that USDA assumed very high levels of nonfat dry milk prices in their baseline.

The Food and Agricultural Policy Research Institute (FAPRI) at the University of Missouri analyzed the impact of the final rule at the request of the U.S. House of Representatives Subcommittee on Livestock and Horticulture. FAPRI assembled a number of leading academic institutions, USDA, and the International Dairy Foods Association and developed a consensus report. That study concluded that the effect of the final rule would be minimal on dairy farm income. In particular, they concluded that USDA "developed a package that is expected to have relatively little effect on aggregate dairy producer income." For Pennsylvania, however, the FAPRI study showed farm milk prices falling an average 11-22 cents per cwt under Option 1B, and 8 cents per cwt under Option 1A when compared to the baseline.

A careful review of the FAPRI study indicates that the results are highly dependent on the following four critical assumptions:

1. The Class I mover under the final rule is equal to the higher of the Class III or IV prices. Under the FAPRI baseline, the Class III price is above the Class IV price. Thus the authors assumed the Class I mover would be equal to the Class III price plus a premium of $0.10 per cwt.
2. The authors generally assumed that the final rule Class III formula would average $0.16 to $0.60 per cwt below the BFP. The study authors then agreed that the new Class III price would be $0.30 per cwt below the baseline BFP. In other words, the analysts adjusted the Class III value to fit *a priori* expectations.
3. The analysis concluded that the assumption above would create a windfall of $0.30 per cwt for cheese processors. They then assumed that 75 percent of this windfall would go to dairy farmers (in the form of higher farm prices) and 25 percent to processors, retailers and consumers.
4. The new Class I differentials under the final rule (Option 1B) will result in significant reductions in the Northeast, Mid-Atlantic, Northwest, Southeast and Southwest regions. The authors assumed in one scenario that this reduction (or gain for the Upper Midwest and Florida) would be partially offset by an increase (reduction) in over-order premiums equal to 50 percent of the change in Class I differentials. In other words, they assumed that some of the reduction in Class I differentials would be offset by local market forces. Implicitly the authors also assumed that dairy farmers would receive all of these premiums in the years they were generated.

These are fairly strong assumptions. It is clear that any negative impact on dairy farm income computed in the FAPRI model as a result of the final rule would be partially offset by these *a priori* adjustments. The argument made is that market supply and demand forces can and do drive local market prices above minimum federal order prices. In theory, that is what over-order premiums do. In reality, over-order premiums largely reflect the power of cooperatives to bargain for higher prices in the absence of a competing source of independent milk.

Finally, in an earlier study Bailey developed a preliminary short-run, first year impact of the final rule on regional dairy farm income (Bailey April 1999b). That study assumed that in addition to implementing the final rule, the dairy price support program would end and the price of nonfat dry milk would decline to $0.85 per pound. The study concluded that the average farm price in all 11 federal orders would decline by $0.46 per cwt relative to the baseline. In addition, milk marketings in all orders would decline 0.4 percent. These two changes resulted in a drop in milk farm income of $583 million, or 3.8 percent relative to the baseline. Of that amount, $140 million was due exclusively to the decline in Class I prices. The limitation of this study was that it analyzed the first year of implementation only, and that it assumed rather than computed a drop in nonfat dry milk prices. In addition, the study did not sort out the impacts of the final rule, namely the separate impacts of new pricing formulas, changes in Class I differentials, and the termination of the dairy price support program.

Federal Order Reform

USDA's Final Rule

USDA announced on August 30, 1999 that a producer referendum for order reform was approved (http://www.ams.usda.gov/news/231c.htm). As a result, USDA announced the implementation of the final rule. The final rule was later modified by Congress which adopted modified Option 1A Class I pricing differentials. Nevertheless, the final rule adopted by USDA represents a major change in the way milk is priced. The changes can be summarized as follows:

- Consolidate the number of federal milk marketing orders
- Create a new class of milk used for butter and nonfat dry milk production (Class IV)
- Replace the BFP with a Class III price formula independent of any survey of unregulated milk
- Incorporate the use of multiple component pricing in determining farm prices in some federal orders
- Develop new formulas for the Class I mover, and for Class II, III, and IV prices that are a function of current market information
- Replace the system of Class I differentials and location adjustments with a new map of county-level Class I differentials (modified Option 1B)
- Standardize and consolidate a number of details in each order to provide consistent definitions of key terms and reporting requirements across orders.

Federal order reform consolidated 31 federal orders into 11 orders. It replaced the BFP with a new Class III pricing formula independent of a survey price for unregulated milk. It developed new formulas for class prices that better reflect the market value of milk components such as protein, butterfat, and nonfat solids. These new formulas are defined in Table 1. The Class III price is specified as a function of component values of protein and other solids, and the Class IV price is a function of the component value of nonfat solids. These new formulas are more market oriented in that they eliminate many of the lags in the old pricing formulas that delayed the transmission of market information to dairy farmers.

Table 1. Summary of Equations and Identities in the USDA's Final Rule

COMPONENT PRICES[2]

1) NASS survey cheese price = (weekly barrel price + \$0.03)*α +(weekly block price)*(1 - α), where α = lbs barrels sold/(lbs barrels sold + lbs blocks sold)[3]
2) Butterfat Price = ((NASS AA Butter Survey Price - 0.114)/0.82)
3) Protein Price = ((NASS Cheese Survey Price - 0.1702)*1.405) + ((((NASS Cheese Survey Price - 0.1702)*1.582) - Butterfat Price)*1.28)
4) Other Solids Price = ((NASS Dry Whey Survey Price - 0.137)/0.968)
5) Nonfat Solids Price = ((NASS Nonfat Dry Milk Survey Price - 0.137)/1.02)

ADVANCED PRICING FACTORS[4]

6) Advanced Class III Skim CWT Price = (3.1*two-week average Protein Price[5]) + (5.9*two-week average Other Solids Price[5])
7) Advanced Class IV Skim CWT Price = (9.0*two-week average Nonfat Solids Price[5])
8) Advanced Butterfat Price = ((two-week average NASS AA Butter Survey Price[5] - 0.114)/0.82)

CALCULATION OF CLASS IV PRICES[2]

9) Class IV Skim Milk Price = (9.0* Monthly Avg Nonfat Solids Price)
10) Class IV CWT Price = (0.965*Class IV Skim Milk Price) + (3.5*Butterfat Price)

CALCULATION OF CLASS III PRICES[2]

11) Class III Skim Milk Price = (3.1*Monthly Avg Protein Price) + (5.9*Monthly Avg Other Solids Price)
12) Class III CWT Price = (0.965*Class III Skim Milk Price) + (3.5*Butterfat Price)

CALCULATION OF CLASS II PRICES

13) Class II Skim Milk Price = (Advanced Class IV Skim Milk Price + \$0.70)[5]
14) Class II Butterfat Price = Monthly Butterfat Price + \$0.007[2]
15) Class II CWT Price = (0.965*Class II Skim Milk Price) + (3.5*Class II Butterfat Price)

CALCULATION OF CLASS I PRICES[4]

16) Class I Skim Price Mover = higher of the advanced Class III or IV Skim Milk Prices
17) Class I Butterfat Price Mover = Advance Butterfat Price
18) Class I Skim Milk Price = Class 1 Skim Price Mover + Class 1 Differential
19) Class I Butterfat Price = Class 1 Butterfat Price Mover + Class 1 Differential/100
20) Class I CWT Price = 0.965*Class 1 Skim Milk Price + 3.5*Class 1 Butterfat Price

NOTE: Component prices are in \$/lb; skim prices are in \$/cwt; butterfat prices are in \$/lb.

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[2] Released on or before the 5th of the month; prices applicable to the ***preceding*** month.
[3] Weekly block and barrel prices will be weighted by block and barrel sales volumes to compute a weekly average "cheese"price. Monthly cheese prices then are computed by averaging computed cheese prices by total weekly volumes.
[4] Released on or before the 23rd of the month; prices applicable to the ***following*** month.
[5] This price will be based on two-week average NASS survey price(s) released prior to the 23rd of the month.

A new formula was adopted to set monthly minimum prices for milk used for fluid uses (Class I milk) by using either the higher of the advanced Class III or Class IV skim milk price, plus a new Class I differential that varies by county. A monthly price was also determined for milk used for soft manufactured dairy products (Class II), such as yogurt and ice cream, and is equal to the advanced Class IV skim milk price plus 70 cents per cwt.

Class I differentials ultimately recommended by Secretary Glickman in the final rule are presented in Table 2. The Secretary computed these Class I differentials by raising Option 1B from the preliminary rule by 40 cents per cwt (hence the term "modified"). The final rule differentials resulted in a substantial change relative to the old differentials. For example, in the Northeast, Class I differentials declined $0.49 per cwt in Boston, $0.64 in New York City, and $0.89 in Philadelphia. Differentials also declined in the Mid-Atlantic, Southeast, Southwest, and Western regions of the U.S and in some parts of the Central U.S. Class I differentials under the final rule did not change in Ohio and Indiana, but did rise in the Upper Midwest and Florida relative to the old levels.

Another significant change in dairy policy that should be discussed is the elimination of the dairy price support program. Initially, this program was to be terminated under the FAIR Act by January 2000. However, the deadline was extended by one year by the FY2000 Agricultural Appropriations Bill signed into law October 1999. This could have important implications for any analysis of order reform since nonfat dry milk and cheese prices are expected to fall from current levels when the price support program ends. That in turn should reduce the value of protein, nonfat solids and other solids component values, as well as class prices.

Consolidated Appropriations Act

The Consolidated Appropriations Act adopted by Congress and signed by President Clinton represented a consensus among federal lawmakers regarding key points in order reform. While it retained most of the recommendations of the Secretary of Agriculture, it effectively "amended" parts of the final rule. More specifically the act:

- Requires the federal order reform final rule be implemented as published in the Federal Register on Sept. 1, 1999, with changes made to the Class I price structure.
- Adoption of Option 1A-Location Specific Class I Differentials contained in the proposed rule published on January 30, 1998 as corrected and modified through April 2, 1999.
- Requires USDA to conduct a hearing to reconsider the Class III and Class IV prices contained in the final rule, with new pricing formulas to be implemented by January 1, 2001. This hearing process ***could*** replace the current manufacturing allowance of 17.02 cents per pound in the protein component formula by 14.7 cents.
- Requires that USDA establish a dairy forward pricing pilot program within 90 days of enactment of the legislation.
- Continues Congressional consent for the Northeast Interstate Dairy Compact through September 30, 2001.

Modified Option 1A differentials are presented in Table 2. This option would average $2.41 per cwt across all orders. That compares with $2.35 per cwt under the old system and $2.17 under the final rule. For the Northeast, Class I differentials under order reform would result in a one penny per cwt increase in Boston and New York City, and a 9 cent per cwt drop in Philadelphia. To summarize, modified Option 1A Class I differentials contained in the Consolidated Appropriations Act are closer to the old Class I differentials than are those proposed in the Secretary's final rule.

Historical Impact of Changes in Class Prices

Before proceeding with the analysis, it is important to make an historical comparison of class prices with and without federal order reform. In other words, what impact would order reform have had on class prices. The purpose of this comparison is twofold. First, to illustrate any historical differences between class prices under pre-reform regulations and those under order reform as adopted in the Consolidated Appropriations Act. Second, to see how a model of class prices under order reform developed in this study compares with estimates published by USDA.

The period of comparison used is January 1996 – December 1999. Obviously historical class prices under the pre-reform system already exist for that period. But what would class prices have been during this period had federal order reform been implemented January 1, 1996? How would those prices compare to actual class prices? A simple simulation model was developed to answer those questions.

Class prices under order reform were simulated monthly for January 1996 – December 1999 using NASS monthly average commodity prices and the new formulas for class prices published in the USDA's final rule (see Table 1). Those simulations were then compared to actual class prices. In addition, these simulations were compared to USDA's simulation of class prices under order reform as published in ***Dairy Market News***. For the most part, the USDA simulation matched the simulation published in this report.

First, let us discuss how class prices were defined under pre-reform regulations. The Basic Formula Price, or BFP, was defined as the Class III price and was the minimum price for milk used for cheese and butter production. The BFP in month t was equal to the base month survey price in month t-1, plus an update formula that reflected changes in butter, nonfat dry milk and cheese prices between months t and t-1. The base month survey price mainly reflected what unregulated cheese plants in Minnesota and Wisconsin paid for milk. For a complete review of how the BFP was computed, see Gould and Cropp. The Class II price was for milk used for soft manufactured dairy products and was equal to the BFP in month t-2 plus $0.30 per cwt. The Class I price was equal to the Class I mover (the BFP in month t-2) plus a local Class I differential. The Class IIIa price was for milk used for nonfat dry milk production and was defined as follows:

Equation 1: Class IIIa price = (nonfat dry milk price, Central States – 0.125)* (9-(0.4/nonfat dry milk price, Central States)) + butterfat differential*35

Table 2. Class I Differentials in the USDA Regulatory Impact Analysis of the Final Rule

	Old Differentials	Final Rule	Option 1B	Adopted by Congress: Modified Option 1A	Change in Option 1A differentials relative to: Old	Final Rule	Option 1B
	--------------------------------Dollars Per Hundredweight						----------------------------
Northeast (NYC)							
New England (Boston)	3.24	2.75	2.35	3.25	0.01	0.50	0.90
NY-NJ (New York City)	3.14	2.50	2.10	3.15	0.01	0.65	1.05
Middle Atlantic (Philadelphia)	3.09	2.20	1.80	3.00	-0.09	0.80	1.20
Unregulated NY and New England	2.54	2.05	1.65	2.55	0.01	0.50	0.90
Appalachian (Charlotte)							
Carolina (Charlotte)	3.08	2.55	2.15	3.10	0.02	0.55	0.95
Tennesse Valley (Knoxville)	2.77	2.25	1.85	2.80	0.03	0.55	0.95
Louis-Lex-Evansville (Louisville)	2.11	1.95	1.55	2.20	0.09	0.25	0.65
Southeast (Atlanta)	3.08	2.90	2.50	3.10	0.02	0.20	0.60
Florida (Tampa)							
Upper Florida (Jacksonville)	3.58	3.80	3.40	3.70	0.12	-0.10	0.30
Tampa Bay (Tampa)	3.88	4.20	3.80	4.00	0.12	-0.20	0.20
SE Florida (Miami)	4.18	4.75	4.35	4.30	0.12	-0.45	-0.05
Mideast (Cleveland)							
Michigan Upper Pen (Marquette)	1.35	1.50	1.10	1.80	0.45	0.30	0.70
Southern Michigan (Detroit)	1.85	1.85	1.45	1.80	-0.05	-0.05	0.35
E. Ohio-W. Penn. (Cleveland)	2.00	2.00	1.60	2.00	0.00	0.00	0.40
Ohio Valley (Columbus)	2.04	2.00	1.60	2.00	-0.04	0.00	0.40
Indiana (Indianapolis)	1.90	2.00	1.60	2.00	0.10	0.00	0.40
Upper Midwest (Chicago)							
Chicago Regional (Chicago)	1.40	1.95	1.55	1.80	0.40	-0.15	0.25
Upper Midwest (Minneapolis)	1.20	1.60	1.20	1.70	0.50	0.10	0.50
Central (Kansas City)							
Iowa (Des Moines)	1.55	1.95	1.55	1.80	0.25	-0.15	0.25
Nebraska-W. Iowa (Omaha)	1.75	2.00	1.60	1.85	0.10	-0.15	0.25
Eastern S. Dakota (Sioux Falls)	1.50	1.60	1.20	1.75	0.25	0.15	0.55
Central Illinois (Peoria)	1.61	2.00	1.60	1.80	0.19	-0.20	0.20
S. Illinois-E. Missouri (Alton)	1.92	2.10	1.70	2.00	0.08	-0.10	0.30
South West Plains (Oklahoma City)	2.77	1.95	1.55	2.60	-0.17	0.65	1.05
E. Colorado (Denver)	2.73	1.55	1.15	2.55	-0.18	1.00	1.40
W. Colorado (Grand Junction)	2.00	2.20	1.80	2.00	0.00	-0.20	0.20
Greater Kansas City (Kansas City)	1.92	1.90	1.50	2.00	0.08	0.10	0.50
Southwest (Dallas)							
Texas (Dallas)	3.16	2.10	1.70	3.00	-0.16	0.90	1.30
New Mexico-West Texas (El Paso)	2.35	1.75	1.35	2.25	-0.10	0.50	0.90
Western (Salt Lake City)							
SW Idaho-E. Oregon (Boise)	1.50	1.35	0.95	1.60	0.10	0.25	0.65
Great Basin (Salt Lake City)	1.90	1.50	1.10	1.90	0.00	0.40	0.80
Arizona (Phoenix)	2.52	1.55	1.15	2.35	-0.17	0.80	1.20
Pacific Northwest (Seattle)	1.90	1.45	1.05	1.90	0.00	0.45	0.85
Average of Orders	2.35	2.17	1.77	2.41	0.06	0.24	0.64

Source: USDA, "Federal Milk Marketing Order Reform: Regulatory Impact Analysis." March 1999, Appendix Table 4.

Next, let us discuss the simulation model representing federal order reform. The new formulas for class prices under order reform are defined in Table 1. They are dependent on a NASS survey of dairy commodity prices (block cheese, barrel cheese, nonfat dry milk, and dry whey). USDA began reporting this survey data in October 1998 (USDA, NASS). In order to make a historical comparison between the new and old class prices, NASS survey prices would need to be simulated prior to October 1998 using linkage equations. These equations were estimated using Ordinary Least Squares over the time period October 1998 – March 2000 using monthly data. The NASS survey data was estimated as a function of market cash prices (the Chicago Mercantile Exchange, and Central States average prices). The estimated NASS linkage equations were as follows:

Equation 2: Survey butter prices(t) = -0.11536 + 1.0944*CME Grade AA butter(t)
(-2.0169) (25.52)

Equation 3: Survey cheese(t) = 0.1546 + 0.8749*CME 40-lb. cheese price(t) + 0.2618*Dum1
(1.79) (14.79) (3.65)

Equation 4: Survey NFDM(t) = 0.3212 + 0.6775*NFDM Central States(t)
(6.40) (14.06)

Equation 5: Survey whey(t) = 0.0155 + 0.9278*Central States dry whey(t)
(1.24) (14.59)

where CME = Chicago Mercantile Exchange, NFDM = nonfat dry milk, and t is for month t, and Dum1 = 1 in month January 1999. The parentheses below the coefficients contain t statistics.

The cheese and butter NASS survey equations were estimated as a function of the CME cash prices for 40-pound block cheese and Grade AA butter. The nonfat dry milk and whey NASS survey prices were estimated as a function of the Central States average monthly prices for the same commodities. Eighteen observations were used over the months October 1998 - March 2000.

One would expect the estimated coefficients for the commodity prices to be close to 1.0. That is because the national NASS survey reflects what buyers actually pay for dairy commodities at the wholesale level. Those prices in most cases are directly related to cash market prices; in this case the Chicago Mercantile Exchange. Statistically speaking, it has been observed that weekly NASS survey prices reflect a 2-3 week lag with the cash markets. This may explain why the coefficient on the commodity market prices in a monthly NASS-to-commodity linkage equation may be less than one. It does not account, however, for the nonfat dry milk price linkage equation, which is considerably less than one. This difference suggests some unique characteristics of the sample period.

Monthly NASS survey prices were then simulated over the period January 1996 – September 1998. Actual NASS survey data were used for the period October 1998 – December 2000. Monthly component values were then computed based on the formulas in Table 1. Note that advanced component values used in Class I and II prices were not computed in this study since only monthly commodity data was used. Instead, a one-month lag in commodity prices was used to compute the Class I and II skim milk price and the Class I butterfat price. These results are presented in Appendix Table 1.

The final step was to make historical comparisons between: 1) the simulated values for order reform class prices estimated in this study, 2) order reform class prices estimated by USDA and updated in ***Dairy Market News***, and 3) historical class prices computed under the old system.

The results of this comparison are presented in Figures 1-4 and Appendix Table 2. The results were then averaged over the period January 1996 – December 1999 and are summarized in Table 3.

These results in Table 3 indicate that Class I and II prices, as defined under order reform and using historical commodity prices, would have been $0.39 and $0.30 per cwt, respectively, ***higher*** than under the old definition. Class III and IV prices as defined under the new system, however, would have been $0.20 and $0.05 per cwt ***lower*** than the old definition.

The reason the new Class I mover averaged $0.39 per cwt higher than the old Class I mover (the BFP lagged two months) is because the new formulas use the higher of the advance Class III or Class IV skim milk prices. The simulation model developed to compare historical class prices approximated the advance Class III and IV skim milk prices by using one-month lags for the protein, other solids, and nonfat solids prices. The actual definition uses two-week average prices. This difference was assumed to be small over the 36 months used in this study. The advance skim milk pricing factors developed in this study averaged $8.0358 per pound for Class III and $8.1988 for Class IV over the 36-month period. The base skim milk price used in the Class I mover over this time period averaged $8.8298 per cwt. That is $0.79 per cwt higher than the advance Class III skim milk price and $0.63 per cwt higher than the advance Class IV skim milk price.

The reason for this difference is that the Class I mover uses the higher of the advance Class III or Class IV skim milk price each month. Thus, over time, one would expect the base skim milk price in the Class I mover to be higher than either the Class III or IV advance skim milk prices. In fact, the base skim milk price averaged $0.71 per cwt higher than the average of the advance Class III and IV skim milk prices over the 36-month period. ***Clearly this is the reason why the Class I mover under order reform averaged $0.39 per cwt higher than the old Class I mover (BFP lagged two months).*** This new definition will likely result in an increase in the new Class I mover if one assumes a continuation of volatile cheese prices compared to stable prices for nonfat dry milk. That volatility in cheese prices will result in an effective premium for the Class I mover.

The new definition of the Class II price averaged $0.30 per cwt above the old definition of the Class II price over the study period for one main reason. The new definition of the Class II price uses a $0.70 per cwt Class II differential compared to $0.30 per cwt differential used in the old definition.

Figure 1. Comparison of Old and New Class I Movers

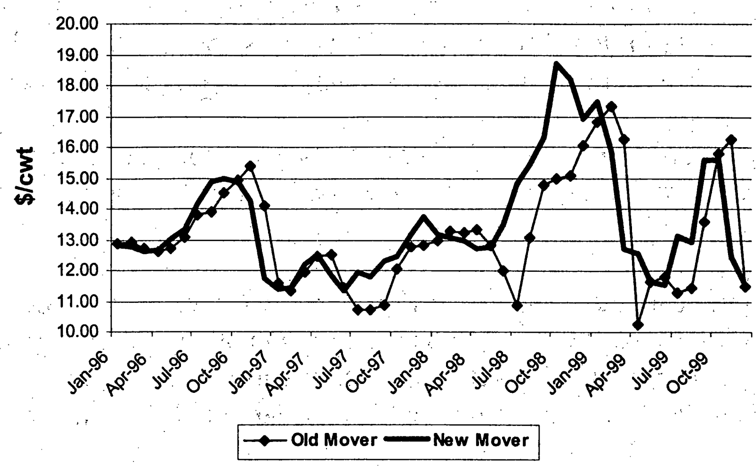


Figure 2. Comparison of Old and New Class II Prices

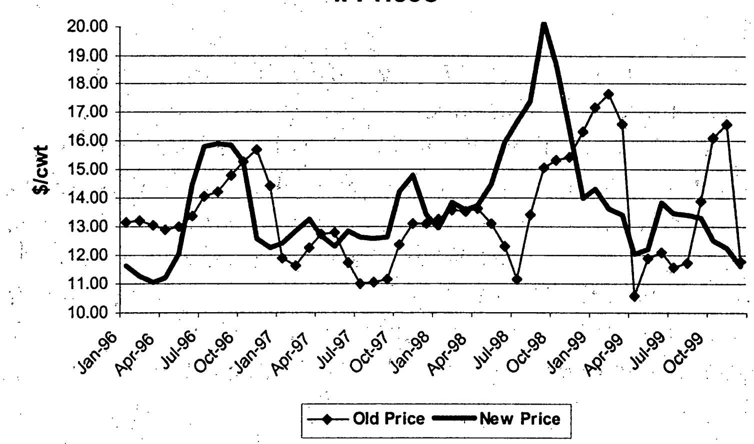


Figure 3. Comparison of the Basic Formula Price and the New Class III Price

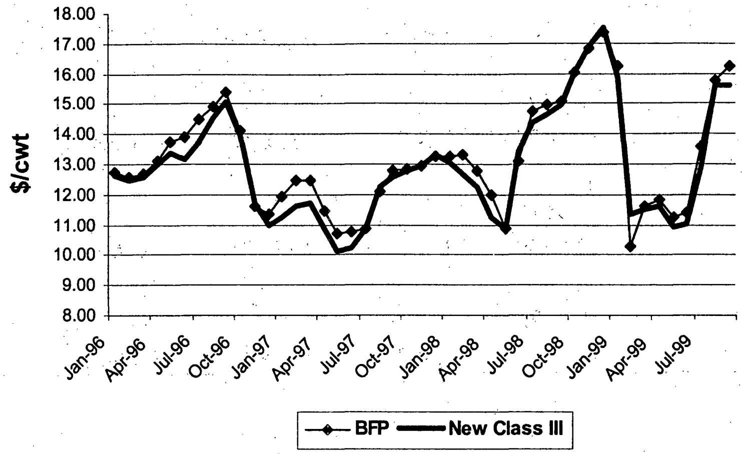


Figure 4. Comparison of the Old Class IIIa and New Class IV Prices

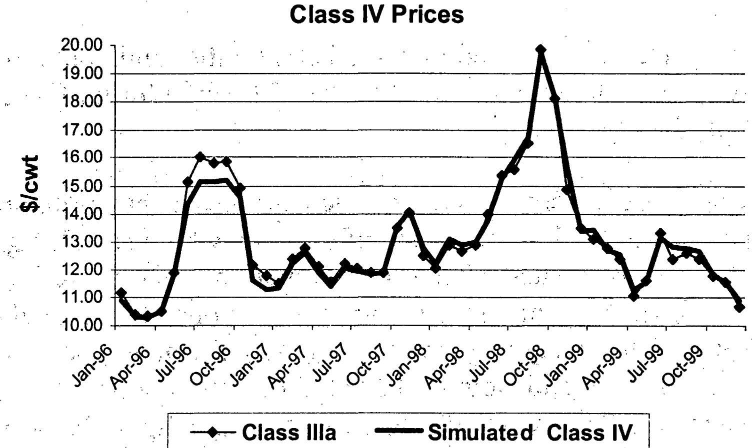


Table 3. Comparison of Pre-reform and Reform Class Prices Using Historical Data and a Simulation Model: Averages Over the Period January 1996-December 1999

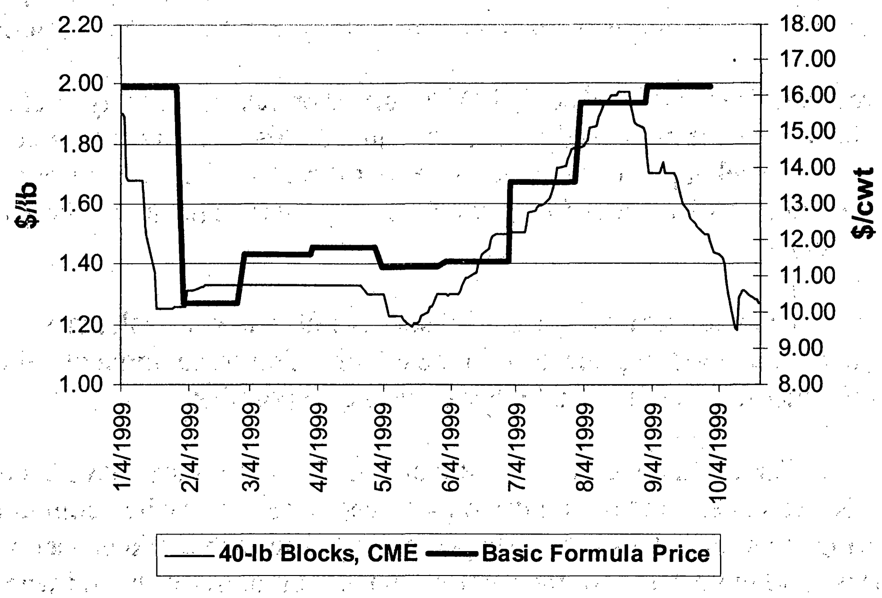
	This Study	USDA Simulation	Pre-reform Class Prices	USDA minus This Study	This Study Minus Pre-reform Class Prices
Class I Prices:					
Base skim milk price ($/cwt)	8.8298				
Advanced butterfat price ($/lb)	1.4336				
Class I cwt mover ($/cwt)	13.5383	13.6373	13.1510	0.0990	0.3873
Class II Prices:					
Skim milk price ($/cwt)	8.8988				
Class II cwt price ($/cwt)	13.7494	13.7437	13.4510	-0.0057	0.2983
Class III Prices:					
Skim milk price ($/cwt)	7.9615				
Class III cwt price ($/cwt)	12.8200	12.6594	13.0185	-0.1606	-0.1985
Class IIIa/IV Prices:					
Skim milk price ($/cwt)	8.1822				
Class IV cwt price ($/cwt)	13.0334	13.0676	13.0856	0.0342	-0.0522

The new Class III price averaged almost $0.20 per cwt below the old BFP. This is because it no longer relies on a survey of unregulated cheese plants in the Upper Midwest. That survey has been replaced by a new pricing formula. That formula employs a protein price that is a function of a "make allowance" and a cheese yield coefficient. The make allowance is supposed to reflect the economic cost of converting milk into cheese. The historical difference between the old and new Class III price can be attributed to this new formula.

Finally, the new Class IV price for milk used to manufacture butter and nonfat dry milk is reasonably close in value to the old definition of the Class IIIa price for milk used to manufacture nonfat dry milk only.

One of the corner stones of order reform was to provide dairy producers more up to date pricing information. Under the old system, there was a significant delay between changes in dairy commodity prices (i.e. cheese prices) and when this information was reflected in farm prices (i.e. the Basic Formula Price). Lagged pricing information was responsible for a delayed farm response in the milk supply. This delay is illustrated in Figure 5 where block cheese prices declined significantly in September and October 1999 but the BFP continued to increase and peaked at $16.26 in September. As a result, due to the two-month lag in the definition of the Class I mover, Class I prices in all federal orders peaked in November 1999. One can argue that this lag in the old pricing structure distorted retail-to-producer price signals and delayed the adjustment in the milk supply. This positive aspect of order reform could easily be overlooked in many economic studies, particularly those involving an annual simulation model such as that used in the next section of this study.

Figure 5. Cheese vs. BFP Prices



Short-run Impact of NASS Survey

The Chicago Mercantile Exchange (CME) represents the cash market where cheese trades daily. Cheese prices from the CME, however, are not used in the formulas for component prices in order reform. Rather, a weekly national survey of commodity prices is conducted by the National Agricultural Statistics Service (NASS). That survey is not audited. In other words, USDA does not follow up their weekly surveys with any periodic audit to determine whether the reported data matches true wholesale prices. The reason for this is the obvious cost of any audit. According to USDA in their report of the Secretary's final decision (USDA, AMS, April 2, 1999),

> At the present time there appears to be no need for the suggested changes to proposed surveys. The scope of the surveys that have been undertaken by NASS, and their geographic representation, appears to be comprehensive. Unless there is some indication that the prices gathered by the survey process are not representative, the very significant increase in regulation required to audit those prices and the steps that would need to be taken to make participation mandatory would be excessive and are not anticipated to be undertaken at this time

The significance of the weekly NASS survey prices is that USDA uses them to compute component values, which are then used to compute class prices. Two-week and one-month average NASS survey prices are computed by weighting weekly prices by volume. It is these summaries that are then used in the formulas for component prices.

The reason for using a national survey rather than a cash market price was that the latter could be subject to market manipulation. Such manipulation could alter the value of class prices. Manipulation would be less likely by using a national survey of wholesale commodity prices.

Analysis of the relationship between weekly NASS survey prices and weekly average cash market prices indicates the former closely tracks the latter. This might be expected. However, there appears to be a 2-week lag between when weekly average cash market prices are announced, and reported NASS values (using week ending data). The lag is likely due to administrative delays.

Another unexpected outcome from using a NASS survey rather than a cash market price is that it could result in a lower commodity price used in the computation of component values. This appears to be so for cheese. Of course, a higher price is also possible.

The data in table 4 indicates that over the period that NASS survey prices have been collected, national average NASS cheese and nonfat dry milk prices were lower when compared to the commodity exchange markets. This is to be expected since the cash markets used in table 4 are for Chicago (cheese and butter) and for the Central States (nonfat dry milk and whey). Cash prices for dairy commodities in the West are usually lower than in the Midwest. Thus use of Western prices in the national NASS survey would result in that price being lower than prices in Chicago. Prices in other regions such as the Northeast could be higher than Midwestern prices.

What is unusual, however, is that over the period October 1998 – March 2000, monthly NASS average survey prices for butter are marginally higher than the Chicago, CME prices for Grade AA butter. One would have expected a slight discount due to lower butter prices in the West. A closer observation of table 5 indicates why NASS cheese prices, for example, are lower than the CME 40-pound block cheese price. For the 5-weeks under consideration, the NASS survey price for 40-pound blocks averaged 5.72 cents per pound higher in the states of Minnesota and Wisconsin than in the "Other States." The category "Other States" largely reflects Western states. ***Thus one can conclude that had USDA used the CME cheese price for Chicago rather than a national NASS survey price, component values and class prices under order reform would have been higher.***

Impact of Changes in Commodity Prices on Class Prices

The new formulas for component values and class prices under order reform are a function of dairy commodity prices. The NASS survey prices for cheese, butter, nonfat dry milk and dry whey clearly drive the formulas for component prices, which in turn affect the value of class prices. The question is, how sensitive are the new formulas for class prices to changes in these commodity prices? In addition, which component values and class prices would change as a result of each change in dairy commodity prices?

To answer this question, the new equations that define component values and class prices were shocked one at a time by changing the level of the commodity prices. This analysis did not

Table 4. Comparison Between Cash and NASS Survey Dairy Commodity Prices: Average Monthly Prices Over the Period October 1998- March 2000

	Cash Market 1/	NASS Survey	Difference
Cheese (40-lb block)	1.4324	1.4223	-0.0101
Butter (Grade AA)	1.2870	1.2930	0.0061
Nonfat Dry Milk	1.0411	1.0266	-0.0145
Dry Whey	0.1944	0.1959	0.0015

1/ Cheese and butter prices are from the Chicago Mercantile Exchange; nonfat dry milk and whey are Central States.

Table 5. NASS Cheddar Cheese Prices by Style and Region

Style and Region	Apr 15, 2000	Apr 8, 2000	Apr 1, 2000	Mar 25, 2000	Mar 18, 2000
			$/lb.		
40 lb. Blocks					
MN/WI	1.1392	1.1463	1.1470	1.1508	1.1457
Other States	1.0862	1.0880	1.0885	1.0926	1.0878
U.S. average	1.0985	1.0986	1.0986	1.1047	1.1012
500 lb. Barrels 1/					
MN/WI	1.0864	1.0935	1.0985	1.0976	1.1039
Other States	1.0596	1.0723	1.0728	1.0734	1.0752
U.S. average	1.0730	1.0817	1.0824	1.0848	1.0891

Source: NASS, USDA, "Dairy Products Prices," Da 2-8 (4-00), April 20, 2000.
1/ Price adjusted to 39 percent moisture.

employ a detailed simulation model that would reflect supply and demand parameters. Instead, it used the formulas from the final rule and held everything else constant. In other words, it reflected a simple shock to the baseline levels of individual dairy commodity prices and its impact on component values and class prices. The results of this simulation are in table 6.

The first simulation increased the CME **butter price** by 10 percent, or 12 cents per pound. Note that this would increase the NASS survey butter price as well. The component value for butterfat rose 11 percent, or 15 cents per pound. On the other hand, the component value for protein fell 8.7 percent, or 19 cents per pound. That occurred because the value of butterfat in cheese is incorporated into the new formula for the component value of protein. The increase in the butterfat value resulted in a 4.3 percent increase in the Class I price, a 4.1 percent increase in the Class II price, and a 4.3 percent increase in the Class IV price. All of the class price formulas multiply the butterfat price times the butterfat level in the milk. The Class III price, however, declined 0.4 percent with respect to an increase in the butterfat component value. That is because the skim price of Class III milk is a function of the protein price, which declined 8.7 percent.

Table 6. Impact of a 10-percent Increase in Dairy Commodity Prices on Component Values and Class Prices Under Federal Order Reform

	Units	Baseline	Butter Prices change	Butter Prices % change	Cheese Prices change	Cheese Prices % change	NFDM Prices change	NFDM Prices % change	Dry Whey Prices change	Dry Whey Prices % change
Commodity Prices:										
Cheese, 40-lb.	$/lb	1.3500	0.00	0.0%	0.14	10.0%	0.00	0.0%	0.00	0.0%
Butter, Grade AA	$/lb	1.2300	0.12	10.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
NFDM, Cen. Sts.	$/lb	1.0150	0.00	0.0%	0.00	0.0%	0.10	10.0%	0.00	0.0%
Dry whey, Cen. Sts.	$/lb	0.1812	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.02	10.0%
Component Values:										
Butterfat	$/lb	1.3684	0.15	11.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
Protein	$/lb	2.2106	-0.19	-8.7%	0.46	20.9%	0.00	0.0%	0.00	0.0%
Other Solids	$/lb	0.0472	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.02	39.7%
Nonfat Solids	$/lb	0.8466	0.00	0.0%	0.00	0.0%	0.10	11.8%	0.00	0.0%
Class Prices:										
Class I:										
Skim milk mover	$/cwt	7.6194	0.00	0.0%	0.95	12.4%	0.90	11.8%	0.00	0.0%
Class I cwt price	$/cwt	12.1421	0.53	4.3%	0.91	7.5%	0.86	7.1%	0.00	0.0%
Class II:										
Skim milk price	$/cwt	8.3194	0.00	0.0%	0.00	0.0%	0.90	10.8%	0.00	0.0%
Class II cwt price	$/cwt	12.8421	0.53	4.1%	0.00	0.0%	0.86	6.7%	0.00	0.0%
Class III:										
Skim milk price	$/cwt	7.1312	-0.60	-8.3%	1.44	20.1%	0.00	0.0%	0.11	1.5%
Class III cwt price	$/cwt	11.6710	-0.05	-0.4%	1.39	11.9%	0.00	0.0%	0.11	0.9%
Class IV										
Skim milk price	$/cwt	7.6194	0.00	0.0%	0.00	0.0%	0.90	11.8%	0.00	0.0%
Class IV cwt price	$/cwt	12.1421	0.53	4.3%	0.00	0.0%	0.86	7.1%	0.00	0.0%

Next, the CME 40-pound block **cheese price** was increased by 10 percent, or 14 cents per pound. That raised the protein price by 20.9 percent, or 46 cents per pound. No other component values were altered. The higher protein price increased the Class III skim milk price by 20.1 percent and the Class I skim milk mover by 12.4 percent. Note that the definition of the Class I skim milk mover is the higher of the advanced Class III or IV skim milk pricing factors. As a result of these changes, the Class III price rose $1.39 per cwt and the Class I mover rose $0.91 per cwt.

The price of **nonfat dry milk** was next increased 10 percent, or 10 cents per pound. That increased the component value of nonfat solids by 11.8 percent, or 10 cents per pound. None of the other component prices changed. The increase in the nonfat solids price then increased the skim milk price in Class I, II, and IV prices by 90 cents per cwt. That raised the cwt prices for these classes by 86 cents. The Class III price did not change.

The reverse case was also analyzed, that is a **10 percent drop** in the price of **nonfat dry milk**, or 10 cents per pound. The reason for this was to simulate what could occur if the support price for nonfat dry milk were lowered or eliminated. A 10-percent drop in the price of nonfat dry milk reduced the price of nonfat solids by 11.8 percent, or 10 cents per pound. That in turn lowered the advanced skim milk price for Class IV milk below that for Class III milk (note the latter is not a function of the price of nonfat dry milk). As a result, the Class I cwt price fell 3.9 percent, or $0.47 per cwt, and the Class II cwt price fell 6.7 percent, or $0.87 per cwt. The Class IV cwt price declined 7.1 percent, or $0.87 per cwt, due to the drop in the price of nonfat solids.

Finally, a 10 percent increase in the price of **dry whey** was simulated. That reflects an increase in whey prices of about two cents per pound. The component value of other solids rose by two cents per pound, or 39.7 percent. The only class prices affected by a change in the value of whey is the Class III price. The Class III skim milk price increased by 11 cents per pound, or by 1.5 percent. Likewise, the Class III cwt price rose by 11 cents per pound, or by 0.9 percent.

This exercise clearly demonstrates that the formulas for the new component and class prices are very sensitive to changes in dairy commodity prices. That's because these formulas were designed to allow for greater price signals from the market to dairy producers.

Data and Methods

Method of Analysis

An alternative method of analyzing the economic impact of federal order reform is to develop an economic simulation model of the U.S. dairy industry and to simulate the impact of federal order reform. The model developed for this study is a static equilibrium model that incorporates intermediate-run elasticities of supply and demand for the U.S. dairy industry as well as details of federal milk marketing orders. The model is not dynamic, which would show equilibrium results for each quarter or year of analysis. Rather, the model is static. It reflects results only after a sufficient period of time is allowed for adjustments in supply and demand. The model is "intermediate" in that it assumes this adjustment period is about 3-5 years.

To analyze the economic impact of order reform, a baseline scenario was first developed to reflect pre-reform market conditions and formulas for class prices. Next, alternative scenarios were developed that reflected changes implemented under order reform such as the new definitions of class prices and changes in Class I differentials. Finally, a comparison of supply, demand and prices is made between the baseline and alternative scenarios. These differences reflect the economic impact of changes due to order reform.

Model Used

The dairy industry model presented in this study is similar in structure to earlier work by Bailey and Gamboa and to the USDA model used to analyze the final rule (USDA, March 1999). Supply and demand equations were specified using a constant elasticity functional form. The model is a static equilibrium model that reflects intermediate-run adjustments in the milk supply. It is multi-regional in that it reflects milk supply, milk allocation and class prices by federal marketing order. The model reflects 13 regions: the 11 federal order regions specified in federal order reform, an unregulated region, and California. The 11 federal orders exactly match the boundaries of the consolidated orders defined in the final rule. Detailed equations describing federal order prices are included in the model. The overall supply and demand for dairy products, however, is modeled at the national level.

One shortcoming of this model is that the baseline already implicitly reflects order consolidation since it uses the proposed 11 federal orders specified in the final rule rather than the 31 orders. The reason for this simplification is that it allows for a direct comparison between the baseline and scenarios reflecting federal order reform. It was assumed that consolidation of federal orders alone would result in very little change in regional milk production.

The dairy industry model is presented in Appendix Table 3. Milk marketings are assumed to be identical to milk production and are specified by federal order *i* as a function of the farm price of milk. The latter is equal to the federal order blend price plus any market over-order premiums for fluid milk. Regional milk marketings vary with changes in regional farm prices and supply elasticities. The model then allocates milk marketings to alternative class uses according to relative class prices and returns to processing. There are four classes of milk use in the model.

The dairy industry model in this study reflects the details of federal order pricing and uses a conventional exogenous fluid differential model. Class prices are determined simultaneously in the model by solving first for commodity prices for cheese, butter, nonfat dry milk and whey, and using fixed location-specific fluid differentials and other parameters of federal orders.

Supply and demand for dairy commodities and market-clearing conditions are determined at the national level. The supply of dairy commodities in the model is determined by the amount of milk in Class III and IV in all federal orders, multiplied by the appropriate commodity conversion factors. Demand for these dairy commodities is then specified as a function of wholesale dairy commodity prices. All other variables that affect demand (i.e. competing prices, income, tastes and preferences) are implicitly reflected in the intercept terms and do not vary under model simulation. Stocks of dairy commodities are modeled as a function of wholesale commodity prices (negative elasticity) and production of the commodity (positive elasticity). Imports and exports of dairy commodities are assumed to be exogenous in this study.

The dairy industry model solves simultaneously for four wholesale prices: butter, nonfat dry milk, dry whey and cheese. The model solves for a price that will set supply equal to demand for each of these dairy commodities. Any changes in these prices will affect class prices, which in turn will affect milk marketings and milk allocation. Changes in both class prices and milk allocation will also change the blend price at the farm level. That in turn will affect the level of milk marketings. Marketings and milk allocation are in fact simultaneously determined since milk allocation alters the blend price.

The dairy industry model uses the old definitions of class prices that existed prior to federal order reform in the baseline. Equation 1 above defined the Class IIIa price. The rest of the federal order class prices that existed prior to order reform are defined below based on the BFP and the butterfat differential. These equations were estimated in this study using Ordinary Least Squares as follows:

Equation 6: BFP(t) = 0.1696 + 8.9432*CME 40-lb. block cheese price(t)
(0.2265) (17.3141)

Equation 7: Butterfat Differential = -0.0388 + 0.1302*CME Grade AA butter(t)
(-13.3652) (61.5946)

where t is for month t and the figures in parentheses below the estimated coefficients are t statistics. The BFP in month t is defined as the base month price in t-1, plus an adjustment formula that updates changes in dairy commodity prices between t and t-1. The price of cheese is hypothesized to be the dominant factor that determines both the base month price and the adjustment formula. Therefore the cheese price in period t was used in the model and was found to be statistically significant.

The next step was to take these monthly models and use them in the annual dairy simulation model. This was done by using the estimated parameters from the monthly model and replacing months with years in the model specification. It was hypothesized that use of a monthly model to estimate the relevant parameters in the specification would be more up to date than using annual data.

And finally, a Pennsylvania sub-model was developed for this analysis. The model uses prices determined at the national and regional level in determining Pennsylvania milk production and marketings, and farm milk prices and sales. The model estimates Pennsylvania milk marketings as a function of state farm milk prices. The federal order prices and percent milk use for Class I, II, III and IV purposes were determined for Pennsylvania by a weighting of four federal orders. In other words, the Class I price used in the Pennsylvania model is a weighted average of the following new federal orders: Northeast (55 percent), Mideast (30 percent), Appalachian (5 percent), and Southeast (5 percent). These percentage weightings were approximated based on historical sales from Pennsylvania; actual data will not be available for another year.

Thus the Pennsylvania sub-model is a function of regional federal order data. Any changes in milk marketings, class use and prices in these regional orders due to changes in federal order data is thus fed back to Pennsylvania via this model.

Sources of Data and the Model Baseline

The objective for the baseline in this study is to develop a projection of milk marketing conditions for a "typical" year in which federal order reform is to be implemented. Normally one uses historical data from a representative year to develop a baseline. That was not possible in this study since data for the consolidated orders was not yet available at the time of this study. Thus a representative baseline ***was created*** from historical data and projections into the future.

The baseline should reflect historical relationships between prices for butter, cheese, nonfat dry milk, and dry whey. This is particularly important for this study since a comparison is made between pre-reform class prices--which are determined principally by cheese prices--to new formulas that are a function of butter, nonfat dry milk, cheese and whey. The choice of commodity prices in the baseline can easily skew any comparison to alternative scenarios under order reform.

Once the baseline data was assembled, the model--which includes price identities for pre-reform federal order prices and supply and demand parameters--must be "calibrated" to this baseline via adjustments in equation intercepts.

Detailed data on federal milk marketing orders for 1997 was used to construct the baseline. Annual data was collected for milk marketings, class use and class prices for 31 federal orders, California, and the residual unregulated states and regions. The major source of data was the Agricultural Marketing Service of USDA (April 1998, June 1998). Additional sources were annual summaries and reports provided by individual federal market administrators. Data for California was provided by the California Department of Food and Agriculture.

Once the details of federal order data for 1997 was amassed, a forecast of milk marketings and class use for each of the 31 federal orders and California, and dairy commodity supply, use and prices was created for the year 2000. This forecast used actual data from 1997 and forecasts provided by the Food and Agricultural Policy Research Institute. The original 31 federal orders in the 1997 baseline were aggregated into the 11 orders as defined in the final rule. This was done in order to allow for a direct comparison between the baseline and any alternative scenarios that would reflect federal order reform.

Model Scenarios

After the model was calibrated to the baseline, alternative scenarios were developed to isolate the economic impact of federal order reform. It is important to recognize that the final order reform adopted by the Congress reflects a number of changes that potentially have a unique impact on dairy farm income. These changes include:

1. Consolidation from 31 to 11 federal orders,
2. Replacing current definitions of class prices with new class formulas under the final rule,
3. Replacing current Class I differentials,
4. Possible elimination of the dairy price support program, and
5. Potential changes to existing over-order premiums.

As stated earlier, the baseline already reflects a consolidation of federal orders. In that way one can compare any changes in supply, demand and prices under the baseline relative to federal order changes. It was assumed that the consolidation of federal milk marketing orders would not result in any significant changes in supply, demand and prices for milk and dairy products.

The old formulas for federal order class prices were estimated as a function of dairy commodity prices. The BFP, for example, was estimated in equation 6 as a function of the 40-pound block cheese price. The Class I and II prices are directly a function of the BFP. And the Class IIIa price is a function of Central States nonfat dry milk prices and the butterfat differential (see equation 1).

These old formulas for class prices were replaced in the alternative scenarios with new formulas and Class I differentials specified under order reform. These equations are a function of the NASS survey prices, which in turn are a function of the CME and Central States prices. Thus, like the baseline, class prices under the alternative scenarios are a function of commodity prices.

The dairy price support program was scheduled to be terminated on January 1, 2000 as part of the FAIR Act of 1996. It was extended for one year under the FY2000 Agricultural Appropriations Bill. While its elimination was not a result of federal order reform, it does have significant impacts on any consideration of federal order reform. That is because the new formulas for class prices under order reform are now directly a function of dairy commodity prices. Nonfat dry milk prices, in particular, are likely to decline when the dairy price support program is eliminated. Thus there is an indirect link between the dairy price support program and federal order reform.

Another factor to consider is how existing over-order premiums will change under federal order reform. Earlier studies assumed that some of the declines in class prices under order reform would be offset with increases in over-order premiums. It was assumed in this study, however, that over-order premiums would remain unchanged in any of the alternative scenarios considered. Observation of over-order premiums in the fourth quarter of 1999 and the first quarter of 2000--when the Class III price reached a 20-year low--suggests that over-order premiums do not necessarily increase in the face of declining market prices.

Another very important factor to consider is how to reflect the new definition of the Class I mover in an annual simulation model. Recall that the earlier comparison of class prices over the period January 1996 - December 1999 in this study indicated that the new definition of the Class I mover was $0.39 per cwt higher than the old Class I mover. The reason was that the new Class I mover used the higher of the advance Class III and IV skim milk prices. Due to weekly volatility in cheese prices and relatively stable prices for nonfat dry milk, the skim milk price used in the Class I mover averaged $0.71 per cwt higher than the average of the Class III and IV advance skim milk prices over the historical time period. Every time the NASS survey cheese price rose above $1.35 per pound, the Class III skim milk price was greater than the Class IV skim milk price, and vice versa. But how does one reflect this economic reality in an annual simulation model that employs the higher of the 12-month average Class III and Class IV skim milk prices in the definition of the Class I mover?

The answer to this question is that the annual simulation model had to be slightly modified under simulations that reflected federal order reform in order to prevent any bias in the model results. This was done by changing the definition of the Class I skim milk price as follows:

Equation 8: Class I Skim Milk Price = $0.71 + AVERAGE(Class III & IV Skim Milk Prices)

This slight modification reflected the reality that under a continuation of volatile cheese prices, the Class I skim milk price will average more than either the Class III or Class IV advance skim milk prices. The $0.71 employed in equation 8 above was computed from the historical difference in prices over the period January 1996 – December 1999.

A final consideration in developing model scenarios for this study is that the Secretary's plan for using Option 1B Class I differentials would result in a significant change in minimum Class I prices in many federal orders. Likewise, the ultimate adoption of the modified Option 1A plan by the Congress under the Consolidated Appropriations Act resulted in much less change in some federal orders. Both scenarios were retained for study in this analysis since both were considered for ultimate adoption in the order reform process.

Thus the following 4 scenarios were developed to isolate and analyze the impact of federal order reform and elimination of the dairy price support program on regional milk prices and sales:

Scenario No. 1: Final Rule equations, Option 1B, maintain DPSP. The Secretary's new class price formulas contained in the final rule are implemented, along with Option 1B Class I differentials. In addition, the dairy price support program (DPSP) is maintained.

Scenario No. 2: Final Rule equations, old Class I differentials, and maintenance of the DPSP. This scenario is the same as no. 1 above except the old Class I differentials are maintained.

Scenario No. 3: Maintain old Class I Differentials and formulas, and eliminate the DPSP. The only difference between this scenario and the baseline is that the dairy price support program is eliminated. This would result in a reduction of government removals of nonfat dry milk from 207 million pounds to 100 million pounds. It was assumed that some minimum level of nonfat dry milk would be purchased from the market for domestic and/or export purposes.

Scenario No. 4: Final Rule equations, Modified Option 1A differentials, and maintenance of the DPSP. This scenario specifically reflects the intent of Congress in the Consolidated Appropriations Act of 1999. It reflects the new class price formulas in the final rule and modified Option 1A Class I differentials. A continuation of the dairy price support program was also assumed.

The above four scenarios were run individually and compared to the baseline. The model was modified to reflect these changes and was then simulated to generate new prices for butter, cheese, nonfat dry milk, and dry whey. The changes relative to the baseline reflect the impact of each of the scenarios.

The above 4 scenarios and the baseline form the basis for the analysis of federal order reform. The difference between scenario 2 and the baseline isolates the impact of the new pricing formulas in the Secretary's final rule. Scenario 1 minus scenario 2 isolates the impact of the Secretary's Option 1B Class I differentials. Scenario 4 minus scenario 2 isolates the impact of the modified Option 1A Class I differentials. The difference between scenario 3 and the baseline isolates the impact of the elimination of the dairy price support program. The difference between scenario 1 and the baseline shows the impact of the Secretary's final rule. And finally, the difference between scenario 4 and the baseline shows the impact of the Consolidated Appropriations Act. This type of comparison is possible since a log-linear model was used.

Results

The model results from the four scenarios are in tables 7-10. The results are reported as changes relative to the baseline.

Scenario No. 1—Secretary's Final Rule

This scenario was designed to analyze Secretary Glickman's plan to implement the final rule. The new class price equations were used as well as Option 1B Class I differentials. The dairy price support program was maintained.

One would expect two things to happen under this scenario. First, with all other things the same, the levels of the class prices would be altered by the new definitions of class prices. An earlier comparison of class prices suggests that order reform would result in increases in Class I and II prices, and reductions in the Class III price. Second, major regional changes in Class I differentials may alter the level of Class I prices. That is because the new definitions of Class I differentials under Option 1B would result in some areas of the country receiving a higher price and some receiving a lower price. Thus, one would expect federal orders in the Northeast and Southwest would experience reductions in pool values due to reduced Class I differentials. Florida would face an increase in pool values due to an increase in the Class I differential. In the Upper Midwest, increases in the Class I price would be offset by reductions in the Class III price.

The model results indicate that the NASS survey prices and hence component values changed very little under this scenario when compared to the baseline (see table 7). Major changes did take place, however, in the levels of class prices. Table 8 shows the Class I mover increased $0.41 per cwt and the Class II price rose $0.34 per cwt relative to the baseline. The Class III price fell $0.48 per cwt relative to the baseline. Finally, the Class IV price rose $0.27 per cwt relative to the baseline. All of these changes were anticipated due to the new definitions of class price formulas and are similar to the historical comparison made earlier in this study.

The regional impacts of this scenario may be found in table 9. This scenario resulted in a $0.16 per cwt decline in the farm price of milk in the Northeast relative to the baseline. The drop was due to two factors: a decline of $0.25 per cwt in the average Class I price in the Northeast, and a drop of $0.48 per cwt in the Class III price, both relative to the baseline. The Class I price fell largely due to a $0.67 per cwt reduction in the Class I differential as a result of the Option 1B pricing plan. This was partially offset by a $0.41 per cwt rise in the Class I mover relative to the baseline. The baseline assumed that about 43 percent of milk in the Northeast order was used for Class I purposes, and about 30 percent was used for Class III purposes. The fall in the Class I and III prices in the Northeast were partially offset by gains in the Class II and IV prices.

Milk marketings fell 79 million pounds, or 0.3 percent, in the Northeast due to the lower farm milk price. Lower marketings and a lower farm price resulted in a decline of $50 million, or 1.4 percent, in farm milk sales in the Northeast relative to the baseline.

Table 7. Commodity Supply and Demand Under Alternative Scenarios

		Scenario #1 Final Rule, 1B Keep DPSP		Scenario #2 FR, Old Diffs Keep DPSP		Scenario #3 Old Diffs & Frmls Elim DPSP		Scenario #4 Con Apps Act Keep DPSP	
	Baseline	Change	% Chng	Change	% Chng	Change	% Chng	Change	% Chng
Cheese:									
Production (mil. lbs.)	7,710	-17	-0.2%	-1	0.0%	12	0.2%	1	0.0%
Domestic use (mil lbs.)	7,919	-15	-0.2%	-1	0.0%	11	0.1%	1	0.0%
Wholesale price ($/lb.)	1.350	0.0075	0.6%	0.0005	0.0%	-0.0054	-0.4%	-0.0005	0.0%
Butter:									
Production (mil. lbs.)	1,174	-2	-0.2%	1	0.1%	-45	-3.9%	1	0.1%
Domestic use (mil lbs.)	1,129	-2	-0.2%	1	0.1%	-44	-3.9%	1	0.1%
Wholesale price ($/lb.)	1.2300	0.0039	0.3%	-0.0030	-0.2%	0.1030	8.4%	-0.0029	-0.2%
Nonfat dry milk:									
Production (mil. lbs.)	1,075	-2	-0.2%	1	0.1%	-42	-3.9%	1	0.1%
Domestic use (mil lbs.)	882	-1	-0.2%	1	0.1%	61	6.9%	1	0.1%
Wholesale price ($/lb.)	1.015	0.0031	0.3%	-0.0024	-0.2%	-0.1267	-12.5%	-0.0023	-0.2%
Dry Whey									
Production (mil. lbs.)	1,137	-2	-0.2%	0	0.0%	2	0.1%	0	0.0%
Domestic use (mil lbs.)	963	-2	-0.2%	0	0.0%	2	0.2%	0	0.0%
Wholesale price ($/lb.)	0.181	0.0022	1.2%	0.0002	0.1%	-0.0015	-0.8%	-0.0001	-0.1%

The Florida order received a $0.32 per cwt increase in the Class I differential and a $0.41 per cwt increase in the Class I mover under this scenario. Florida has very little non-fluid milk sales. As a result, their farm milk price rose $0.54 per cwt. Milk marketings in the Florida order increased 14.8 million pounds, or 0.5 percent, and farm milk sales increased $18.6 million, or 3.5 percent, both relative to the baseline.

The Upper Midwest order had a very different result in this scenario from either the Northeast or Florida due to a greater reliance on Class III sales. The new Upper Midwest order encompasses parts of Illinois, Iowa, Michigan, Minnesota, North Dakota, South Dakota, and Wisconsin. Their Class I differential was estimated to increase $0.49 per cwt in this scenario relative to the baseline. However, it was estimated in the baseline that only 20 percent of all sales in this order were for fluid purposes. Approximately 73 percent were used for Class III purposes. The Class III price declined $0.48 per cwt relative to the baseline in this scenario. As a result, the farm price of milk in the Upper Midwest order declined $0.15 per cwt, milk marketings fell 62 million pounds, or 0.3 percent, and farm milk sales fell $41 million, or 1.5 percent, all relative to the baseline.

For the United States as a whole, the average farm price fell $0.07 per cwt under this scenario. Milk marketings fell 0.2 percent, and farm milk sales fell $150 million, or 0.7 percent.

Table 8. Impact of Alternative Scenarios on Component Values and Class Prices

		Scenario #1 Final Rule, 1B Keep DPSP		Scenario #2 FR, Old Diffs Keep DPSP		Scenario #3 Old Diffs & Frmls Elim DPSP		Scenario #4 Con Apps Act Keep DPSP	
	Baseline	Change	% Chng	Change	% Chng	Change	% Chng	Change	% Chng
NASS Survey Prices ($/lb):									
Butter	1.2361	0.004	0.3%	-0.003	-0.2%	0.103	8.3%	-0.003	-0.2%
Cheese	1.3253	0.008	0.6%	0.001	0.0%	-0.005	-0.4%	0.000	0.0%
Dry Whey	0.1827	0.002	1.2%	0.000	0.1%	-0.002	-0.8%	0.000	-0.1%
Nonfat Dry Milk	1.0005	0.003	0.3%	-0.002	-0.2%	-0.127	-12.7%	-0.002	-0.2%
Dry Buttermilk	0.7150	0.006	0.9%	-0.005	-0.7%	-0.239	-33.4%	-0.005	-0.7%
Component Prices ($/lb)									
Butterfat	1.3684	0.005	0.3%	-0.004	-0.3%	NA	NA	-0.003	-0.3%
Protein	2.2106	0.020	0.9%	0.007	0.3%	NA	NA	0.003	0.1%
Other Solids	0.0472	0.002	4.8%	0.000	0.3%	NA	NA	0.000	-0.3%
Nonfat Solids	0.8466	0.003	0.4%	-0.002	-0.3%	NA	NA	-0.002	-0.3%
Class I Prices ($/cwt):									
Skim Milk Price Mover	7.62	0.52	6.8%	0.47	6.1%	NA	NA	0.46	6.0%
Butterfat Price Mover	1.37	0.00	0.3%	0.00	-0.3%	NA	NA	0.00	-0.3%
Class I Price Mover	12.24	0.41	3.4%	0.34	2.7%	-0.05	-0.4%	0.33	2.7%
Class II Prices ($/cwt):									
Skim Milk Price	8.32	0.03	0.3%	-0.02	-0.3%	NA	NA	-0.02	-0.2%
Class II Price	12.54	0.34	2.7%	0.27	2.1%	-0.05	-0.4%	0.27	2.1%
Class III Prices ($/cwt):									
Skim Milk Price	7.13	0.07	1.0%	0.02	0.3%	NA	NA	0.01	0.1%
Class III Price	12.24	-0.48	-3.9%	-0.56	-4.6%	-0.05	-0.4%	-0.58	-4.7%
Class IV Prices ($/cwt):									
Skim Milk Price	7.62	0.03	0.4%	-0.02	-0.3%	NA	NA	-0.02	-0.3%
Class IV Price	11.91	0.27	2.3%	0.20	1.7%	-0.67	-5.6%	0.20	1.7%

In Pennsylvania, the farm milk price fell $0.03 cents per cwt under this scenario (see table 10). The Class I price in Pennsylvania rose by a penny per cwt. That is because the Class I mover increased $0.41 per cwt and was offset by a decline in the Class I differential by $0.40 per cwt. The drop in the Class I differential for Pennsylvania was approximated from the change in differentials recommended under Secretary Glickman's Option 1B plan. That new plan would lower Class I differentials $0.25 per cwt in Western Pennsylvania and up to $0.98 per cwt in Southeastern Pennsylvania (i.e. Lancaster County). The model computed an average change of $0.40 per cwt based on an approximation of the percent of Pennsylvania milk sold in four major federal orders (Northeast, Mideast, Appalachian, and Southeast).

The decline in the Class I differential was almost exactly offset by an increase in the Class I mover. That is because the new definition of the Class I mover is the higher of the Class III or IV skim milk price. Thus Pennsylvania Class I milk prices were relatively unaffected by this scenario. The Class I market is important to Pennsylvania since over 47 percent of all milk produced in the state is marketed for Class I purposes. Pennsylvania uses a significant amount of

Table 9. Impact of Alternative Scenarios on Regional Farm Milk Sales

		Scenario #1 Final Rule, 1B Keep DPSP		Scenario #2 FR, Old Diffs Keep DPSP		Scenario #3 Old Diffs & Formu. Elim DPSP		Scenario #4 Con Apps Act Keep DPSP	
	Baseline	Change	% Chng	Change	% Chng	Change	% Chng	Change	% Chng
Northeast									
Marketings (mil. lbs.)	24,867.5	-79.0	-0.3%	16.0	0.1%	-51.5	-0.2%	10.1	0.0%
Farm Price ($/cwt)	13.899	-0.157	-1.1%	0.032	0.2%	-0.103	-0.7%	0.020	0.1%
Farm milk sales (mil $)	3,456.3	-49.9	-1.4%	10.2	0.3%	-32.6	-0.9%	6.4	0.2%
Appalachian									
Marketings (mil. lbs.)	4,997.9	-0.7	0.0%	21.8	0.4%	-4.1	-0.1%	23.9	0.5%
Farm Price ($/cwt)	15.220	-0.008	-0.1%	0.239	1.6%	-0.044	-0.3%	0.261	1.7%
Farm milk sales (mil $)	760.7	-0.5	-0.1%	15.3	2.0%	-2.8	-0.4%	16.8	2.2%
Southeast									
Marketings (mil. lbs.)	7,556.2	0.7	0.0%	12.0	0.2%	-3.8	-0.1%	10.3	0.1%
Farm Price ($/cwt)	15.249	0.008	0.1%	0.143	0.9%	-0.045	-0.3%	0.123	0.8%
Farm milk sales (mil $)	1,152.3	0.7	0.1%	12.7	1.1%	-4.0	-0.3%	10.8	0.9%
Florida									
Marketings (mil. lbs.)	2,967.1	14.8	0.5%	6.5	0.2%	-1.2	0.0%	8.8	0.3%
Farm Price ($/cwt)	17.973	0.536	3.0%	0.232	1.3%	-0.043	-0.2%	0.315	1.8%
Farm milk sales (mil $)	533.3	18.6	3.5%	8.1	1.5%	-1.5	-0.3%	11.0	2.1%
Mideast									
Marketings (mil. lbs.)	13,062.8	27.3	0.2%	14.3	0.1%	-11.3	-0.1%	12.7	0.1%
Farm Price ($/cwt)	13.933	0.163	1.2%	0.085	0.6%	-0.067	-0.5%	0.076	0.5%
Farm milk sales (mil $)	1,820.0	25.1	1.4%	13.1	0.7%	-10.3	-0.6%	11.6	0.6%
Upper Midwest									
Marketings (mil. lbs.)	21,841.6	-61.7	-0.3%	-132.1	-0.6%	-18.2	-0.1%	-101.5	-0.5%
Farm Price ($/cwt)	12.909	-0.151	-1.2%	-0.322	-2.5%	-0.045	-0.3%	-0.248	-1.9%
Farm milk sales (mil $)	2,819.5	-40.9	-1.5%	-87.0	-3.1%	-12.1	-0.4%	-67.0	-2.4%
Central									
Marketings (mil. lbs.)	9,745.6	-2.0	0.0%	-5.1	-0.1%	-8.3	-0.1%	-2.7	0.0%
Farm Price ($/cwt)	13.707	-0.016	-0.1%	-0.040	-0.3%	-0.065	-0.5%	-0.021	-0.2%
Farm milk sales (mil $)	1,335.8	-1.8	-0.1%	-4.6	-0.3%	-7.5	-0.6%	-2.4	-0.2%
Southwest									
Marketings (mil. lbs.)	8,407.7	-83.6	-1.0%	9.9	0.1%	-24.4	-0.3%	-8.8	-0.1%
Farm Price ($/cwt)	13.905	-0.293	-2.1%	0.035	0.3%	-0.086	-0.6%	-0.031	-0.2%
Farm milk sales (mil $)	1,169.1	-36.0	-3.1%	4.3	0.4%	-10.6	-0.9%	-3.8	-0.3%
Western									
Marketings (mil. lbs.)	4,878.2	-50.2	-1.0%	-53.5	-1.1%	-8.5	-0.2%	-53.3	-1.1%
Farm Price ($/cwt)	12.679	-0.276	-2.2%	-0.294	-2.3%	-0.047	-0.4%	-0.293	-2.3%
Farm milk sales (mil $)	618.5	-19.7	-3.2%	-21.0	-3.4%	-3.4	-0.5%	-20.9	-3.4%
Arizona-Las Vegas									
Marketings (mil. lbs.)	2,947.8	-46.4	-1.6%	-20.1	-0.7%	-4.9	-0.2%	-26.9	-0.9%
Farm Price ($/cwt)	13.148	-0.436	-3.3%	-0.190	-1.4%	-0.046	-0.4%	-0.254	-1.9%
Farm milk sales (mil $)	387.6	-18.8	-4.8%	-8.2	-2.1%	-2.0	-0.5%	-11.0	-2.8%
Pacific Northwest									
Marketings (mil. lbs.)	6,546.1	10.3	0.2%	22.0	0.3%	-54.1	-0.8%	21.5	0.3%
Farm Price ($/cwt)	12.870	0.058	0.5%	0.124	1.0%	-0.301	-2.3%	0.121	0.9%
Farm milk sales (mil $)	842.5	5.1	0.6%	11.0	1.3%	-26.5	-3.1%	10.7	1.3%

Continued--

Table 9--continued

	Baseline	Scenario #1 Final Rule, 1B Keep DPSP Change	% Chng	Scenario #2 FR, Old Diffs Keep DPSP Change	% Chng	Scenario #3 Old Diffs & Formu. Elim DPSP Change	% Chng	Scenario #4 Con Apps Act Keep DPSP Change	% Chng
Other Unregulated Regions									
Marketings (mil. lbs.)	21,912.6	-97.2	-0.4%	-108.1	-0.5%	-22.8	-0.1%	-104.1	-0.5%
Farm Price ($/cwt)	13.252	-0.197	-1.5%	-0.219	-1.7%	-0.047	-0.4%	-0.211	-1.6%
Farm milk sales (mil $)	2,903.9	-55.9	-1.9%	-62.1	-2.1%	-13.2	-0.5%	-59.9	-2.1%
State of California									
Marketings (mil. lbs.)	29,699.8	50.4	0.2%	-8.4	0.0%	-229.8	-0.8%	-12.8	0.0%
Farm Price ($/cwt)	12.491	0.061	0.5%	-0.010	-0.1%	-0.274	-2.2%	-0.015	-0.1%
Farm milk sales (mil $)	3,709.8	24.4	0.7%	-4.0	-0.1%	-109.5	-3.0%	-6.2	-0.2%
United States Totals									
Marketings (mil. lbs.)	159,431	-317.1	-0.2%	-224.6	-0.1%	-443.0	-0.3%	-222.8	-0.1%
Farm price ($/cwt)	13.491	-0.067	-0.5%	-0.051	-0.4%	-0.111	-0.8%	-0.046	-0.3%
Farm milk sales (mil $)	21,509	-149.5	-0.7%	-112.3	-0.5%	-236.1	-1.1%	-103.8	-0.5%

Table 10. Impact of Alternative Scenarios on Pennsylvania

	Baseline	Scenario #1 Final Rule, 1B Keep DPSP Change	% Chng	Scenario #2 FR, Old Diffs Keep DPSP Change	% Chng	Scenario #3 Old Diffs & Formu. Elim DPSP Change	% Chng	Scenario #4 Con Apps Act Keep DPSP Change	% Chng
Milk Marketings (mil. lbs.)	11,119	-6.05	-0.1%	16.08	0.1%	-25.66	-0.2%	13.92	0.1%
Class I Differential ($/cwt)	2.60	-0.40	-15.5%	0.00	0.0%	0.00	0.0%	-0.01	-0.4%
Class I Price ($/cwt)	14.85	0.01	0.1%	0.34	2.3%	-0.05	-0.3%	0.32	2.2%
FO Blend Price ($/cwt)	13.47	-0.03	-0.2%	0.07	0.6%	-0.12	-0.9%	0.06	0.5%
Market Over Order Premium ($/cwt)	1.00	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
Effective Farm Price ($/cwt)	13.94	-0.03	-0.2%	0.07	0.5%	-0.12	-0.8%	0.06	0.4%
PA Population (1000)	12,068	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
Per Capita Fluid Consumption (lbs.)	205.0	-0.04	0.0%	-1.37	-0.7%	0.20	0.1%	-1.30	-0.6%
Total Fluid Consumption (mil.gal)	287.0	-0.06	0.0%	-1.92	-0.7%	0.28	0.1%	-1.83	-0.6%
Class I Price ($/gal.)	1.366	0.00	0.1%	0.03	2.1%	0.00	-0.3%	0.03	2.0%
Dollar Markup ($/gal.)	1.133	0.00	0.1%	0.02	2.1%	0.00	-0.3%	0.02	2.0%
Retail Fluid Milk Price ($/gal.)	2.499	0.00	0.1%	0.05	2.1%	-0.01	-0.3%	0.05	2.0%
Percent Markup (%)	82.9%	0.00	0.0%	0.00	0.0%	0.00	0.0%	0.00	0.0%
Retail Fluid Milk Expenditures (mil.$)	717.2	0.32	0.0%	10.30	1.4%	-1.48	-0.2%	9.79	1.4%
Farm Milk Sales (mil. $)	1,549.8	-3.85	-0.2%	10.27	0.7%	-16.28	-1.1%	8.89	0.6%

milk for Class II purposes, almost 17 percent, in the baseline. Pennsylvania used 25 percent of its milk for Class III purposes in the baseline and the balance, 11 percent, was used for Class IV purposes. The Class II price of milk increased $0.34 per cwt in this scenario relative to the baseline. Thus, despite a drop of $0.48 per cwt in the Class III price, the farm price of milk in Pennsylvania fell just $0.03 per cwt due to offsetting increases in the Class I, II, and IV prices. Milk marketings declined $6 million, or 0.1 percent, and farm milk sales declined $4 million, or 0.2 percent.

Scenario No. 2—New Class Price Formulas, Old Class I Differentials, and Maintenance of the Dairy Price Support Program

This scenario is virtually the same as scenario 1 with the exception that the baseline Class I differentials were used. Thus one would expect higher Class I differentials in the Northeast and West, and lower Class I differentials in the Upper Midwest and Southeast in this scenario when compared to scenario 1.

Scenario 2 was designed to compute the impact of the new class pricing formulas contained in the Secretary's final rule and adopted in the Consolidated Appropriations Act. Since this scenario uses the same Class I differentials as in the baseline, the difference between this scenario and the baseline effectively isolates the economic impact of the new class price formulas.

As in scenario 1, the results for scenario 2 showed very little change in dairy commodity prices and component values when compared to the baseline. The major changes that occurred were the result of the new class price formulas. Under scenario 2, the new Class I mover increased $0.34 per cwt, the Class II price increased $0.27 per cwt, and the new Class IV price rose $0.20 per cwt. The Class III price, however, fell $0.56 per cwt under this scenario relative to the baseline. The Class III price fell more in scenario 2 than under scenario 1 due to a slightly lower butterfat price. The price of Grade AA butter fell in scenario 2 relative to the baseline as more milk was pulled into Class IV uses due to declines in Class III prices. Under scenario 1, butter prices actually rose slightly relative to the baseline due to a greater decline in U.S. milk production.

The farm milk price for the Northeast increased $0.03 per cwt in scenario 2 relative to the baseline due to an increase in Class I, II and IV prices. The minimum Class I price for the Northeast increased $0.34 per cwt relative to the baseline due to the $0.34 per cwt increase in the Class I mover; the Class I differential remained unchanged relative to the baseline. Milk marketings in the Northeast rose slightly, about 0.1 percent. Farm milk sales increased by $10 million, or 0.3 percent.

The impact of scenario 2 was slightly more pronounced in Pennsylvania when compared to the Northeast. The farm price of milk in Pennsylvania rose $0.07 per cwt compared to the baseline. Again, that rise was due in part to an increase of $0.34 per cwt in the Class I price of milk due to the new Class I mover. About 47 percent of all milk sales from Pennsylvania are for fluid purposes. The higher Class I price was partially offset by a lower Class III price. Milk marketings in the state rose a modest 0.1 percent due to the higher farm price. And, farm milk sales increased $10 million, or 0.7 percent.

Scenario No. 3—Eliminate the Dairy Price Support Program

The purpose of scenario 3 is to examine the impact of eliminating the dairy price support program. That program operates independently of the federal order program and was not directly impacted by the federal order reform process. However, the price support program can have a major impact on dairy product prices, which in turn affect the new formula prices under federal order reform. Thus eliminating the dairy price support program could have a major impact on farm milk prices.

The elimination of the dairy price support program was simulated in this scenario by reducing USDA purchases of surplus nonfat dry milk from 207 million pounds in the baseline to 100 million pounds. It was assumed that some minimum purchases of nonfat dry milk would be needed for domestic and export programs. The important point of this scenario is to examine the impact when market prices of dairy products (i.e. nonfat dry milk) are allowed to fall below CCC purchase prices. ***This scenario reflects the impact of falling nonfat dry milk prices prior to implementation of federal order reform.***

The direct impact of reducing net purchases of nonfat dry milk under the dairy price support program was a decrease in nonfat dry milk prices by $0.13 per pound relative to the baseline. That reduced the Class IIIa price and shifted more milk into Class III uses. As a result, production of butter and nonfat dry milk declined 3.9 percent relative to the baseline. Butter prices rose $0.1030 per pound. The cheese price declined $0.005 per pound as slightly more milk was shifted into Class III uses and cheese production rose 0.2 percent. Higher cheese production resulted in more dry whey. The price of dry whey fell $0.002 per pound. The Class IIIa price declined $0.67 per cwt due to the decline in the price of nonfat dry milk. All other class prices fell $0.05 per cwt due to the slight reduction in the price of cheese. Under the baseline, cheese prices determine the BFP, which in turn drives the Class I, II and III prices. This scenario maintained these old formulas.

The elimination of the dairy price support program and the resulting drop in cheese and nonfat dry milk prices reduced farm prices and milk sales in virtually every federal order. That is because the decline in the cheese price affected the Class I, II, and III prices, and the drop in the price of nonfat dry milk affected the Class IIIa price. Nationwide, the farm price of milk declined $0.11 per cwt and farm milk sales declined $236 million, or 1.1 percent. ***Note that this scenario reflects the impact of the elimination of the dairy price support program using the old formulas for class prices that are in the baseline.***

In the Northeast, farm milk prices declined $0.10 per cwt and farm milk sales declined $33 million, or 0.9 percent. In Pennsylvania, the farm price declined $0.11 per cwt and farm milk sales declined $16 million, or 1.1 percent.

One important point to note is that the results of any analysis of the economic impact of reducing or eliminating the dairy price support program are highly conditioned on the starting point in the baseline. If one starts with market prices for cheese, butter and nonfat dry milk above CCC purchase prices with zero net purchases of surplus products, an elimination of the dairy price support program would have little or no impact. The baseline used in this study assumes a cash price for nonfat dry milk that is at the CCC purchase price with a positive level for net surplus purchases. Thus, elimination of the dairy price support program would logically result in a reduction in the market price of nonfat dry milk.

Scenario No. 4—Consolidated Appropriations Act

The final scenario was designed to reflect the parameters of the Consolidated Appropriations Act. It includes the class price formulas under the Secretary's final rule and the modified Option 1A differentials. The results show very little impact on dairy commodity prices and component values, but more significant impacts on class prices and regional milk sales and farm prices.

The Class I mover increased $0.33 per cwt and the Class II price rose $0.27 per cwt relative to the baseline. The Class IV price increased $0.20 per cwt. The Class III price, however, declined by $0.58 per cwt. Again, these impacts were due to the new definitions of class price formulas.

Regions of the country that depend on Class III sales showed a reduction in farm milk sales, whereas regions that had higher Class I, II and IV sales showed an increase in farm milk sales.

In the Northeast, the average Class I differential fell just $0.017 per cwt under the change to Option 1A differentials, or –0.53 percent. The Class I mover, however, increased $0.33 per cwt. Thus the Class I price in the Northeast increased $0.31 per cwt relative to the baseline due almost entirely to the new definition of the Class I mover under order reform. This increase in the Class I price, as well as the higher Class II and IV prices, raised the pool value of milk and helped offset declines due to the $0.58 per cwt drop in the Class III price. The baseline assumed that roughly 43 percent of milk use in the Northeast was for Class I purposes, and about 30 percent was for Class III uses. The farm price of milk in the Northeast thus increased $0.02 per cwt. Milk marketings were relatively unchanged under this scenario. The value of farm milk sales, however, rose $6 million, or 0.2 percent.

In the Upper Midwest, the farm price of milk declined $0.25 per cwt due mainly to the lower Class III price. Milk marketings fell 0.5 percent. And the value of farm milk sales fell $67 million, or 2.4 percent. The Upper Midwest marketing order is highly dependent on Class III sales for pool revenue. The baseline assumed that 73 percent of all milk marketings in this order are used for Class III, or cheese making, purposes.

In Pennsylvania, the results of this scenario were similar to that of the Northeast order. The farm price of milk rose $0.06 per cwt relative to the baseline, milk marketings rose 0.1 percent, and farm milk sales increased almost $9 million, or 0.6 percent.

Analysis of Individual Elements of Federal Order Reform

The final step in the analysis was to compare each of the above four scenarios to each other and to the baseline in order to isolate and quantify the major elements of federal order reform. Those elements are: the dairy price support program, Option 1A and 1B Class I differentials, and the new class price formulas under federal order reform. The impacts of each of these elements on regional farm prices and milk sales are shown in table 11.

The results of this analysis vary significantly by region of the country. In the Northeast order, elimination of the dairy price support program and use of Option 1B pricing under the Secretary's final rule created the largest reduction in farm milk prices and sales. The elimination of the dairy price support program resulted in a decline of $33 million in the Northeast, whereas adoption of the Option 1B Class I pricing program resulted in a decline of $60 million. On the other hand, use of the new class price formulas in the Secretary's final rule resulted in higher farm prices and milk sales in the Northeast. The farm price of milk increased $0.03 per cwt and farm milk sales rose $10 million in the Northeast due to these new formulas. This was due largely to the new Class I mover that uses the higher of the Class III or IV skim milk price. This results in higher Class I prices than the old Class I mover.

In the Upper Midwest order, a region highly dependent on Class III milk sales, the use of the new class price formulas under federal order reform resulted in a reduction in the farm price of milk and farm milk sales. This was due to the decline in the Class III price relative to the baseline. The farm price fell $0.32 per cwt in the Upper Midwest and farm milk sales fell $87 million relative to the baseline due to the introduction of these new class price formulas. A less significant drop occurred with the elimination of the dairy price support program. Under that scenario, the farm milk price in the Upper Midwest fell $0.05 per cwt and farm milk sales fell $12 million. Farm prices and farm milk sales would have increased, however, under adoption of either Option 1A or 1B due to the rise in Class I differentials in the Upper Midwest order relative to the baseline. Under Option 1A, Class I differentials from the Consolidated Appropriations Act increased the farm price $0.07 per cwt and farm milk sales rose $20 million. Under the Secretary's Option 1B plan, farm milk prices increased $0.17 per cwt and farm milk sales rose $46 million.

For the entire United States, the dairy policy element that produces the largest reduction in farm milk prices and sales is the elimination of the dairy price support program. The economic model used in this study estimated a decline of $0.13 per pound in the wholesale price of nonfat dry milk relative to the baseline under an elimination of the dairy price support program. That resulted in a $0.11 per cwt decline in the U.S. average farm milk price and a reduction of $236 million in farm milk sales relative to the baseline.

The next greatest impact investigated in this study at the U.S. level was due to the new class price formulas implemented under federal order reform. Those new formulas were estimated to reduce the farm price of milk $0.05 per cwt relative to the baseline. While the class I, II and IV prices rose under this scenario relative to the baseline, the Class III price fell $0.56 per cwt. Under the baseline, Class III use of milk for the entire United States averaged 34 percent, one

Table 11. Impacts of Major Elements of Federal Order Reform on Regional Milk Prices and Sales

	Price Support Program	Modified Option 1B	Modified Option 1A	Final Rule Class Price Formulas	Consol. Approps Act	Secretary's Final Rule
Northeast						
Farm Price ($/cwt)	-0.103	-0.189	-0.012	0.032	0.020	-0.157
Milk sales (mil $)	-32.6	-60.1	-3.7	10.2	6.4	-49.9
Appalachian						
Farm Price ($/cwt)	-0.044	-0.246	0.023	0.239	0.261	-0.008
Milk sales (mil $)	-2.8	-15.8	1.5	15.3	16.8	-0.5
Southeast						
Farm Price ($/cwt)	-0.045	-0.135	-0.020	0.143	0.123	0.008
Milk sales (mil $)	-4.0	-11.9	-1.8	12.7	10.8	0.7
Florida						
Farm Price ($/cwt)	-0.043	0.304	0.083	0.232	0.315	0.536
Milk sales (mil $)	-1.5	10.6	2.9	8.1	11.0	18.6
Mideast						
Farm Price ($/cwt)	-0.067	0.078	-0.010	0.085	0.076	0.163
Milk sales (mil $)	-10.3	12.0	-1.5	13.1	11.6	25.1
Upper Midwest						
Farm Price ($/cwt)	-0.045	0.171	0.074	-0.322	-0.248	-0.151
Milk sales (mil $)	-12.1	46.1	20.0	-87.0	-67.0	-40.9
Central						
Farm Price ($/cwt)	-0.065	0.024	0.019	-0.040	-0.021	-0.016
Milk sales (mil $)	-7.5	2.8	2.1	-4.6	-2.4	-1.8
Southwest						
Farm Price ($/cwt)	-0.086	-0.328	-0.066	0.035	-0.031	-0.293
Milk sales (mil $)	-10.6	-40.3	-8.1	4.3	-3.8	-36.0
Western						
Farm Price ($/cwt)	-0.047	0.018	0.001	-0.294	-0.293	-0.276
Milk sales (mil $)	-3.4	1.3	0.1	-21.0	-20.9	-19.7
Arizona-Las Vegas						
Farm Price ($/cwt)	-0.046	-0.246	-0.064	-0.190	-0.254	-0.436
Milk sales (mil $)	-2.0	-10.5	-2.8	-8.2	-11.0	-18.8
Pacific Northwest						
Farm Price ($/cwt)	-0.301	-0.066	-0.003	0.124	0.121	0.058
Milk sales (mil $)	-26.5	-5.9	-0.3	11.0	10.7	5.1
Other Unregulated Regions						
Farm Price ($/cwt)	-0.047	0.022	0.008	-0.219	-0.211	-0.197
Milk sales (mil $)	-13.2	6.2	2.2	-62.1	-59.9	-55.9
State of California						
Farm Price ($/cwt)	-0.274	0.071	-0.005	-0.010	-0.015	0.061
Milk sales (mil $)	-109.5	28.4	-2.1	-4.0	-6.2	24.4
United States Totals						
Farm Price ($/cwt)	-0.111	-0.016	0.005	-0.051	-0.046	-0.067
Milk sales (mil $)	-236.1	-37.2	8.5	-112.3	-103.8	-149.5
Pennsylvania						
Farm Price ($/cwt)	-0.115	-0.099	-0.010	0.072	0.062	-0.027
Milk sales (mil $)	-16.3	-14.1	-1.4	10.3	8.9	-3.9

percentage point more than used for Class I purposes. The decline in the U.S. average farm price of milk--due to the new class price formulas--resulted in a reduction of $112 million in farm milk sales relative to the baseline.

Also at the U.S. level, the use of Option 1B pricing differentials resulted in a reduction of $37 million in farm milk sales, whereas the modified Option 1A plan, which was ultimately adopted by the Congress, resulted in a net increase of $9 million, both relative to the baseline. The results for the Option 1B pricing plan suggest that increases in farm milk sales in some regions of the country--notably in the Florida, Mideast, Upper Midwest and in California--offset reductions in sales in the Northeast, Appalachian, Pacific Northwest, Southeast, Southwest, and Arizona-Las Vegas orders.

For Pennsylvania, the results in Table 11 suggest that an elimination of the dairy price support program and adoption of Option 1B Class I differentials would have resulted in the largest reductions in farm prices and milk sales. With the elimination of the dairy price support program, Pennsylvania farm milk prices fell $0.12 per cwt and farm milk sales declined $16 million relative to the baseline. With adoption of the Option 1B pricing program for Class I differentials, farm milk prices in Pennsylvania declined $0.10 per cwt and farm milk sales declined $14 million, both relative to the baseline. Adoption of the modified Option 1A differentials, on the other hand, was almost revenue neutral for Pennsylvania. The new class price formulas adopted in the final rule, however, resulted in an increase in Pennsylvania farm milk prices by $0.07 per cwt and an increase in farm milk sales by $10 million, both relative to the baseline.

Conclusions

The results of this study show that the new class prices under order reform are much more dependent on the price of dairy commodities than the formulas used prior to order reform. Class prices under the old system varied mainly with changes in the price of cheese and, to a lesser extent, butter. Under the new system there is a direct linkage between changes in cash market prices for cheese, butter, nonfat dry milk and whey, and component prices for butterfat, protein and other solids. These component prices in turn drive the prices for Class I, II, III and IV milk.

This study shows that eliminating the dairy price support program ***prior to order reform*** reduced the wholesale price of nonfat dry milk by more than 13 cents per pound annually relative to the baseline. That in turn slightly lowers the wholesale price of cheese as more milk shifted away from Class IIIa uses and into Class III uses. Those lower prices resulted in lower class prices, lower pool values, and lower farm prices. U.S. farm milk sales declined by $236 million relative to the baseline. Elimination of the dairy price support program in the face of the new federal order reforms, however, resulted in a much greater economic impact (more later).

A simple historical comparison of class prices indicates that the Class I mover and Class II prices as defined under order reform are $0.39 and $0.30 per cwt, respectively, ***higher*** than under the old definition. Class III and IV prices as defined under order reform are $0.20 and $0.05 per cwt ***lower*** than the old definition. Using the more detailed dairy industry model developed for this report, the Class I mover increased $0.34 per cwt, the Class II price increased $0.27 per cwt, the Class III price ***fell*** $0.56 per cwt, and the Class IV price rose $0.20 per cwt under federal order reform when compared to the baseline.

The results in Tables 9 and 11 show that for the Northeast, the Consolidated Appropriations Act resulted in higher farm milk prices and sales than under the Secretary's final rule. The Northeast farm price increased $0.02 per cwt and farm milk sales rose $6 million under the Consolidated Appropriations Act when compared to the baseline. However, adoption of the Secretary's final rule would have resulted in a decline of $0.16 per cwt in the Northeast farm price and a reduction of $50 million in farm milk sales, both relative to the baseline. Much of this decline is attributable to the lower Class I differentials that would exist in the Northeast under the Secretary's Option 1B pricing plan.

For Pennsylvania, we estimate that the Secretary's final rule would have reduced the farm price of milk $0.03 per cwt and lowered farm milk sales by $4 million. This study shows a decline of $0.67 per cwt in the average Class I differential for the Northeast under Option 1B relative to the baseline. For Pennsylvania, this difference is $0.40 per cwt. Thus, the farm price impact of the Secretary's final rule was found to be less for Pennsylvania than for the Northeast federal order.

The results for Pennsylvania also suggest that the Consolidated Appropriations Act would increase Pennsylvania farm prices and milk sales relative to the baseline. The farm price increased $0.06 per cwt and farm milk sales rose $9 million under this scenario when compared to the baseline. The class I differentials in the modified Option 1A plan ultimately adopted by the Congress in the Consolidated Appropriations Act are very similar to those used in the baseline. Thus, for Pennsylvania, most of the increase in farm milk prices and sales under this scenario can be attributed to the higher Class I mover and higher Class II price that was defined in the final rule.

For the United States, the Consolidated Appropriations Act resulted in a slightly smaller decline in farm milk prices and sales when compared to the results under the Secretary's final rule. The U.S. average farm price and milk sales fell $0.05 per cwt and $104 million, respectively, relative to the baseline under the Consolidated Appropriations Act scenario. On the other hand, the U.S. average farm price and milk sales fell $0.07 per cwt and $150 million, respectively, relative to the baseline under the Secretary's final rule scenario. From a statistical perspective, the difference in economic impact between these two scenarios was not significant. However, there were large regional differences in the results of these alternative policy scenarios.

In conclusion, the results of this study suggest that regional farm milk sales are conditioned in part on the level of Class I differentials. Also, the new formulas for class prices adopted in the Secretary's final rule are much more sensitive to changes in dairy commodity prices than under the old system. Hence, major changes in the level of dairy commodity prices--such as a reduction in nonfat dry milk prices due to an elimination of the dairy price support program--would have significant economic consequences. For example, the economic model used in this study indicates that elimination of the dairy price support program in the face of federal order reform would result in a much greater reduction in farm milk sales than under the old system. The elimination of the dairy price support program in combination with the implementation of the Secretary's final rule resulted in a reduction in U.S. farm milk sales of $483 million relative to the baseline. The elimination of the dairy price support program in combination with the Consolidated Appropriations Act resulted in a decline in U.S. farm milk sales of $436 million.

The reason for the large reduction in milk sales due to the combined effects of elimination of the dairy price support program and federal order reform is because the new formulas for class prices under order reform, particularly the Class I and II prices, are highly dependent on the price of nonfat dry milk. Under the old system, any change in the nonfat dry milk price had little impact on the Class II price since the latter was equal to the old Basic Formula Price (BFP) plus $0.30 per cwt. The BFP was a function of the cheese price. Under federal order reform, the Class II price is driven by the Class IV skim milk price, which in turn is a function of the price of nonfat dry milk. Under the old system, a drop in the price of nonfat dry milk had little impact on the Class I mover since it was equal to the BFP lagged two periods. Under order reform, the Class I mover is a function of the higher of the Class III and IV skim milk prices. In the baseline used in this study, the Class IV skim milk price is higher than the Class III skim milk price, and the Class IV skim milk price is a function of the price of nonfat dry milk. Thus, elimination of the dairy price support program could have a significant impact on class prices under the new system of federal order reform if the price of nonfat dry milk is reduced.

It should be noted that this study also raises issues that were not directly analyzed. For example, this study finds that the new definition of the Class III price is $0.20 - $0.56 per cwt below what the BFP would have been. It also shows a significant reduction in farm milk prices and sales if the dairy price support program is eliminated. What is not addressed, however, is the long-term economic impact of reducing the make allowance for protein (i.e. raising the Class III price) from current levels. How will this affect processors? In addition, the study does not address broader issues associated with maintaining the dairy price support program. In particular, what is to be done with the surplus nonfat dry milk purchased under the price support program? Government stocks of nonfat dry milk are increasing in 2000 while exports of nonfat dry milk under the Dairy Export Incentive Program are being reduced due to our agreements under the WTO trade agreement. These are questions that deserve to be addressed, but were not analyzed in this report.

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Appendix Table 1. NASS Survey Simulation and Component Prices, $/lb

	NASS Butter Survey 1/	NASS Cheese Survey 1/	NASS Dry Whey, Survey 1/	NASS NFDM Survey 1/	Component Prices Butterfat price	Protein price	Other solids price	Nonfat solids
1996								
Jan	0.7517	1.3609	0.2482	1.0969	0.7777	3.0884	0.1149	0.9411
Feb	0.6741	1.3597	0.2232	1.0712	0.6831	3.2056	0.0891	0.9159
Mar	0.6726	1.3684	0.2264	1.0662	0.6812	3.2378	0.0924	0.9110
Apr	0.7185	1.4078	0.2278	1.0662	0.7372	3.3014	0.0938	0.9109
May	0.9232	1.4603	0.2150	1.1214	0.9868	3.1620	0.0806	0.9651
Jun	1.3799	1.4610	0.2127	1.1893	1.5437	2.4515	0.0782	1.0317
Jul	1.5474	1.5214	0.2196	1.1986	1.7481	2.3970	0.0854	1.0408
Aug	1.5590	1.5857	0.2368	1.1932	1.7622	2.5995	0.1031	1.0355
Sep	1.5590	1.6368	0.2405	1.1939	1.7622	2.7747	0.1069	1.0361
Oct	1.4206	1.5363	0.2178	1.1929	1.5934	2.6460	0.0834	1.0352
Nov	0.7873	1.3133	0.1849	1.1649	0.8211	2.8699	0.0495	1.0078
Dec	0.7757	1.2371	0.1837	1.1317	0.8069	2.6265	0.0483	0.9752
Year Avg	***1.0641***	***1.4374***	***0.2197***	***1.1405***	***1.1586***	***2.8634***	***0.0855***	***0.9839***
1997								
Jan	0.8738	1.2661	0.1879	1.0884	0.9266	2.5729	0.0526	0.9328
Feb	1.0593	1.3028	0.2050	1.0952	1.1528	2.4091	0.0702	0.9394
Mar	1.1520	1.3124	0.2116	1.0970	1.2659	2.2973	0.0771	0.9412
Apr	1.0045	1.2375	0.1859	1.0884	1.0860	2.2707	0.0506	0.9328
May	0.9409	1.1684	0.1783	1.0578	1.0084	2.1330	0.0427	0.9027
Jun	1.1206	1.1752	0.1901	1.0496	1.2276	1.8758	0.0549	0.8947
Jul	1.0879	1.2258	0.2147	1.0483	1.1877	2.1003	0.0803	0.8935
Aug	1.0810	1.3536	0.2250	1.0412	1.1793	2.5495	0.0909	0.8864
Sep	1.0997	1.3728	0.2462	1.0382	1.2021	2.5863	0.1128	0.8836
Oct	1.4879	1.3751	0.3025	1.0360	1.6755	1.9882	0.1709	0.8814
Nov	1.6238	1.3907	0.3129	1.0343	1.8412	1.8295	0.1817	0.8797
Dec	1.3096	1.4087	0.3221	1.0343	1.4581	2.3817	0.1913	0.8797
Year Avg	***1.1534***	***1.2991***	***0.2319***	***1.0591***	***1.2676***	***2.2495***	***0.0980***	***0.9040***
1998								
Jan	1.1904	1.4056	0.2766	1.0310	1.3127	2.5573	0.1442	0.8765
Feb	1.4078	1.3981	0.2428	1.0292	1.5778	2.1921	0.1093	0.8747
Mar	1.3568	1.3564	0.2381	1.0274	1.5156	2.1286	0.1044	0.8729
Apr	1.3935	1.2685	0.2229	1.0223	1.5604	1.7697	0.0887	0.8679
May	1.5771	1.2357	0.2257	1.0191	1.7842	1.3710	0.0916	0.8648
Jun	1.9221	1.4817	0.2527	1.0191	2.2050	1.6759	0.1195	0.8648
Jul	2.0827	1.5722	0.2731	1.0191	2.4008	1.7359	0.1406	0.8648
Aug	2.2627	1.6047	0.2754	1.0241	2.6203	1.5662	0.1430	0.8697
Sep	2.9014	1.6563	0.2778	1.0539	3.3992	0.7463	0.1455	0.8989
Oct	2.5081	1.7607	0.2544	1.0732	2.9196	1.7183	0.1213	0.9178
Nov	1.9260	1.8278	0.2425	1.0745	2.2098	2.8570	0.1090	0.9191
Dec	1.3563	1.8643	0.2436	1.0864	1.5150	3.8715	0.1101	0.9308
Year Avg	***1.8237***	***1.5360***	***0.2521***	***1.0399***	***2.0850***	***2.0158***	***0.1189***	***0.8852***
1999								
Jan	1.4154	1.7225	0.2137	1.0637	1.5871	3.2928	0.0792	0.9085
Feb	1.2984	1.2925	0.1897	1.0359	1.4444	2.0006	0.0544	0.8813
Mar	1.3019	1.3064	0.1917	1.0169	1.4487	2.0428	0.0565	0.8626
Apr	1.0160	1.3126	0.1845	1.0071	1.1000	2.5104	0.0491	0.8530
May	1.0781	1.2499	0.1739	1.0069	1.1757	2.1984	0.0381	0.8528
Jun	1.4609	1.2786	0.1711	1.0046	1.6426	1.6992	0.0352	0.8506
Jul	1.3793	1.4583	0.1724	1.0054	1.5430	2.4431	0.0366	0.8514
Aug	1.3683	1.7154	0.1810	1.0089	1.5296	3.3421	0.0455	0.8548
Sep	1.3252	1.7084	0.1892	1.0174	1.4771	3.3853	0.0539	0.8631
Oct	1.1273	1.3934	0.1944	1.0184	1.2357	2.6138	0.0593	0.8641
Nov	1.0637	1.2058	0.1917	1.0168	1.1582	2.0696	0.0565	0.8625
Dec	0.9184	1.1368	0.1892	1.0111	0.9810	2.0597	0.0539	0.8570
Year Avg	***1.2294***	***1.3984***	***0.1869***	***1.0178***	***1.3603***	***2.4715***	***0.0515***	***0.8635***

1/ Simulated NASS survey prices January 1996 - September 1998; actual NASS survey prices thereafter.

Appendix Table 2. Historical Class Prices Compared to Simulated Class Prices Under Order Reform, $/cwt

	Reform Class IV Price	Actual Class IIIa	Reform Class III Price	Actual BFP	Reform Class II Price	Actual Class II Price	Reform Class I Mover	Actual Class I Mover
1996								
Jan	10.90	11.16	12.61	12.73	11.61	13.17	12.84	12.87
Feb	10.35	10.39	12.48	12.59	11.26	13.21	12.77	12.91
Mar	10.30	10.32	12.59	12.70	11.04	13.03	12.62	12.73
Apr	10.49	10.52	12.99	13.09	11.19	12.89	12.66	12.59
May	11.84	11.90	13.37	13.77	12.07	13.00	13.04	12.70
Jun	14.36	15.12	13.18	13.92	14.49	13.39	13.34	13.09
Jul	15.16	16.01	13.77	14.49	15.78	14.07	14.14	13.77
Aug	15.16	15.82	14.53	14.94	15.91	14.22	14.89	13.92
Sep	15.17	15.85	15.07	15.37	15.86	14.79	15.00	14.49
Oct	14.57	14.94	13.96	14.12	15.27	15.24	14.86	14.94
Nov	11.63	12.18	11.74	11.61	12.57	15.67	14.26	15.37
Dec	11.29	11.75	10.96	11.34	12.28	14.42	11.72	14.12
Year Avg	***12.60***	***13.00***	***13.10***	***13.39***	***13.28***	***13.93***	***13.51***	***13.63***
1997								
Jan	11.34	11.50	11.24	11.94	12.42	11.91	11.37	11.61
Feb	12.19	12.36	11.64	12.46	12.84	11.64	11.46	11.34
Mar	12.60	12.78	11.75	12.49	13.28	12.24	12.18	11.94
Apr	11.90	12.10	10.88	11.44	12.67	12.76	12.49	12.46
May	11.37	11.56	10.15	10.70	12.34	12.79	11.84	12.49
Jun	12.07	12.22	10.22	10.74	12.83	11.74	11.32	11.44
Jul	11.92	12.06	10.89	10.86	12.63	11.00	11.93	10.70
Aug	11.83	11.88	12.27	12.07	12.59	11.04	11.81	10.74
Sep	11.88	11.87	12.58	12.79	12.61	11.16	12.28	10.86
Oct	13.52	13.50	12.78	12.83	14.24	12.37	12.45	12.07
Nov	14.08	14.01	12.95	12.96	14.80	13.09	13.18	12.79
Dec	12.74	12.46	13.32	13.29	13.45	13.13	13.76	12.83
Year Avg	***12.29***	***12.36***	***11.72***	***12.05***	***13.06***	***12.07***	***12.17***	***11.77***
1998								
Jan	12.21	12.04	13.07	13.25	12.94	13.26	13.19	12.96
Feb	13.12	12.89	12.70	13.32	13.84	13.59	13.06	13.29
Mar	12.89	12.67	12.26	12.81	13.60	13.55	12.98	13.25
Apr	13.00	12.88	11.26	12.01	13.75	13.62	12.70	13.32
May	13.76	13.96	10.87	10.88	14.48	13.11	12.79	12.81
Jun	15.23	15.38	13.41	13.10	15.93	12.31	13.47	12.01
Jul	15.91	15.59	14.40	14.77	16.61	11.18	14.80	10.88
Aug	16.72	16.52	14.67	14.99	17.38	13.40	15.44	13.10
Sep	19.70	19.81	14.96	15.10	20.15	15.07	16.30	14.77
Oct	18.19	18.13	16.05	16.04	18.73	15.29	18.73	14.99
Nov	15.72	14.87	16.90	16.84	16.41	15.40	18.19	15.10
Dec	13.39	13.48	17.51	17.34	13.98	16.34	16.90	16.04
Year Avg	***14.99***	***14.85***	***14.01***	***14.20***	***15.65***	***13.84***	***14.88***	***13.54***
1999								
Jan	13.45	13.12	15.85	16.27	14.34	17.14	17.51	16.84
Feb	12.71	12.78	11.35	10.27	13.65	17.64	15.85	17.34
Mar	12.56	12.36	11.51	11.62	13.42	16.57	12.71	16.27
Apr	11.26	11.06	11.64	11.81	12.04	10.57	12.56	10.27
May	11.52	11.62	10.91	11.26	12.23	11.92	11.64	11.62
Jun	13.14	13.29	11.04	11.42	13.86	12.11	11.53	11.81
Jul	12.79	12.37	12.92	13.59	13.49	11.56	13.14	11.26
Aug	12.78	12.62	15.61	15.79	13.45	11.72	12.92	11.42
Sep	12.67	12.37	15.60	16.26	13.29	13.89	15.61	13.59
Oct	11.83	11.78	12.48	11.49	12.52	16.09	15.60	15.79
Nov	11.54	11.57	10.57	9.79	12.26	16.56	12.48	16.26
Dec	10.88	10.69	9.90	9.63	11.62	11.79	11.54	11.49
Year Avg	***12.26***	***12.14***	***12.45***	***12.43***	***13.01***	***13.96***	***13.59***	***13.66***

Appendix Table 3. Dairy Industry Simulation Model

Marketings and Milk Use

1. $S^i = A^i (P_b^i)^{\alpha i}$
2. $C1U^i = TFC^i$
3. $C2U^i = C^i (C2P^i)^{\theta}$
4. $CGE = P_c * 9.87 + P_w * 5.6 + (P_{bt} - 0.10) * 0.238$
5. $BPGE = P_{bt} * 4.27 + P_n * 8.07 + P_{bm} * 0.42$
6. $C3U^i = \xi^i * (S^i - C1U^i - C2U^i)$
7. $\xi^i = D^i * CGE^{\delta} * BPGE^{-\delta}$
8. $C4U^i = S^i - C1U^i - C2U^i - C3U^i$

Price Identities

9. $C4P = f(P_n, P_{bt})$
10. $C3P = f(P_c, P_{bt})$
11. $C2P = C4P + 0.70$
12. $C1MOVER = \max(C3P, C4P)$
13. $C1P^i = C1DIF^i + C1MOVER$
14. If $C1P^i < CP^i$, then CP^i, else $C1P^i$
15. $CPR^i = CP^i - C1P^i$
16. $P_b^i = ((C1P^i + PR^i + CPR^i) * C1U^i + C2P * C2U^i + C3P * C3U^i + C4P * C4U^i) / S^i$

Retail Fluid Milk Consumption

17. $PCF^i = B^i (RPF^i)^{\beta}$
18. $RPF^i = C1PG^i + \$MU^i$
19. $C1PG^i = (C1P^i + PR^i + CPR^i) * 8.62/100$
20. $TFC^i = PCF^i * POP^i$
21. $RFME^i = (TFC^i / 8.62) * RPF^i$

Commodity Production Identities

22. $PRD_c = \sum_i C3U^i * MEC_c$
23. $PRD_{bt} = \sum_i (C3U^i + C4U^i * \lambda) * MEC_{bt}$
24. $PRD_n = \sum_i C4U^i * MEC_n$
25. $PRD_w = f(PRD_c)$

Commodity Demand and Market Clearing Conditions

26. $DU_j = E(P_j)^{\eta_j}$
27. $DSTK_j = F(P_j)^{\eta_j} * (PRD_j)^{\rho_j}$
28. $PRD_j + IMP_j + DSTK(-1)_j = DU_j + DSTK_j + EXP_j$

Endogenous Variables

$BPGE$:	butter/nonfat dry milk gross earnings, \$/cwt. milk
$C1MOVER$:	class 1 mover, \$/cwt.
$C1P^i$:	class 1 price, \$/cwt., federal order i
$C1PG^i$:	class 1 cost of fluid milk to processors, \$/gal., federal order i
$C1U^i$:	class 1 use, mil. lbs., federal order i
$C2P$:	class 2 price, \$/cwt.
$C2U^i$:	class 2 use, mil. lbs., federal order i
$C3P$:	class 3 price, \$/cwt.
$C3U^i$:	class 3 use, mil. lbs., federal order i
$C4P$:	class 4 price, \$/cwt.
$C4U^i$:	class 4 use, mil. lbs., federal order i
CGE:	cheese gross earnings, \$/cwt milk
CPR^i:	dairy compact premium, \$/cwt., federal order i
$DSTK_j$:	ending commercial stocks, mil. lbs., dairy commodity j
$DSTK(-1)_j$:	beginning commercial stocks, mil. lbs., dairy commodity j
DU_j:	domestic use, mil. lbs., dairy commodity j
P_{bt}:	price of grade AA butter, Chicago, \$/lb.
P_c:	price of 40-lb. block cheese, Chicago, \$/lb.
P_b^i:	farm price of milk, \$/cwt., federal order i
P_n:	price of nonfat dry milk, Central States, \$/lb.
PCF^i:	per capita fluid milk consumption, lbs., federal order i
PRD_j:	production, mil. lbs., dairy commodity j
$RFME^i$:	retail fluid milk expenditures, mil. dollars, federal order i
RPF^i:	retail fluid milk price, \$/gal., federal order i
S^i:	milk marketings, mil. lbs., federal order i
TFC^i:	total fluid milk consumption, mil. lbs., federal order i
ξ^i:	the proportion of residual milk used for class 3 use, percent, federal order i

Exogenous Variables

αi:	milk supply elasticity, federal order i
β:	retail fluid demand elasticity
θ:	class 2 elasticity
δ:	class 3 elasticity
λ:	proportion of class 3 milk used to make butter from whey cream
ρj:	stock elasticity with respect to production, dairy commodity j
η_j:	demand elasticity, dairy commodity j
$\$MU^i$:	farm to retail markup, \$/gal., federal order i
$C1DIF^i$:	class 1 differential, \$/cwt., federal order i
CP^i:	compact price set by compact commission, \$/cwt., federal order I

EXP_j :	exports of dairy commodities, mil. lbs., dairy commodity j
IMP_j :	imports of dairy commodities, mil. lbs., dairy commodity j
MEC_j :	milk equivalent conversion factor, dairy commodity j
P_{bm} :	price of dry buttermilk, Central States, \$/lb.
P_w :	price of dry whey, Central States, \$/lb.
POP^i :	civilian residential population, mil., federal order i
PR^i :	class 1 market over-order premium, \$/cwt., federal order i
j :	dairy commodity (c=cheese, bt=butter, n=nonfat dry milk, w=dry whey)
$A^i - F^i$:	model constants