

**Economic Analysis for the Recommended Decision on  
Class III and Class IV Price Formulas**

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**United States Department of Agriculture  
Marketing and Regulatory Programs  
Agricultural Marketing Service  
Dairy Programs**

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### **I. Statement of Need for the Recommended Action**

#### *A. Statutory Directive*

The Consolidated Appropriations Act, 2000, required the United States Department of Agriculture (USDA) to reconsider the Class III and Class IV component pricing formulas that were implemented on January 1, 2000 as part of the consolidation and reform of Federal milk orders.

A formal hearing was held by the Agricultural Marketing Service (AMS) on May 8-12, 2000, in Alexandria, Virginia, to consider proposals submitted by the industry to change the formulas. The material issues on the record of the hearing relate to the elements of the Class III and Class IV pricing formulas, including: commodity prices, manufacturing (make) allowances, and factors related to product yield. In December 2000, the Department released a Tentative Final Decision on Class III and Class IV Price Formulas. However, some of the provisions of the interim final rule were enjoined by the U.S. District Court for the District of Columbia. This recommended decision considers comments filed in response to the tentative final decision and recommends changes that are consistent with record evidence and the Court's ruling.

The major changes from the price formulas implemented on January 1, 2000 recommended by this decision are: (1) adjusting product yield factors in the protein and nonfat solids prices; (2) using a barrel cheese price at 38 percent moisture rather than 39 percent moisture in the Class III component formulas; and (3) adjusting the make allowances for butter, nonfat dry milk, dry whey, and cheese.

The purpose of the *Economic Analysis for the Recommended Decision on Class III and Class IV Price Formulas* is to evaluate the costs and benefits of the recommended changes to the pricing formulas.

#### *B. Analysis*

The primary purpose of this decision is to recommend changing the product pricing formulas used to price milk regulated under Federal milk marketing orders and classified as either Class III or Class IV milk. However, these product price formulas also affect the prices of regulated milk classified as Class I and Class II. The economic effects of the modifications in this decision are analyzed simultaneously as a change from the set of formulas implemented on January 1, 2000. See Appendix A for a listing of formula changes.

## 1. Baseline

Impacts were measured as changes from the model baseline as adapted from the August 2001 World Agricultural Supply and Demand Estimates(WASDE-337) report for 2002 projections and the USDA dairy baseline published in February 2001 (USDA Agricultural Baseline Projections to 2010,USDA Staff Report WAOB-2001-1) for annual projections from 2003 to 2006. The USDA baseline is a national, annual projection of the supply-demand-price situation for milk and dairy products. Baseline assumptions are: (1) the price support program would end on December 31, 2001; (2) the Dairy Export Incentive Program would continue to be utilized; and (3) the Federal Milk Marketing Order Program would continue as reformed on January 1, 2000. While closely adapted from the USDA baseline, the Dairy Programs model baseline is on a calendar year (Tables 1A-1C). The five-year analytical period runs from 2002 through 2006.

## 2. Analysis Assumptions and Relationships

This analysis focuses on impacts on milk marketed under all Federal milk marketing orders, and treats the Federal order system as a single entity for purposes of generating system-wide price and quantity changes. Order-specific changes in uniform blend prices and blend prices plus premiums are estimated as well. The Federal order share of U.S. milk marketings is about 71 percent. About 82 percent of all fluid milk and about 65 percent of all milk in manufactured products is marketed under Federal order regulation. Milk marketed in California, milk marketed under other state regulations, and unregulated milk are treated separately. The hard manufactured dairy product markets are national.

### a. Econometric Model

The dairy industry econometric model used in this analysis includes milk marketed through the Federal order system, California, and other milk markets. Demands for fluid milk and the major manufactured dairy products are included. The model generates estimates for the annual average National Agricultural Statistical Service (NASS) wholesale prices for American cheese (weighted average for blocks and barrels), butter, nonfat dry milk, and dry whey. The Federal order pricing formulas are driven by the NASS prices. Resulting Federal order prices are averaged with California price estimates to estimate a U.S. all-milk price. See Appendix B for more details.

### b. Regions

Given the prominence of Federal order marketings in the U.S. milk manufacturing industry, prices paid for manufactured milk under Federal orders cannot get too far out of alignment with the value of milk for manufacturing in the rest of the United States. Similarly, the fluid prices in non-Federal order markets are largely reflective of Federal order minimum Class I prices. However, milk may be pooled or not pooled under the order system depending on prices paid for manufactured milk relative to the Federal order blend price. Thus, all milk marketings, other than California's, are estimated as a function of the average Federal order blend price plus premiums payment estimates. The Federal order share of these marketings is estimated as a function of the Federal order blend price relative to the minimum price of Class III and IV milk.

The impacts of the Class III and Class IV price formula changes on the separate Federal orders and milk supply regions are estimated as well. Federal order milk marketings are estimated for each of the 11 orders. An order-specific baseline is developed, using year 2000 class utilizations as the basis. Federal order milk marketings are estimated for each of the 11 orders and class utilizations for individual orders were adjusted proportionally. It was assumed that pooling patterns through 2002-2006 would be similar to 2000 patterns. Given the class utilizations and primary market Class I differentials, Federal order blend prices are calculated from the various class prices for skim milk and butterfat, and changes in the Federal order blend prices are estimated, as a result of the recommended decision. Assuming that the changes in Federal order blend prices are reflected in the surrounding regions, changes in milk marketings from the states associated with the order regions are estimated. California milk marketings are estimated as a function of the California pool price.

#### c. Federal Order All-Milk Price

A Federal order all-milk price is calculated that includes premiums on Class I and Class III milk. It is assumed that the over-orders paid on Class II and IV milk reflect costs associated with marketed milk and therefore are not passed on to producers in the form of a premium. The Class I over-order premium varies as supply and demand conditions change. Annual Class I over-order payments, estimated as a function of cheese production and per capita fluid milk demand, exhibit little variation across the analytical period. Of the Class I over-order payment, 85 percent is assumed to include costs associated with serving fluid markets, with the balance (15 percent) paid to producers in the form of a premium. There are indications that minimum Class III prices under Federal order reform have been low enough relative to the value of the milk in cheese to generate premiums that are paid to producers delivering to cheese plants. Thus, changes in the minimum Class III price under the recommended decision are expected to be at least partially offset by opposite changes in the Class III over-order premium.

The model generates separate premiums for milk used in American cheese and “other cheese”. The Class III premium for milk used in American cheese is the difference between the model estimated value of milk in American cheese and the Class III price. The value of milk in American cheese is estimated from prices for American cheese and dry whey. The analysis assumes that the price paid for milk used to make American cheese is the Class III price and Class III premium. That is, holding all else constant, premiums for milk in American cheese will move penny-for-penny in opposite direction to changes in the Class III price. The prices paid for milk used in “other cheese” are the Class III price plus a premium that is less responsive to changes in the Class III price. Premiums for milk in “other cheese”, estimated from the Class III price and trend, are less responsive to changes in Class III prices, resulting in less change in premiums through the analytical years.

#### d. Potential Impact on Class I and II Prices

In addition to altering the sharing of manufacturing proceeds between manufacturing plants and producers, the decision's formula changes have an impact on Class I and Class II

prices. Class I skim prices reflect the higher of the Class III or Class IV skim prices, plus a location differential ranging from \$1.60 to \$4.30. Class II prices reflect the Class IV prices plus a 70-cent differential.

e. Product Demand and Milk Allocation Relationships

Demands for fluid milk and manufactured dairy products are functions of per capita consumption and population. Per capita consumption for the major milk and dairy products are estimated as functions of own prices, substitute prices, and income. Retail and wholesale margins are assumed unchanged from baseline. The milk supply is used first to meet the demands for fluid milk and soft manufactured products. After these demands are met, the remaining milk supply is used for manufacturing hard products. This volume is allocated to making cheese and making butter and nonfat dried milk according to gross returns to manufacturing in each class. Wholesale prices for cheese, butter, nonfat dry milk, and dry whey reflect supply and demand for these products.

f. Baseline Price Structure

The relative price structure of the key dairy products in the baseline is important to the effects of the formula changes. First, relative prices and returns to manufacturer's influence the allocation of nonfat solids and butterfat in Class III and Class IV products. Second, the protein price varies inversely with the butter price. The baseline projects steady increases in the demand for cheese, with cheese prices increasing steadily from about \$1.25 per pound in 2003 to about \$1.41 in 2006. With the loss of the price support program, nonfat dried milk prices are projected to range between \$0.87 and \$0.97 per pound in 2002-2004 before rebounding to around \$1.10 in 2005-2006. This pattern occurs because at relatively low nonfat dry milk prices, it becomes more profitable to shift nonfat solids and butterfat into cheese. Butter prices move opposite to nonfat dry milk prices, as butter prices are driven up with the use of more butterfat in cheese. Thus, butter prices are in the \$1.35-\$1.40 range in 2002-2004, and then drop to around \$1.17 in 2006. The ratio of butter to cheese prices decreases steadily from around 1.05 in 2002 to around 0.83 in 2006. When the butter price falls, the formula driven protein price increases. The baseline cheese price increases and steady butter prices cause the protein price to increase steadily in 2002-2004, and the protein price to increase at a higher rate in 2005-2006 when butter prices fall.

This set of product prices generates Class IV prices (3.5 percent butterfat) ranging from about \$11.66 to \$13.03 per hundredweight over 2002-2006. The Class III prices (3.5 percent butterfat) range from about \$11.11 to \$12.90. The higher of the Class III and Class IV prices at 3.5 percent butterfat are used to set the minimum Class I price. The Class IV price is projected to be the higher through the baseline years. Over time it is expected that market prices for Class III and Class IV skim milk will tend toward each other (Federal order minimum plus over-order premiums).

Average 2002-06 class prices at class average butterfat prices differ substantially, reflecting the variation in butterfat content among the products in the uses.

Class I - \$13.05, 2.02% butterfat  
Class II - \$19.02, 7.84% butterfat  
Class III - \$12.38, 3.82% butterfat  
Class IV - \$16.98, 6.88% butterfat

## II. CLASS III AND IV FORMULA CHANGES

The Class III and IV price formulas are amended by slightly adjusting make allowances and conversion (yield) factors. A single price for butterfat is used in both Class III and Class IV. See Appendix A for details on the formulas.

### A. Class III Formula Changes

#### 1. Background

The Federal Order system as of January 1, 2000, calculated a single price for butterfat, based on its value in butter using the NASS butter price series. This butterfat price was applicable for Class III and Class IV. Since the Class III and Class IV butterfat prices are the same, a butterfat adjustment was included in the Class III protein price formula to compensate for the difference in the value of butterfat in cheese versus butter.

$$\begin{aligned} \text{Protein Price} = & \\ & (\text{Cheese Price} - 0.1702) * 1.405 + \\ & ((\text{Cheese Price} - 0.1702) * 1.5802 - \text{Butterfat Price}) * 1.28. \end{aligned}$$

The butterfat value adjustment subtracts the uniform butterfat price from the value of butterfat in cheese according to the Van Slyke cheese yield formula, and multiplies the difference by 1.28. (See *New England et al. Final Decision*, March 1999, p.185.)

As can be seen in the formula, the protein price moves in opposite direction to butterfat price movements. When the butterfat price increases relative to the cheese price, the protein price declines. Thus, a butter price increase results in a butterfat price increase and reduced protein and Class III skim milk prices, even if the cheese price does not change. (With the exception of the make allowance set at \$0.165 and the adjustment of cheese prices to 38 percent moisture, the Judge ordered protein price formula is identical to that under Federal order reform.)

## 2. Recommended Decision

The recommended decision modifies the protein price formula by multiplying the butterfat price by 0.9 and replacing the 1.28 adjustment factor with 1.17, while retaining the yield conversion factors from the Van Slyke formula. The NASS weighted average cheese prices will use the 500-pound barrel price adjusted to 38% moisture instead of 39% moisture, which will result in an increase in the cheese price from how it was calculated under order reform. The make allowance for “other nonfat solids” is increased to \$0.159, having been at \$0.137 under reform and \$0.140 under the Judge order. The make allowance for butter is increased to by \$0.001 per pound under the recommended decision, which reduces the butterfat price by about \$0.0012 per pound as compared to the order reform butterfat price formula.

$$\begin{aligned} \text{Protein Price} = & \\ & (\text{Cheese Price} - 0.165) * 1.405 + \\ & ((\text{Cheese Price} - 0.165) * 1.582 - \text{Butterfat Price} * 0.9) * 1.17. \end{aligned}$$

$$\text{Other Solids Price} = (\text{Dry whey price} - \$0.159) / 0.968$$

$$\text{Butterfat Price} = (\text{Butter Price} - 0.115) / 0.82$$

The recommended decision protein price formula puts relatively more weight on the cheese price. As a result, the protein price under the recommended decision will not change as much as under the order reform or court order decision protein prices when butter prices change relative to cheese (all else constant). The amended moisture adjustment adds about 3.5 cents to the protein price and about 10 cents to the Class III milk price.

### *B. Class IV Formula Changes*

The changes made in the Class IV component formulas are minimal. The make allowances for butter and nonfat dry milk are increased slightly from the Federal order reform levels, by \$0.001 for butter and \$0.003 for nonfat dry milk. (Same as Judge ordered.) The divisor used in the butterfat component formula is unchanged, while the 1.02 divisor previously used in the nonfat solids price formula to reflect the relative values and yields of buttermilk powder and nonfat dry milk is eliminated. With nonfat dry milk priced at \$1.00 per pound, the formula change results in an increase in the Class IV price (3.5 butterfat) of \$0.12 per hundredweight.

$$\text{Class IV butterfat price (per lb.):} \quad (\text{NASS AA butter price} - \$0.115 \text{ M.A.}) / 0.82 \text{ yield factor}$$

$$\text{Class IV nonfat solids price (per lb.):} \quad (\text{NASS nonfat dry milk price} - \$0.14 \text{ M.A.})$$

### III. AGGREGATE RESULTS OF THE CLASS III AND CLASS IV AMENDMENTS

The results of the amendments to the Class III and Class IV formulas are summarized using five-year, 2002-2006, average changes from the model baseline (Tables 2A-2C). The year-to-year changes in key variables from the baseline are presented as well. The results presented for the Federal order system are in the context of the larger U.S. market. In particular, the Federal order price formulas use national manufactured dairy product prices.

#### *A. Results Overview.*

The advanced Class I base price is driven by the higher of the Class III or Class IV skim milk prices. The Class I base price is the Class IV price in all years of the analytical period for both the base formulas and in all years except 2002 and 2006 as amended under the decision. It is possible, however, that in years with one of the classes being the mover, the other class price could be the mover in some months. The Class I price, at the class average test of 2 percent butterfat, is slightly above baseline price levels in each year. This results in small proportional reductions in the demand for skim milk and butterfat for Class I use. Milk generally shifts from Class I use to the production of butter, nonfat dry milk, and cheese in the same proportions as in the baseline. As a result, the wholesale prices of butter, nonfat dry milk and cheese each decrease slightly.

The Federal order blend price (3.5 BF) increases by an average \$0.20 per hundredweight over the 2002-2006 period. The Class I price at 3.5 percent butterfat increases by an average of \$0.06 per hundredweight. The Class III price at 3.5 percent butterfat increases by an average of \$0.38 per hundredweight, while the Class II and Class IV prices (3.5 BF) increase by an average of \$0.04 per hundredweight. The minimum blend price at test increases by \$0.20 as well, but with greater variation in changes among the separate classes, with the average Class IV price declining \$0.07 per hundredweight and the Class III increasing by \$0.38.

The Federal order all-milk price (at test), which includes premiums, increases an average of \$0.10 per hundredweight. This increase reflects an average decline of \$0.22 per hundredweight in the estimated premiums on Class III milk, which is due to the increase in the Class III Federal order price and slight declines in the dairy product prices.

#### *B. Producers*

Over the five-year period, the changes taken as a whole result in an increase of about \$0.20 per hundredweight in the Federal order minimum blend price for milk at test. The Federal order all-milk price, which includes the effects of over-order premiums, is increased by \$0.10 per hundredweight. Federal order marketings increase by an average 83 million pounds, reflecting the increase in the Federal order all-milk price. Cash receipts in the Federal order system increase by \$136 million (0.8 percent) from baseline receipts of \$17,194 million.

The distribution of the 2002-2006 annual average price changes across the 11 orders mainly varies with the distribution of Class III and Class IV utilizations. (See Regional Analysis Section for greater Detail) The increases in the Federal order minimum blend at test range from



\$0.07 in the Florida and Appalachian orders, to \$0.25-\$0.31 in the Western, Central, and Upper Midwest orders. Increases in the Federal order all-milk price, which includes premiums, range from \$0.02 per hundredweight in the Pacific Northwest to \$0.14 per hundredweight in the Central and Mideast orders.

The expected range of changes in the Federal order blend and all-milk prices across the orders could be significantly narrowed or obscured by shifts in milk pooling to take advantage of pool price differences. The analysis assumes that changes in each order's Class III and Class IV utilizations are consistent with system-wide changes. (Regional analysis is discussed in greater detail below.)

The five-year annual average U.S. all-milk price increases by \$0.07 per hundredweight. U.S. milk marketings increase by an average 65 million pounds annually, and cash receipts increase by \$126 million (0.5 percent) from baseline receipts of \$23,884 million.

### *C. Milk Processors and Manufacturers*

Annual Class IV and Class II skim milk prices increase each year by an average of \$0.08 per hundredweight (1.1 percent) for the 2002-2006 period. This results mainly from changing the conversion factor for nonfat dry milk to nonfat solids from 1.02 to 1.0. The Class I skim milk price increase averages \$0.10. Butterfat prices decline each year by an average of 1.05 cents per pound.

Changes in class prices at class butterfat tests indicate the changes in pool obligations per hundredweight of milk, by processor class. The Class IV price at test (about 6.88 percent butterfat) declines by an average of \$0.07 from a baseline average of \$16.98 per hundredweight, mainly as the result of a slight (0.06 percentage points) reduction in the butterfat content of Class IV over 2002-2006. The Class II price at test is unchanged from the baseline average of \$19.02 per hundredweight. The Class I price at test (about 2 percent butterfat) increases on average \$0.07 from a baseline average of \$13.05 per hundredweight (0.57 percent).

The annual average Class III price at test (3.82 percent butterfat) increases by about \$0.38 from a baseline average of \$12.38 per hundredweight during 2002-2006. From the 2002 and 2003 Class III price increase of \$0.48 per hundredweight, the changes steadily decline, ending in an increase of \$0.23 in 2006. The major change in the Class III price is the average protein price increase of \$0.18 per pound, ranging from an increase of \$0.22 in 2002 and 2003 and declining to an increase of about \$0.13 in 2006. The nature of this change is dependent upon the baseline structure of butter and cheese prices. The years of greatest increase are in 2002-2003 when the butter price exceeds the cheese price. The change in the Class III price results primarily from a combination of changes in the protein formula that slightly reduces the impact of the butterfat price on the protein price, and offsets the increase in the dry whey make allowance in the other solids price in all years but 2006.

The slightly lower dairy product prices and higher prices for skim milk in all classes result in a shift of returns from manufacturing plant owners, both proprietary and cooperative, to

producers whose milk is processed by proprietary processors that are pooled on Federal orders. This takes place through the increases in the Federal order milk prices at test and more revenue in the Federal order pools, and through losses of revenues to manufacturing operations because of product price declines.

#### *D. Consumers*

Changes in consumer expenditures are calculated assuming that no changes other than the formula changes occur. The expected \$0.07 per hundredweight increase in the minimum Class I price for 2002-2006 result in an average \$0.006 increase in the price per gallon of fluid milk for consumers. Annual consumer expenditures for fluid milk over 2002-2006 are estimated to increase on average by about \$29 million in the Federal order system and by \$28 million in the U.S.

The price of butter is estimated to decrease on average \$0.008 per pound for the period. Cheese is estimated to decrease \$0.005 per pound. Annual consumer expenditures over the five-year period are estimated to decrease by \$10 million on butter and by \$24.0 million on total cheese, assuming no other economic changes.

### **IV. RESULTS OF THE RECOMMENDED CLASS III AND CLASS IV FORMULA AMENDMENTS BY REGION AND ORDER**

The impacts of the recommended Class III and Class IV formula amendments are extended to the 11 Federal orders and the 12 supply regions that roughly correspond to the 11 orders and the Non-F.O. Regulated Western regions. Regional supply responses were estimated, consistent with the aggregated estimations. In the process of regional supply response estimation, regional and U.S. dairy ration prices were statistically analyzed and shown to be highly correlated.

#### *A. Regional Feed Cost Analysis*

This analysis includes an examination of the relationships of regional feed costs to U.S. average costs and an estimation of regional supply response relationships. Feed costs are among the most important variable costs in milk production. The Dairy Programs model includes a mixed ration cost based upon prices for corn, soybeans, and hay. Milk production is estimated with milk per cow and cow number equations that incorporate the ration cost as the primary variable cost. Other costs are captured in the intercepts of the equations.

The statistical correlations of regional ration price movements with the U.S. ration price were calculated using the April monthly average prices for 1986-1999. April is the only month for which regional and national 16-percent protein dairy ration prices are reported by NASS. The simple correlations of regional feed ration prices to U.S. feed ration prices average 95 percent, ranging between 90 and 99 percent. Further statistical analysis indicates that the means of the regional feed prices are not significantly different from the average U.S. feed price for years 1986-1999, and that regional feed price changes are proportional to U.S. feed price

changes. Therefore, the regional supply relationships use the U.S. feed price as calculated with corn, soybean, and hay prices. The estimated regional parameters on the milk/feed price ratio reflect the proportion of regional to U.S. feed price change. Any other regional differences in marginal costs of production are captured in the parameter estimates for intercepts and other variables.

### *B. Regional Milk Supply Estimation*

Regional supply responses were estimated using the same variables included in the equations for milk marketing in the aggregated FMMOS region. Regional milk prices are the weighted state average all-milk prices from NASS. The relationships are summarized in Appendix B. However, some differences in the regional estimates of elasticities with respect to the milk-feed price ratio are worth noting. Cow numbers are least responsive to the milk-feed price ratio in the Upper Midwest, Central, and Mideast, with elasticities around 0.017. For the Pacific Northwest, Florida, the Northeast, Southeast, and Non-F.O. Regulated West responses to milk-feed prices range from 0.03 to 0.06. In the Southwest and Arizona the milk-feed price elasticity is about 0.074. The highest response is in the Western order at 0.11, the same as in California. The Appalachian region's cow numbers do not significantly respond to the milk-feed price ratio and are dominated by a downward trend.

Milk per cow responses to the milk/feed ratio vary as well. Milk per cow elasticities with respect to milk/feed are less than 0.02 in the Southwest, Central, Northeast, Southeast, and Upper Midwest regions. Milk per cow elasticities range from 0.027 to 0.046 in Appalachia, Pacific Northwest, Mideast, California, and the Non-F.O. Regulated West. Milk per cow response to the milk/feed ratio is not significantly different from zero in Florida, Arizona, and the Western orders.

### *C. Order and Regional Impact of Formula Amendments*

The impacts of the Class III and Class IV amendments are extended to the 11 Federal orders and the 12 supply regions that roughly correspond to the 11 orders and the Non-F.O. Regulated Western regions. Class utilizations for each order are extended to year 2006, assuming pooling patterns similar to those in year 2000 and given Federal order milk marketings through 2006. Pool prices for each order are calculated given the class utilizations and the class prices. The supply of milk marketed through the Federal orders and markets other than California is disaggregated into 12 supply areas by estimating a set of supply relationships that is consistent with the aggregated relationships. Thus, given changes in the respective order and regional prices, changes in milk production and marketings are estimated for each region.

## 1. Federal Order Class Utilizations, 2002-2006

Federal order class utilizations for year 2000 are presented in Table 3. Projected 2002-2006 average class utilizations for each order are shown in Table 4. Overall, the biggest change is that Class III utilization increases from about 43 percent to 47 percent. Class III utilization is projected to be above the system wide 47 percent in three orders, the Upper Midwest (79 percent), Western (63 percent), and Central (61 percent).

Class IV utilization declines about 3 percent, from about 8 percent in 2000 to about 5 percent averaged over the 2002-2006 period. The Pacific Northwest and Arizona-Las Vegas are projected to maintain the highest Class IV utilizations at around 22 percent.

Class I utilization declines by less than one percent to 38 percent across all orders and averaged over the 2002-2006 period. The highest annual average Class I utilizations range from around 65 percent in the Appalachian and Southeast orders to about 85 percent in Florida. The Midwest, Northeast, and Southwest Class I utilizations are about 44 percent. The Western and Upper Midwest orders have the lowest Class I utilizations at 24 and 17 percent, respectively.

Class II utilization for the Federal order system, declines by less than a percent, remaining at about 10 percent. The Northeast Class II utilization is highest at 16 percent, followed by the Appalachian and Southeast orders at around 13 percent.

## 2. Federal Order Blend Price Changes

The estimated impacts of the formula changes on each order's minimum blend prices at test are reported in Table 5. The range of the five-year average \$0.20 impact on the minimum blend prices at test is \$0.07 per cwt. (Appalachian and Florida) to \$0.31 per cwt. (Upper Midwest). Differences in the orders' class utilizations determine the effects on the blend and all-milk prices.

Orders with highest Class III utilization, Upper Midwest, Western, and Central are affected the most from the average \$0.38 increase over the baseline average Class III price of \$12.38 per hundredweight. The Upper Midwest blend price increases by \$0.31 over the five-year average of \$12.67 per hundredweight. The Central and Western blend prices increase by \$0.25 over average blend prices of about \$13.00 per hundredweight.

Orders with low Class III utilizations (Florida and Appalachian) are affected the least from the Recommended Decision, with increases of \$0.07 over five-year average blend prices of about \$14.60 per hundredweight. The minimum blend price increases for the other orders range from \$0.16 to \$0.21 per hundredweight.

The price changes by order presented assume pooling patterns trended from year 2000. The recommended formulas would somewhat reduce incentives to shift milk out of the Upper Midwest, Western, and Central orders and onto orders with higher blend prices. However, cooperatives and individual producers shift milk from orders with lower prices to orders with higher prices to the extent that the changes in revenues exceed the costs of qualifying milk to be

pooled on the higher-priced order. The average blend price would increase by \$0.20 per hundredweight, and it is expected that the process of shifting milk among the separate orders for price advantage would tighten the distribution of the 11 order blend prices around the \$0.20 average.

### 3. Changes in Federal Order Blend Price plus Premiums

The positive impact on the Federal order all-milk price, the blend price plus premiums, is less than the impact on the blend price (Table 6). The premium on Class III milk is decreased by an average of \$0.22 per hundredweight, due to increases in the Federal order Class III price and the decline in the product prices.

The range of the five-year \$0.10 average change in the all-milk prices by order is \$0.02 per cwt. (Pacific Northwest) to \$0.11 per cwt. (Mideast). The primary determinants of the magnitude of change in blend price plus premiums are Class III utilization and the proportion that is American cheese. To the extent that Class III utilization comprises “other cheese”, less of the Class III price increase is offset by loss in premiums.

Orders with changes of \$0.13-\$0.14 per cwt. include the Central, Mideast, and Northeast. These orders are distinguished by higher levels of “other cheese” production, for which higher levels of premiums are maintained along with the higher Class III price. The Upper Midwest increase of \$0.11 reflects that only about half of its 78 percent Class III utilization is “other cheese”.

Average price changes in the remaining regions range from \$0.02 to \$0.07 per hundredweight. At the high end are Arizona-Las Vegas (\$0.07) with about half its Class III utilization in “other cheese”, and Florida (\$0.06) with its 85 percent Class I utilization. The Appalachian and Southeast prices increase by \$0.04, the Southwest and West increase by \$0.03, and the Pacific Northwest increase is \$0.02 per hundredweight.

### 4. Regional Milk Production Changes

Regional milk production is projected through the 2002-2006 analytical period to be consistent with the projected Federal order all-milk prices and projected U.S. milk production. Milk price changes in the milk supply regions are assumed to be consistent with the changes in Federal orders= all-milk prices resulting from the Recommended Decision. Regional milk production change estimates due to implementing the Recommended Decision are shown in Table 7. The 5-year average regional milk production changes range from unchanged in the Non-F.O. Regulated West, to plus 27 million pounds in the Northeast.

The Northeast and Upper Midwest milk production increases are by far the largest change, averaging 27 and 25 million pounds, respectively, over 2002-2006. The Northeast has the highest percent increase (0.09%) in milk production of all regions, while the Upper Midwest percent increase is slightly smaller (0.07%), and its milk production base is larger.

Milk production increases by 10 million pounds in the Mideast region and by 7-8 million pounds in the Southwest and West regions, where the Federal order all-milk price increases are \$0.14 and \$0.03 respectively. The response of cow numbers to milk price changes is the lowest in the Mideast with an elasticity of about 0.015, about 0.075 in the Southwest, and highest in the Western region at 0.11,

Milk production increases in all other regions range from no change up to about 5 million pound increases on average over the five-year period.

Again, it is pointed out that these production changes assume that changes in regional milk prices reflect changes in the Federal order all-milk prices, which are highly dependent on year 2000 pooling patterns.

Table 1A: Baseline: Selected Supply-Demand-Price Estimates from the Model Baseline Based on the USDA Baseline, 2002-2006.

	Units	2002	2003	2004	2005	2006	5-year average
<b>U.S. Milk Production</b>	mil. Lbs	170,174	173,279	176,079	177,957	180,086	175,515
<b>U.S. Marketings</b>							
Class I	mil. Lbs	56,396	56,931	57,358	57,281	57,398	57,073
Class II	mil. Lbs	15,616	15,794	15,814	15,889	16,004	15,823
Class III	mil. Lbs	81,109	84,289	86,772	88,840	90,586	86,319
Class IV	mil. Lbs	16,244	15,475	15,424	15,261	15,486	15,578
Total U.S. Marketings	mil. Lbs	169,074	172,204	175,079	176,982	179,186	174,505
Import Ingredients	mil. Lbs	290	284	290	289	287	288
Total Supply	mil. Lbs	169,364	172,488	175,369	177,270	179,473	174,793
<b>U.S. Marketings Fat</b>							
Class I Fat	mil. Lbs	1,142	1,153	1,162	1,160	1,163	1,156
Class II Fat	mil. Lbs	1,336	1,349	1,351	1,356	1,365	1,351
Class III Fat	mil. Lbs	2,812	2,900	2,974	3,046	3,111	2,969
Class IV Fat	mil. Lbs	933	936	958	951	955	947
Total U.S. Fat	mil. Lbs	6,202	6,316	6,422	6,491	6,572	6,401
Import Ingredients Fat	mil. Lbs	22	22	22	22	22	22
Total Supply Fat	mil. Lbs	6,223	6,338	6,444	6,513	6,594	6,423
<b>U.S. Marketings SNF</b>							
Class I SNF	mil. Lbs	4,997	5,045	5,083	5,076	5,087	5,057
Class II SNF	mil. Lbs	1,291	1,306	1,308	1,314	1,324	1,309
Class III SNF	mil. Lbs	7,081	7,361	7,579	7,760	7,912	7,539
Class IV SNF	mil. Lbs	1,385	1,315	1,308	1,294	1,314	1,323
Total U.S. SNF	mil. Lbs	14,730	15,003	15,254	15,421	15,614	15,204
Import Ingredients SNF	mil. Lbs	24	24	24	24	24	24
Total Supply SNF	mil. Lbs	14,754	15,027	15,278	15,445	15,637	15,228
<b>U.S. Marketings Skim</b>							
Class I Skim	mil. Lbs	55,253	55,778	56,196	56,120	56,235	55,917
Class II Skim	mil. Lbs	14,280	14,445	14,464	14,533	14,639	14,472
Class III Skim	mil. Lbs	78,297	81,388	83,799	85,794	87,474	83,350
Class IV Skim	mil. Lbs	15,311	14,539	14,467	14,310	14,531	14,631
Total U.S. Skim	mil. Lbs	162,872	165,888	168,657	170,490	172,614	168,104
Import Ingredients Skim	mil. Lbs	268	262	268	267	265	266
Total Supply Skim	mil. Lbs	163,140	166,150	168,925	170,757	172,879	168,370
<b>Product Prices</b>							
Cheese Price	\$/lb.	1.3121	1.2547	1.3096	1.3549	1.4104	1.3284
Dry Whey Price	\$/lb.	0.2268	0.2208	0.2286	0.2309	0.2380	0.2290
Butter Price	\$/lb.	1.3815	1.3790	1.3396	1.2265	1.1668	1.2987
NDM Price	\$/lb.	0.9265	0.8726	0.9670	1.0843	1.1401	0.9981
<b>U.S. Milk Prices at Test</b>							
U.S. All-milk price	\$/cwt.	13.42	13.05	13.57	13.99	14.36	13.68
<b>Cash Receipts</b>							
United States	Mil. Dol.	22,698	22,469	23,750	24,767	25,738	23,884

Table 1B: Baseline: Selected Supply-Demand-Price Estimates from the Model Baseline Based on the USDA Baseline, 2002-2006.

	Units	2002	2003	2004	2005	2006	5-year average
<b>F.O. Marketings</b>							
Class I	mil. Lbs	46,295	46,726	47,075	47,031	47,130	46,851
Class II	mil. Lbs	11,526	11,653	11,665	11,702	11,773	11,664
Class III	mil. Lbs	52,447	56,059	57,820	59,053	61,042	57,284
Class IV	mil. Lbs	7,525	6,876	6,494	5,833	5,443	6,434
Total F.O. Marketings	mil. Lbs	117,792	121,315	123,053	123,619	125,387	122,233
<b>F.O. Marketings Fat</b>							
Class I Fat	mil. Lbs	935	944	951	950	952	946
Class II Fat	mil. Lbs	905	913	914	916	921	914
Class III Fat	mil. Lbs	2,020	2,138	2,195	2,246	2,330	2,186
Class IV Fat	mil. Lbs	463	457	456	424	399	440
Total F.O. Fat	mil. Lbs	4,323	4,452	4,516	4,537	4,602	4,486
<b>F.O. Marketings SNF</b>							
Class I SNF	mil. Lbs	4,129	4,168	4,199	4,195	4,204	4,179
Class II SNF	mil. Lbs	961	972	973	976	982	973
Class III SNF	mil. Lbs	4,524	4,839	4,993	5,100	5,272	4,946
Class IV SNF	mil. Lbs	633	575	541	484	450	537
Total F.O. SNF	mil. Lbs	10,248	10,554	10,706	10,755	10,909	10,634
<b>F.O. Marketings Skim</b>							
Class I Skim	mil. Lbs	45,360	45,782	46,124	46,081	46,178	45,905
Class II Skim	mil. Lbs	10,621	10,740	10,751	10,785	10,852	10,750
Class III Skim	mil. Lbs	50,426	53,922	55,624	56,807	58,712	55,098
Class IV Skim	mil. Lbs	7,062	6,419	6,038	5,409	5,044	5,994
Total F.O. Skim	mil. Lbs	113,469	116,863	118,537	119,082	120,785	117,747
<b>F.O. Fat Content by Class</b>							
Class I	%	2.02%	2.02%	2.02%	2.02%	2.02%	2.02%
Class II	%	7.85%	7.84%	7.84%	7.83%	7.82%	7.84%
Class III	%	3.85%	3.81%	3.80%	3.80%	3.82%	3.82%
Class IV	%	6.15%	6.65%	7.02%	7.27%	7.33%	6.88%
Total	%	3.67%	3.67%	3.67%	3.67%	3.67%	3.67%
<b>F.O. Fat Value</b>							
Class I	Mil. \$	1,471	1,482	1,447	1,314	1,248	1,471
Class II	Mil. \$	1,405	1,415	1,372	1,250	1,189	1,405
Class III	Mil. \$	3,123	3,298	3,281	3,048	2,991	3,123
Class IV	Mil. \$	715	706	681	575	512	715
Total	Mil. \$	6,713	6,900	6,782	6,187	5,940	6,713
<b>F.O. Skim Value</b>							
Class I	Mil. \$	4,380	4,203	4,619	5,091	5,329	4,380
Class II	Mil. \$	814	772	863	977	1,036	814
Class III	Mil. \$	3,306	3,192	3,751	4,423	5,112	3,306
Class IV	Mil. \$	492	417	442	452	446	492
Total	Mil. \$	8,992	8,585	9,674	10,943	11,925	8,992



Table 1C: Baseline: Selected Supply-Demand-Price Estimates from the Model Baseline Based on the USDA Baseline, 2002-2006.

	Units	2002	2003	2004	2005	2006	5-year average
<b>F.O. Component Prices</b>							
Protein Price	\$/lb.	1.9383	1.7450	1.9952	2.3270	2.6103	2.1232
Other Solids Price	\$/lb.	0.0928	0.0866	0.0946	0.0970	0.1043	0.0951
Nonfat Solids Price	\$/lb.	0.7740	0.7212	0.8137	0.9287	0.9835	0.8442
<b>F.O. Class Fat Prices</b>							
Class I Price	\$/lb.	1.5726	1.5696	1.5215	1.3836	1.3108	1.4716
Class II Price	\$/lb.	1.5527	1.5497	1.5016	1.3637	1.2909	1.4517
Class III price	\$/lb.	1.5457	1.5427	1.4946	1.3567	1.2839	1.4447
Class IV price	\$/lb.	1.5457	1.5427	1.4946	1.3567	1.2839	1.4447
Fat Pool Price	\$/lb.	1.5530	1.5499	1.5017	1.3638	1.2908	1.4518
<b>F.O. Class Skim Prices</b>							
Class I Price	\$/cwt.	9.6560	9.1808	10.0136	11.0486	11.5411	10.2880
Class II Price	\$/cwt.	7.6660	7.1908	8.0236	9.0586	9.5511	8.2980
Class III price	\$/cwt.	6.5563	5.9205	6.7431	7.7859	8.7075	7.1427
Class IV price	\$/cwt.	6.9660	6.4908	7.3236	8.3586	8.8511	7.5980
Skim Pool Price	\$/cwt.	7.9248	7.3458	8.1614	9.1897	9.8726	8.4989
<b>Over-order Premiums</b>							
Class I Over-order	\$/cwt.	0.96	0.99	1.01	1.02	1.04	1.01
Class III Premium	\$/cwt.	0.54	1.04	0.83	0.73	0.72	0.77
<b>F.O. Milk Prices at 3.5% Fat</b>							
Minimum Class I Price	\$/cwt.	14.82	14.35	14.99	15.50	15.72	15.08
Minimum Class II Price	\$/cwt.	12.83	12.36	13.00	13.51	13.73	13.09
Minimum Class III price	\$/cwt.	11.74	11.11	11.74	12.26	12.90	11.95
Minimum Class IV price	\$/cwt.	12.13	11.66	12.30	12.81	13.03	12.39
Minimum Blend Price	\$/cwt.	13.08	12.51	13.13	13.64	14.05	13.28
Blend + Premiums Milk Price	\$/cwt.	13.38	13.05	13.58	14.05	14.45	13.70
<b>F.O. Milk Prices at Test</b>							
Minimum Class I Price	\$/cwt.	12.64	12.17	12.88	13.62	13.96	13.05
Minimum Class II Price	\$/cwt.	19.25	18.77	19.16	19.03	18.90	19.02
Minimum Class III price	\$/cwt.	12.26	11.58	12.16	12.65	13.28	12.38
Minimum Class IV price	\$/cwt.	16.04	16.32	17.30	17.61	17.61	16.98
Minimum Blend Price	\$/cwt.	13.33	12.76	13.37	13.86	14.25	13.52
Blend + Premiums Milk Price	\$/cwt.	13.63	13.30	13.82	14.27	14.65	13.93
<b>Cash Receipts</b>							
Federal Order	Mil. Dol.	16,055	16,137	17,006	17,636	18,375	17,042

Table 2A: Recommended Decision: Changes in Selected United States Supply-Demand-Price Estimates from the Model Baseline Based on the USDA Baseline, 2002-2006.

	Units	Change from Baseline due to Recommended Decision					Baseline		Percentage change from baseline
		2002	2003	2004	2005	2006	5-year average	5-year average	
<b>U.S. Milk Production</b>	mil. Lbs	29	64	78	78	73	65	175,515	0.037%
<b>U.S. Marketings</b>									
Class I	mil. Lbs	-32	-32	-39	-46	-61	-42	57,153	-0.073%
Class II	mil. Lbs	3	9	9	3	-2	4	15,844	0.028%
Class III	mil. Lbs	27	56	69	87	105	69	86,439	0.079%
Class IV	mil. Lbs	31	32	39	34	31	33	15,599	0.213%
Total U.S. Marketings	mil. Lbs	29	64	78	78	73	65	174,505	0.037%
<b>U.S. Marketings Fat</b>									
Class I Fat	mil. Lbs	-1	-1	-1	-1	-1	-1	1,156	-0.072%
Class II Fat	mil. Lbs	0	1	1	0	0	0	1,351	0.024%
Class III Fat	mil. Lbs	1	2	3	3	4	3	2,969	0.086%
Class IV Fat	mil. Lbs	0	0	0	0	0	0	947	0.034%
Total U.S. Fat	mil. Lbs	1	2	3	3	3	2	6,401	0.037%
<b>U.S. Marketings SNF</b>									
Class I SNF	mil. Lbs	-3	-3	-3	-4	-5	-4	5,057	-0.073%
Class II SNF	mil. Lbs	0	1	1	0	0	0	1,309	0.029%
Class III SNF	mil. Lbs	2	5	6	8	9	6	7,539	0.079%
Class IV SNF	mil. Lbs	3	3	3	3	3	3	1,323	0.225%
Total U.S. SNF	mil. Lbs	3	6	7	7	6	6	15,204	0.037%
<b>U.S. Marketings Skim</b>									
Class I Skim	mil. Lbs	-31	-32	-38	-45	-60	-41	55,997	-0.073%
Class II Skim	mil. Lbs	3	8	8	3	-1	4	14,493	0.029%
Class III Skim	mil. Lbs	26	54	67	83	101	66	83,471	0.079%
Class IV Skim	mil. Lbs	31	32	39	33	30	33	14,652	0.225%
Total U.S. Skim	mil. Lbs	28	62	75	75	70	62	168,613	0.037%
<b>Product Prices</b>									
Cheese Price	\$/lb.	-0.0033	-0.0049	-0.0052	-0.0056	-0.0059	-0.0050	1.3284	-0.375%
Dry Whey Price	\$/lb.	-0.0002	-0.0003	-0.0003	-0.0004	-0.0004	-0.0003	0.2290	-0.130%
Butter Price	\$/lb.	-0.0080	-0.0070	-0.0092	-0.0078	-0.0063	-0.0077	1.2987	-0.589%
NDM Price	\$/lb.	-0.0024	-0.0048	-0.0038	-0.0052	-0.0062	-0.0045	0.9981	-0.447%
<b>U.S. Milk Prices at Test</b>									
U.S. All-milk price	\$/cwt.	0.09	0.07	0.07	0.05	0.05	0.07	13.68	0.491%
<b>Cash Receipts</b>									
United States	Mil. Dol.	161.3	132.4	129.9	104.0	100.2	125.6	23,884.3	0.526%

Table 2B: Recommended Decision: Changes in Federal Order Marketings and Class Revenues from the Model Baseline Based on the USDA Baseline, 2002-2006.

	Units	Change from Baseline due to Recommended Decision					Baseline		Percentage change from baseline
		2002	2003	2004	2005	2006	5-year average	5-year average	
<b>F.O. Marketings</b>									
Class I	mil. Lbs	-32	-35	-42	-50	-65	-45	46,851	-0.095%
Class II	mil. Lbs	2	7	7	2	-1	3	11,664	0.029%
Class III	mil. Lbs	16	36	45	57	70	45	57,284	0.078%
Class IV	mil. Lbs	51	71	88	91	95	79	6,434	1.231%
Total F.O. Marketings	mil. Lbs	38	80	97	101	99	83	122,233	0.068%
<b>F.O. Marketings Fat</b>									
Class I Fat	mil. Lbs	-1	-1	-1	-1	-1	-1	946	-0.095%
Class II Fat	mil. Lbs	0	0	0	0	0	0	914	0.025%
Class III Fat	mil. Lbs	1	2	2	2	3	2	2,186	0.086%
Class IV Fat	mil. Lbs	1	2	2	2	2	2	440	0.420%
Total F.O. Fat	mil. Lbs	1	3	4	4	4	3	4,486	0.068%
<b>F.O. Marketings SNF</b>									
Class I SNF	mil. Lbs	-3	-3	-4	-4	-6	-4	4,179	-0.095%
Class II SNF	mil. Lbs	0	1	1	0	0	0	973	0.030%
Class III SNF	mil. Lbs	1	3	4	5	6	4	4,946	0.079%
Class IV SNF	mil. Lbs	5	6	8	8	8	7	537	1.307%
Total F.O. SNF	mil. Lbs	3	7	8	9	9	7	10,634	0.068%
<b>F.O. Marketings Skim</b>									
Class I Skim	mil. Lbs	-31	-34	-41	-49	-64	-44	45,905	-0.095%
Class II Skim	mil. Lbs	2	6	6	2	-1	3	10,750	0.029%
Class III Skim	mil. Lbs	16	35	43	54	68	43	55,098	0.078%
Class IV Skim	mil. Lbs	50	69	86	89	93	77	5,994	1.291%
Total F.O. Skim	mil. Lbs	37	77	94	97	96	80	117,747	0.068%
<b>F.O. Fat Content by Class</b>									
Class I	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.02%	0.000%
Class II	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	7.84%	-0.004%
Class III	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.82%	0.007%
Class IV	%	-0.03%	-0.04%	-0.06%	-0.07%	-0.08%	-0.06%	6.88%	-0.853%
Total	%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	3.67%	0.000%
<b>F.O. Fat Value</b>									
Class I	Mil. \$	-11.3	-10.2	-13.1	-11.6	-10.2	-11.3	1,470.6	-0.767%
Class II	Mil. \$	-9.7	-8.2	-10.6	-9.6	-8.4	-9.3	1,404.8	-0.662%
Class III	Mil. \$	-20.9	-18.3	-24.3	-21.0	-17.4	-20.4	3,123.0	-0.653%
Class IV	Mil. \$	-3.5	-2.0	-2.6	-1.6	-0.6	-2.0	715.0	-0.287%
Total	Mil. \$	-45.3	-38.7	-50.7	-43.7	-36.6	-43.0	6,713.4	-0.641%
<b>F.O. Skim Value</b>									
Class I	Mil. \$	52.5	24.3	35.1	37.8	51.4	40.2	4,379.9	0.919%
Class II	Mil. \$	9.8	6.9	9.7	10.3	10.1	9.4	814.2	1.150%
Class III	Mil. \$	269.5	290.1	271.1	206.6	165.2	240.5	3,306.1	7.274%
Class IV	Mil. \$	9.9	8.4	11.5	12.6	13.1	11.1	492.0	2.255%
Total	Mil. \$	341.8	329.7	327.4	267.3	239.7	301.2	8,992.2	3.349%

Table 2C: Recommended Decision: Changes in Federal Order Prices and Cash Receipts from the Model Baseline Based on the USDA Baseline, 2002-2006.

	Units	Change from Baseline due to Recommended Decision					Baseline		Percentage change from baseline
		2002	2003	2004	2005	2006	5-year average	5-year average	
<b>F.O. Component Prices</b>									
Protein Price	\$/lb.	0.2153	0.2160	0.1993	0.1588	0.1315	0.1841	2.1232	8.673%
Other Solids Price	\$/lb.	-0.0229	-0.0230	-0.0230	-0.0231	-0.0232	-0.0230	0.0951	-24.235%
Nonfat Solids Price	\$/lb.	0.0101	0.0067	0.0095	0.0104	0.0105	0.0094	0.8442	1.116%
<b>F.O. Class Fat Prices</b>									
Class I Price	\$/lb.	-0.0110	-0.0097	-0.0124	-0.0107	-0.0090	-0.0105	1.4716	-0.717%
Class II Price	\$/lb.	-0.0110	-0.0097	-0.0124	-0.0107	-0.0090	-0.0105	1.4517	-0.727%
Class III price	\$/lb.	-0.0110	-0.0097	-0.0124	-0.0107	-0.0090	-0.0105	1.4447	-0.730%
Class IV price	\$/lb.	-0.0110	-0.0097	-0.0124	-0.0107	-0.0090	-0.0105	1.4447	-0.730%
Fat Pool Price	\$/lb.	-0.0110	-0.0097	-0.0124	-0.0107	-0.0090	-0.0106	1.4518	-0.727%
<b>F.O. Class Skim Prices</b>									
Class I Price	\$/cwt.	0.12	0.06	0.09	0.09	0.13	0.10	10.29	0.950%
Class II Price	\$/cwt.	0.09	0.06	0.09	0.09	0.09	0.08	8.30	1.022%
Class III price	\$/cwt.	0.53	0.53	0.48	0.36	0.27	0.43	7.14	6.089%
Class IV price	\$/cwt.	0.09	0.06	0.09	0.09	0.09	0.08	7.60	1.116%
Skim Pool Price	\$/cwt.	0.30	0.28	0.27	0.22	0.19	0.25	8.50	2.947%
<b>Over-order Premiums</b>									
Class I Over-order	\$/cwt.	-0.001	-0.001	-0.001	-0.001	-0.002	-0.001	1.01	-0.133%
Class III Premium	\$/cwt.	-0.27	-0.27	-0.24	-0.17	-0.14	-0.22	0.77	-28.066%
<b>F.O. Milk Prices at 3.5% Fat</b>									
Minimum Class I Price	\$/cwt.	0.08	0.02	0.04	0.05	0.09	0.06	15.08	0.381%
Minimum Class II Price	\$/cwt.	0.05	0.02	0.04	0.05	0.06	0.04	13.09	0.343%
Minimum Class III price	\$/cwt.	0.48	0.48	0.42	0.31	0.23	0.38	11.95	3.204%
Minimum Class IV price	\$/cwt.	0.05	0.02	0.04	0.05	0.06	0.04	12.39	0.363%
Minimum Blend Price	\$/cwt.	0.25	0.23	0.22	0.17	0.15	0.20	13.28	1.542%
Blend + Premiums Milk Price	\$/cwt.	0.13	0.11	0.11	0.09	0.09	0.10	13.70	0.759%
<b>F.O. Milk Prices at Test</b>									
Minimum Class I Price	\$/cwt.	0.10	0.04	0.06	0.07	0.11	0.07	13.05	0.570%
Minimum Class II Price	\$/cwt.	0.00	-0.02	-0.02	0.00	0.02	0.00	19.02	-0.026%
Minimum Class III price	\$/cwt.	0.47	0.48	0.42	0.30	0.23	0.38	12.38	3.056%
Minimum Class IV price	\$/cwt.	-0.02	-0.07	-0.10	-0.08	-0.08	-0.07	16.98	-0.419%
Minimum Blend Price	\$/cwt.	0.25	0.23	0.21	0.17	0.15	0.20	13.52	1.499%
Blend + Premiums Milk Price	\$/cwt.	0.13	0.11	0.10	0.09	0.08	0.10	13.93	0.731%
<b>Cash Receipts</b>									
Federal Order	Mil. Dol.	156.7	139.8	140.7	120.7	120.9	135.7	17,193.7	0.789%

Table 3: Class Utilization by Federal Orders, 2000

	Class I	Class II	Class III	Class IV
Northeast	43.86%	17.40%	29.02%	9.72%
Appalachian	68.75%	14.07%	6.42%	10.77%
Florida	88.09%	6.75%	2.22%	2.93%
Southeast	65.01%	10.70%	16.32%	7.97%
Upper Midwest	17.47%	3.55%	78.14%	0.83%
Central	30.40%	7.43%	58.57%	3.59%
Mideast	47.36%	14.95%	31.40%	6.29%
Pacific Northwest	30.99%	6.87%	34.67%	27.47%
Southwest	45.57%	9.01%	38.29%	7.13%
Arizona-Las Vegas	31.30%	4.46%	36.10%	28.14%
Western	25.05%	9.01%	57.33%	8.62%
Total 2000	39.33%	10.22%	42.69%	7.75%

Table 4: Adjusted 5-year Average Class Utilization by Federal Orders to reflect the 5-year Average Federal Order Class Utilization under the Baseline Model

	Class I	Class II	Class III	Class IV
Northeast	42.75%	16.25%	34.85%	6.15%
Appalachian	67.01%	13.13%	7.71%	12.14%
Florida	85.87%	6.30%	2.67%	5.16%
Southeast	63.37%	9.99%	19.60%	7.04%
Upper Midwest	17.03%	3.32%	78.82%	0.83%
Central	29.63%	6.94%	61.43%	2.00%
Mideast	46.17%	13.96%	37.50%	2.37%
Pacific Northwest	30.21%	6.41%	41.65%	21.73%
Southwest	44.42%	8.41%	46.17%	1.00%
Arizona-Las Vegas	30.51%	4.16%	43.36%	21.97%
Western	24.42%	8.41%	63.17%	4.00%
Total	38.34%	9.55%	46.84%	5.28%

Table 5: Changes in Minimum Blend Prices at Test due to the Recommended Decision from the Model Baseline, by Federal Orders, 2002-2006 and 5-year average

	Units	Change from Baseline due to Recommended Decision						Baseline	Percentage change from baseline
		2002	2003	2004	2005	2006	5-year average	5-year average	
Northeast	\$/cwt	0.19	0.17	0.17	0.14	0.14	0.16	14.30	0.00%
Appalachian	\$/cwt	0.10	0.05	0.06	0.07	0.09	0.07	14.52	0.51%
Florida	\$/cwt	0.10	0.05	0.06	0.07	0.10	0.07	14.62	0.51%
Southeast	\$/cwt	0.15	0.11	0.12	0.11	0.12	0.12	13.99	0.86%
Upper Midwest	\$/cwt	0.38	0.38	0.34	0.25	0.20	0.31	12.67	2.44%
Central	\$/cwt	0.31	0.30	0.27	0.21	0.17	0.25	12.94	1.95%
Mideast	\$/cwt	0.20	0.19	0.19	0.14	0.13	0.17	13.46	1.27%
Pacific Northwest	\$/cwt	0.20	0.19	0.18	0.15	0.13	0.17	13.72	1.23%
Southwest	\$/cwt	0.26	0.23	0.22	0.17	0.15	0.21	13.32	1.55%
Arizona-Las Vegas	\$/cwt	0.21	0.20	0.18	0.15	0.14	0.18	13.67	1.28%
Western	\$/cwt	0.32	0.31	0.27	0.21	0.17	0.25	12.97	1.96%
Total	\$/cwt	0.25	0.23	0.21	0.17	0.15	0.20	13.52	1.50%

Table 6: Changes in Blend Prices at Test Plus Premiums due to the Recommended Decision from the Model Baseline, by Federal Orders, 2002-2006 and 5-year average

	Units	2002	2003	2004	2005	2006	5-year average
Northeast	\$/cwt	0.15	0.13	0.13	0.12	0.12	0.13
Appalachian	\$/cwt	0.07	0.02	0.03	0.04	0.06	0.04
Florida	\$/cwt	0.09	0.03	0.05	0.06	0.09	0.06
Southeast	\$/cwt	0.07	0.02	0.03	0.04	0.06	0.04
Upper Midwest	\$/cwt	0.14	0.13	0.12	0.09	0.07	0.11
Central	\$/cwt	0.17	0.16	0.15	0.11	0.10	0.14
Mideast	\$/cwt	0.16	0.15	0.15	0.12	0.11	0.14
Pacific Northwest	\$/cwt	0.04	0.01	0.01	0.02	0.03	0.02
Southwest	\$/cwt	0.05	0.01	0.02	0.02	0.03	0.03
Arizona-Las Vegas	\$/cwt	0.10	0.07	0.07	0.06	0.06	0.07
Western	\$/cwt	0.05	0.03	0.03	0.02	0.02	0.03
Total	\$/cwt	0.13	0.11	0.10	0.09	0.08	0.10

Table 7: Changes in Milk Production due to the Recommended Decision from the Model Baseline, by regions, 2002-2006 and 5-year average

Regions	Units	Change from Baseline due to Recommended Decision					5-year average	Baseline	Percentage change from baseline
		2002	2003	2004	2005	2006		5-year average	
Northeast	mil. lbs.	17	28	31	30	29	27	29,753	0.09%
Appalachian	mil. lbs.	1	2	2	2	2	2	6,285	0.03%
Southeast	mil. lbs.	0	2	3	4	5	3	4,510	0.07%
Mideast	mil. lbs.	3	11	12	12	10	10	12,837	0.07%
Southwest	mil. lbs.	1	6	8	10	13	7	13,090	0.06%
Central	mil. lbs.	4	5	6	5	4	5	11,284	0.04%
Upper Midwest	mil. lbs.	10	23	31	33	31	25	35,276	0.07%
West	mil. lbs.	5	7	8	9	9	8	10,259	0.07%
Pacific NW	mil. lbs.	1	3	3	3	4	3	8,263	0.03%
Florida	mil. lbs.	0	1	1	1	1	1	2,535	0.03%
Arizona	mil. lbs.	2	3	3	3	3	3	3,659	0.07%
Unregulated West	mil. lbs.	0	0	0	0	0	0	339	0.05%
Total Federal Order plus 1/ Other Marketings	mil. lbs.	44	89	109	112	110	93	138,186	0.07%
California	mil. lbs.	-14	-25	-31	-34	-37	-28	37,329	-0.08%
Total Milk Production	mil. lbs.	29	64	78	78	73	65	175,515	0.04%

1/ Baseline 5-year average include 95 million pounds of milk production in the states of Alaska and Hawaii.  
Assume no change in production in those states due to Recommended decision.

## Appendix A

### Pricing Formulas as Modified in Recommended Final Decision

Make Allowance = M.A.  
changes in bold

Class III/IV:

Butterfat price (per lb.):  $(\text{NASS AA butter price} - \mathbf{\$0.115 \text{ M.A.}}) / 0.82 \text{ yield factor}$

Class IV:

Class IV nonfat solids price (per lb.):  $(\text{NASS nonfat dry milk price} - \mathbf{\$0.14 \text{ M.A.}}) (\mathbf{\text{no divisor}})$

Class IV skim milk price (per cwt.):  $(\text{Class IV nonfat solids price} \times 9)$

Class IV price (per cwt.):  $(\text{Class IV skim milk price} \times 0.965) + (\text{Butterfat price} \times 3.5)$

Class III:

NASS weighted average cheese price (per lb.): Weighted average of the NASS 500-pound barrel price (**adjusted to 38% moisture**) plus 3 cents and the NASS 40-pound block price, both as reported by the Department for the month

Class III protein price (per lb.):  $((\text{NASS wtd. avg. cheese price} - \mathbf{\$0.165 \text{ M.A.}}) \times 1.405 \text{ yield factor}) + (((\text{NASS wtd. avg. cheese price} - \mathbf{\$0.165 \text{ M.A.}}) \times 1.582 \text{ yield factor}) - (\text{Butterfat price} \times \mathbf{0.90})) \times \mathbf{1.17}$

Class III other nonfat solids (per lb.):  $(\text{NASS dry whey price} - \mathbf{\$0.159 \text{ M.A.}}) / 0.968 \text{ yield factor}$

Class III skim milk price (per cwt.):  $(\text{Class III protein price} \times 3.1) + (\text{Other nonfat solids price} \times 5.9)$

Class III price (per cwt.):  $(\text{Class III skim milk price} \times 0.965) + (\text{Butterfat price} \times 3.5)$



Class II:

Class II skim milk price (per cwt.):	(Advanced Class IV skim milk price + \$0.70)
Class II nonfat solids price (per lb.):	(Class II skim milk price) / 9
Class II butterfat price (per lb.):	(Butterfat price + \$0.007)
Class II price (per cwt.):	(Class II skim milk price X 0.965) + (Class II butterfat price X 3.5)

Class I:

Class I skim milk price (per cwt.):	The skim milk price of the higher of the advanced Class III or Class IV milk prices plus the Class I differential adjusted for location
Class I butterfat price (per lb.):	The butterfat price plus (the Class I differential adjusted for location divided by 100)
Class I price (per cwt.):	(Class I skim milk price X 0.965) + (3.5 X Class I butterfat price)

Advanced pricing factors:

For use in calculating the Class I skim milk and butterfat prices and the Class II skim milk and nonfat solids prices, the advanced pricing factors are computed using the weighted average of the 2 most recent NASS U.S. average weekly survey prices announced before the 24<sup>th</sup> day of the month.

Prices to producers:

Skim/butterfat orders:	No change from current
Component orders:	
Protein price (per lb.):	Protein price from Class III protein price calculation.
Other solids price (per lb.):	Other solids price from Class III other solids price calculation.
Butterfat price (per lb.):	Butterfat price from Class III and IV butterfat price calculation.

All hundredweight prices are rounded to the nearest whole cent.  
All component prices are rounded to the nearest one-hundredth cent.

## Appendix B

### Dairy Programs Econometric Model as Specified for Class III and Class IV Price Formula Analysis

#### Introduction

An econometric model of the U.S. dairy industry developed by Dairy Programs' Office of the Chief Economist is used to support its economic analysis and forecasting responsibilities. The model is comprehensive, including the supply of milk, the allocation of butterfat and nonfat solids to fluid milk and the major manufactured dairy products, and consumer demands for milk and dairy products. The model's supply and demand equations are estimated using annual data from 1980 to 1999. The model is specified to generate long-term supply, demand, and price projections that are consistent with USDA's official baseline projections for the dairy sector. The model is estimated and simulated with SAS (SAS Institute, Inc., *SAS/ETS User's Guide*. Version 6, Second Edition).

Modifications to the official USDA baseline for Federal order analyses include shifting the baseline from a fiscal year basis to a calendar year basis, and breaking out Federal order milk marketings from national milk marketings. For information on USDA's official baseline, see *USDA Agricultural Baseline Projections to 2010*, U.S. Department of Agriculture, Office of the Chief Economist, World Agricultural Outlook Board, Staff Report WAOB-2001-1. The model includes the Federal Milk Marketing Order pricing and pooling system, as well as the dairy price support program.

The dynamic model forecasts annual milk production, fluid milk and manufactured dairy product consumption, and the respective prices, sequentially along the designated time path of 2000 through 2006. The demands for fluid milk and manufactured dairy products generate prices for milk in fluid and manufactured uses. Butterfat and nonfat solids are allocated through the different systems consistent with milk marketed and product manufacturing. The dairy industry model includes the aggregate Federal milk marketing orders, California, and aggregated all other markets. Results for the aggregate Federal milk marketing orders are further disaggregated for the 11 Federal orders and their associated milk production areas.

#### Analytical Framework

Federal order milk marketings and all other milk marketings other than California's, are estimated as a function of the average Federal order blend price plus over-order payment estimates. The Federal order share of these marketings is estimated as a function of the average Federal order blend price relative to the Class III and IV prices, consistent with incentives to market milk outside of the order system when Class III and Class IV prices exceed blend prices. California milk production responds to the California weighted pool price, representing both quota and non-quota milk.

Aggregated Federal order results are extended to the 11 Federal orders and the 12 supply regions that roughly correspond to the 11 orders and the Non-F.O. Western regions. This is accomplished by assuming that pooling patterns similar to those in year 2000 are extended through the baseline period. Blend prices for each order are calculated given the class utilizations and the class prices. The supply of milk marketed through the Federal orders and markets other than California is disaggregated into 12 supply areas by estimating a set of supply relationships that is consistent with the aggregated relationships. Thus, given changes in the pricing formulas, and changes in the aggregated Federal order system, changes in the respective order and regional prices, as well as changes in regional milk production and marketings can be estimated.

#### Dairy Product Composition – Butterfat and Nonfat Solids

The requirements of fluid and manufactured dairy products for nonfat solids and butterfat are estimated with reported historical data. These milk and component uses are classified on a basis consistent with the Federal order as follows:

Class I - fluid uses,

Class II - soft manufactured products (frozen products and other Class II),

Class III - cheese, dry whey, and canned milk, and

Class IV - butter, nonfat dry milk, and whole dry milk.

Fluid use is obtained from Dairy Market Statistics published by AMS, and butterfat and nonfat solids content for fluid milk is from Federal order and California data. Manufactured products include American cheese, other cheese, butter, canned milk, whole dry milk, nonfat dry milk, total frozen products, and other Class II products. Manufactured product production is reported by NASS Dairy Products for all but the other Class II products. Other Class II is treated as a composite solids-equivalent product, historically calculated as the residual butterfat and nonfat solids after meeting all other product requirements.

The nonfat solids and butterfat pounds required for each product are established by multiplying the production of hard manufactured products and the demands for fluid, frozen, and other Class II products by the appropriate conversion factor in Table 1. The factors for the aggregate frozen product are recent year weighted averages across all frozen products. The other Class II solids requirements were established in the historical data by the residual butterfat and nonfat solids left when accounting for all solids in Class I, III, IV and total frozen products. The proportions of the solids in “other Class II” for the forecast period are held at recent year averages.

#### Over-Order Premiums

The Federal order blend plus premiums milk price (all-milk price) includes over-order premiums on Class I and Class III milk. The Class I over-order payment varies as supply and demand conditions change. The model estimates a Class I over-order payment as a function of cheese production and per capita fluid milk demand. Costs associated with serving the fluid market are assumed to comprise 85 percent of the Class I over-order payment, and 15 percent of the Class I over-order are assumed to be premiums that passed on to producers. It is assumed that the over-orders paid on Class II and IV milk reflect costs associated with marketed milk and therefore are not passed on to producers in the form of a premium. The value for all milk used in Class III is derived from the average fluid eligible grade price (NASS) in all areas outside of

California, using the estimated fluid milk, Class II, and Class IIIa/IV prices and the quantities of milk marketed into the appropriate uses.

The model generates Class III premiums as the difference between the model estimated value of milk in Class III uses and the Class III price. The value of milk in American cheese is estimated from prices for American cheese and dry whey. The analysis assumes that prices paid for milk used to make American cheese is the Class III price and the full change in premiums that results from changes in product and Class III prices. That is, holding all else constant, premiums for milk in American cheese will move penny-for-penny in opposite direction to changes in the Class III price. The prices paid for other cheese reflect the Class III price and premiums that are less responsive to changes in the Class III price. That is, it is estimated that premiums for milk in other cheese are less responsive to changes in Class III prices, resulting in less change in premiums through the analytical years. The regional breakout of other cheese production is presented in Table 2. Changes in Class III over-order premiums are calculated for each order based on the proportions of American and other cheese in total cheese production.

#### Milk Supply, Demand, and Allocation

The model estimates milk production via milk per cow and number of cows. The number of cows is estimated as a function of the producer milk price, feed costs, and slaughter prices. Milk production per cow is estimated as a function of milk prices and feed costs. Producers respond to milk price changes relative to feed costs by adjusting milk cow numbers. Milk marketings are estimated as milk production (milk cows times milk per cow), less farm use.

Total demand for milk and dairy products are functions of price, per capita consumption and population. Consumption of each specific product is specified as per capita demand times the projected population for each year. The demands for milk in fluid and soft manufactured uses are specified as plant-level demands for raw milk. The Federal order fluid milk price is estimated using the average Class I differential plus the estimated over-order premium. The demands for frozen products and other Class II products are specified at retail, using the retail ice cream price (index) and the CPI- other dairy products as prices. The six hard manufactured product demand equations are specified at the wholesale level. Wholesale prices for cheese, butter and nonfat dry milk, and dry whey represent estimates of the annual average NASS product prices used in the Federal Order price formulas. Per capita demands are estimated as functions of product price, per capita income, the price or price index for a product substitute (e.g., margarine for butter), and other factors, such as expenditures on food away from home and trend.

Demands for butterfat and nonfat solids in fluid milk products and soft manufactured dairy products have priority in the model, and such demands are filled from the raw milk supply before the hard manufactured product market demands are met. Demands for milk components in fluid use, frozen products, and other Class II products are satisfied directly. Because of the stability and lack of price responsiveness in the demands for whole milk powder, and canned and evaporated milk, the demands for milk components in these uses are satisfied directly as well.

The remaining milk components are allocated between the cheeses, and butter and nonfat dry milk. Milk used in American and other cheese varies as a function of the gross returns of milk in each cheese relative to milk in butter and nonfat dry milk powder. The remaining nonfat and butterfat solids are manufactured into nonfat dry milk powder and butter. Nonfat dry milk and condensed skim can be used in making cheese, using additional butterfat in the cheese milk as opposed to skimming it for butter. The data was obtained from the American Dairy Product Institute. Other dairy products used in frozen products and NDM used in fortifying fluid milk are assumed in the forecast years at levels consistent with recent year levels.

American and other cheese production are estimated on the national level and California shares of both cheese productions are estimated to separate the production between California and Federal order plus other. The California production of dry whole milk, canned milk, and dry whey is estimated as a percent of the U.S. total production. Using the percent of nonfat solids and butterfat required for production of each product in Table 1, the use of milk can be broken out on both a butterfat and nonfat solids basis.

#### Federal Order Marketings

The Federal order share of “Federal order plus other” marketings is estimated as a function of the prior year Federal order share and the Federal order all-milk price (blend price plus premiums) relative to the estimated U.S. value of manufactured milk. The Federal order share of “Federal order plus other” marketings is estimated to average about 90 percent from 2002 to 2006 with slight annual increases. Federal order class uses are estimated as shares of the “Federal order plus other” class uses. Federal order Class I use is based on 2000 data and adjusted annually by the “Federal order plus other” fluid demand equation. Federal order Class II use is estimated similar to the Class I use. Federal order Class IV use is estimated to be 93 percent of the annual “Federal order plus other” Class IV use. Class III milk pooled in the Federal order system is estimated as the remaining butterfat and nonfat solids of all milk pooled under the order system after Class I, II, and IV uses are assigned. This allows Federal order Class III use to vary depending on the total amount of milk that is pooled on the Federal order system, since it has been generally the case that most milk moved in and out of the Federal order system has been Class III milk.

#### **Supply and Demand Equations**

The model and its equations are outlined in Tables 3-7 below, focusing on the estimation of milk production, production of dairy products and milk allocation, product demand, and prices. This econometric model comprises a set of equations that are estimated with annual data from 1980 to 1999. The equations are modified as needed to true up to baseline conditions.

**Table 1: Dairy Product Conversion Factors**

Products	Butterfat and nonfat solids required per product unit	
	Butterfat	Nonfat Solids
	--percent--	
California Producer Milk	3.66	8.76
Non-CA Producer Milk	3.67	8.70
Butter	80.4	1.0
American cheese 1/	36.8	85.1
Other Cheese -Non-California 2/	30	85.8
-California 2/	22	85.8
NDM	0.8	96.2
Canned Milk	7.9	18.5
Dry Whey	1.1	95.0
Dry whole milk	26.5	71.0
Fluid -FO-plus 3/	2.02	8.74
Fluid CA 4/	2.24	9.65
Ice cream-Regular	12.0	10.0
Ice cream-Lowfat	6.0	11.0
Ice Cream-Nonfat	2.0	14.0
Sherbet	2.0	2.0
Frozen yogurt	1.7	9.0
Other	6.0	7.7
Mellorine type	---	10.0
Total Frozen Products 5/	8.95	9.7
Other Class II 6/	46	54

1/ Based on Van Slyke Formula for cheddar Cheese, reflects solids required for production not actual percentage in final product.

2/ Weighted average of other cheeses, reflects solids required for production not actual percentage in final product.

3/ Based on Federal order data of fluid milk sold.

4/ Based on California data of Class I milk and Fluid Sales.

5/ Derived a weighted average frozen product category. Ice Cream products are assumed to weigh 4.5 lbs. per gallon, other frozen products are assumed to weigh 6 lbs. per gallon.

6/ Other Class II composite solids equivalent product. Based on recent years' average.

**Table 2: Other Cheese Production, Percent of Total Cheese, by Region, 2002-2006**

	2002	2003	2004	2005	2006	5-year average
	- percent -					
Northeast	90.1	91.8	93.4	94.3	95.3	93.0
Appalachian 1/	8.5	8.7	8.8	8.9	9.0	8.8
Florida 1/	8.5	8.7	8.8	8.9	9.0	8.8
Southeast 1/	8.5	8.7	8.8	8.9	9.0	8.8
Upper Midwest	47.2	48.1	48.9	49.4	49.9	48.7
Central	66.1	67.3	68.5	69.1	69.8	68.2
Mideast	91.7	93.4	95.0	95.9	96.9	94.6
Pacific Northwest	18.4	18.8	19.1	19.3	19.5	19.0
Southwest 1/	8.5	8.7	8.8	8.9	9.0	8.8
Arizona-Las Vegas	50.9	51.9	52.8	53.3	53.8	52.5
Western	18.3	18.6	18.9	19.1	19.3	18.9
Federal Order and Other Marketing Regions 2/	57.3	58.4	59.4	59.9	60.5	59.1

Based on data obtained from NASS Dairy Products, 2000. Annual changes based on model projections of other cheese production to American cheese production.

1/ No state data available for states in these regions; therefore, assumed to be consistent with NASS **Dairy Products'** South Central Region.

2/ U.S. milk marketing regions excluding California.

**Table 3. Milk Supply Parameters: Federal Order and Other Production, California Production 1/**

	Parameter	Estimate	t-Value	Pr> t	R-Square
<b>Federal Order and Other</b>					
Milk per cow	Intercept	5.541	3.52	0.0034	
(log-log)	Milk-concentrate price ratio, lagged	0.017	1.57	0.1385	
	Milk per cow, lagged	0.393	2.27	0.0395	
	Trend	0.012	3.39	0.0044	
	Dummy – Diversion Program	-0.027	-3.24	0.0059	0.997
Milk cows	Intercept	3.079	1.73	0.1079	
(log-log)	Milk-feed price ratio	0.034	1.45	0.1718	
	Cow slaughter-feed price ratio	-0.021	-1.40	0.1839	
	Milk cows, lagged	0.676	3.58	0.0033	
	Dummy-Buyout	-0.019	-1.51	0.1553	
	Trend	-0.006	-2.15	0.0510	0.994
F.O. Share	Intercept	-0.154	-5.66	<.0001	
(log-log)	F.O. blend price / F.O. Class III price	0.817	3.09	0.0074	
	F.O. blend price / F.O. Class IV price	0.136	1.56	0.1400	
	F.O. Share, Lagged	0.681	6.31	<.0001	0.8300
<b>California</b>					
Milk per Cow	Intercept	5.496	3.33	0.0055	
(log-log)	Milk- concentrate price ratio, lagged	0.038	1.47	0.1643	
	Trend	0.0102	3.20	0.0070	
	Milk per cow, lagged	0.414	2.36	0.0343	
	Dummy – 1994	0.062	3.35	0.0052	
	Dummy – 1998	-0.043	-2.25	0.0426	0.968
Milk cows	Intercept	6.674	57.24	<.0001	
(log-log)	Milk-concentrate price ratio	0.111	4.80	0.0003	
	Cow slaughter-feed price ratio	-0.054	-3.14	0.0073	
	California farm land cost/CPI-all	-0.049	-1.46	0.1663	
	Trend	0.024	37.5	<.0001	0.995

1/ The milk-feed ratio reported by NASS in Agricultural Prices is the basis for calculating feed and concentrate prices. The NASS milk-feed price ratio is reported as a 16 percent protein mixed feed with 51 pounds of corn (0.911 bushels), 8 pounds of soybeans (0.133 bushels), and 41 pounds of alfalfa hay (0.0205 tons). These factors are used for calculating the feed price value used in most of the supply equations. The California number of milk cows, however, is more responsive to a milk-concentrate price ratio, which is used in place of the milk-feed price ratio. The concentrate value is calculated using the same ratio of corn and soybeans as in the above formula to calculate the value of 100 lbs. of concentrate.



**Table 4. Regional milk supply parameters 1/**

	Northeast	Appalachian	Southeast 2/	Mideast	Southwest 2/	Central	Upper Midwest	West	Pacific Northwest 2/	Florida 2/	Non-F.O. West 2/	Arizona
<b>Cows (log-log)</b>												
Intercept	4.298	0.685	-0.641	2.975	-0.146	5.216	1.689	1.603	1.142	2.117	1.053	2.119
Milk-feed price ratio	0.049	-	0.059	0.015	0.075	0.018	0.017	0.113	0.031	0.042	0.042	0.072
Slaughter/feed price ratio	-0.055	-	-	-0.016	-	-	-	-0.135	-	-	-	-0.118
Trend	-0.009	-0.005	-	-0.010	-	-0.019	-0.006	0.008	-	-0.004	-0.010	0.015
Cows, lagged	0.461	0.907	1.081	0.590	1.008	0.277	0.795	0.717	0.796	0.589	0.736	0.504
Dummy-Buyout Program	-	-0.023	-0.052	-0.014	-0.040	-	-0.020	-0.066	-0.048	-	-0.058	-
<b>Milk per cow (log-log)</b>												
Intercept	7.027	5.759	2.549	7.766	4.815	3.683	4.763	7.540	3.932	3.322	5.587	10.895
Milk-concentrate price ratio, lagged	0.014	0.027	0.014	0.037	0.007	0.006	0.017	-	0.034	-	0.046	-
Milk per cow, lagged trend	0.232	0.365	0.721	0.148	0.469	0.594	0.477	0.179	0.578	0.636	0.387	-0.173
Dummy -Diversion Program	0.016	0.010	0.004	0.017	0.013	0.010	0.011	0.019	0.008	0.007	0.010	0.027
	-0.022	-0.057	-0.039	-0.009	0.000	-0.043	-0.026	-0.050	-0.008	-0.042	-0.017	-0.040

1/ Restricted to be consistent with the Federal order plus other equations.

2/ Milk-feed price ratio is lagged one year in the number of cows equations for these regions

**Table 5. Milk Manufacturing and Allocation Parameters**

Variable	Parameter	Estimate	t-Value	Pr> t	R-Square
Production, U.S. Am. Cheese	Intercept	5.494	3.92	<.0001	
	Gross value American cheese/ Gross value butter-powder Dummy 1980-1994	0.321	1.25	0.2293	
	Production, lagged	-0.121	-3.70	0.0022	0.859
		0.322	1.85	0.0842	
Production, U.S. Other Cheese	Intercept	0.443	2.93	0.0097	
	Gross value other cheese/ gross value butter-powder Production, lagged	0.130	1.18	0.2546	
		0.945	44.85	<.0001	0.990
CA Share, Other Cheese	Intercept	-2.246	-2.66	0.0170	
	CA Share, lagged	0.533	3.05	0.0077	
	Log (Trend)	0.430	2.72	0.0150	0.987
CA Share, Am. Cheese	Intercept	-1.974	-1.54	0.1438	
	Gross value American cheese/ gross value other cheese CA Share, lagged	0.428	1.39	0.1838	
		0.690	4.90	0.0002	0.962
Production, Dry Whole Milk	Intercept	165.002	2.79	0.0132	
	Production DWM, lagged	0.297	1.40	0.1820	
	Production NDM	-0.058	-1.82	0.0874	0.464
Production, Canned Milk	Intercept	6.821	117.98	<.0001	
	Trend	-0.022	-8.35	<.0001	0.819
Production Dry Whey	Intercept	154.759	1.78	0.0948	
	Production total cheese	0.028	1.23	0.2378	
	Production dry whey, lagged	0.717	4.45	0.0004	0.786
Ratio, NDM in cheese production to total cheese production	Intercept	0.028	3.92	0.0012	
	Butter price/cheese Price Ratio, lagged	-0.024	-3.35	0.0041	
		0.714	7.77	<.0001	0.910
Condensed Skim in cheese production	Intercept	-117.6	-2.50	0.0245	
	NDM in cheese production	-0.195	-3.03	0.0085	
	Nonfat solids used in cheese production	0.035	3.32	0.0047	
	Cond. Skim in cheese, lagged	0.196	1.09	0.2941	0.798

**Table 6. Estimated Milk and Dairy Product Demand Parameters**

	Parameter	Estimate	t-Value	Pr> t	R-Square
US Fluid Milk per capita(log-log)	Intercept	1.363	2.07	0.0579	
	Fluid price/CPI-Non-alcoholic bev.*	-0.096	-2.10	0.0539	
	Per capita income/CPI-all*	0.309	3.05	0.0086	
	Fluid Milk per capita, lagged*	0.673	5.22	0.0001	
	Trend	-0.007	-4.25	0.0008	0.871
*Parameters used in CA and FO-plus fluid per capita equations					
FO-plus Fluid per capita(log-log)	Intercept	1.375	143.87	<.0001	
	Trend	-0.008	-18.1	<.0001	0.816
CA Fluid per capita (log-log)	Intercept	1.444	94.03	<.0001	
	Trend	-0.012	-16.68	<.0001	0.902
Butter per capita(log-log)	Intercept	0.671	0.94	0.3625	
	NASS butter price/CPI-margarine	-0.056	-1.14	0.2717	
	Per capita income/CPI-all	0.383	1.85	0.0855	
	Dummy 1998	0.084	1.47	0.1649	
	Dummy 1989-1992	-0.130	-4.89	0.0002	0.755
Other Cheese per capita(log-log)	Intercept	0.923	0.58	0.5682	
	Mozzarella price/CPI-meat	-0.614	-3.38	0.0041	
	Food Expenditure Ratio	1.359	1.85	0.0839	
	Per capita income/CPI-all	1.164	2.88	0.0115	0.978
American Cheese per capita(log-log)	Intercept	0.480	0.45	0.6564	
	NASS cheese price/CPI-Meat	-0.157	-1.27	0.2201	
	Per capita income/CPI-all	1.029	5.06	0.0001	0.908
NDM per capita(log-log)	intercept	3.729	2.24	0.0394	
	price/CPI-food	-0.583	-1.49	0.1550	
	Government Removals/NDM Production	-0.994	-4.23	0.0006	0.6023
Dry Whey per capita(log-log)	Intercept	0.576	2.69	0.0163	
	NASS whey price/CPI-food	-0.118	-1.73	0.10.38	
	Dry Whey per capita, lagged	0.815	13.43	<.0001	0.930
Canned Milk per capita(log-log)	Intercept	3.417	50.42	<.0001	
	Canned milk price/CPI-food	-0.600	Assumed to approximate NDM elasticity		
	Trend	-0.045	-14.37	<.0001	0.887
Dry Whole Milk per capita(log-log)	Intercept	6.061	4.89	0.0002	
	DWM price/CPI-all	-1.591	-5.62	<.0001	
	Dummy 1980-1990	0.624	6.38	<.0001	0.757
Frozen products per capita(log-log)	Intercept	2.861	15.03	<.0001	
	Retail Price Ice cream/CPI-all	-0.239	-3.70	0.0019	
	Per capita income/CPI-all	0.214	3.50	0.0030	0.850
Other Class 2 solids per capita(log-log)	Intercept	5.000	4.16	0.0008	
	CPI-other dairy products/CPI-food	-0.756	-4.67	0.0003	
	Per capita income/CPI-all	0.384	0.93	0.3660	
	Trend	-0.022	-3.25	0.0053	0.711

**Table 7. Price Linkages**

	Parameter	Approx. Estimate	t-Value	Pr> t	R-Square
California farm-land value	Intercept	178.768	0.92	0.3696	
	Trend	10.699	5.17	<.0001	
	Value, lagged	0.832	1.15	0.2689	0.619
Class I over-order payment	Intercept	-2.298	-2.28	0.0365	
	Production of total cheese	0.00009	4.47	0.0004	
	Per capita fluid demand	0.011	2.49	0.0243	0.598
Value of milk in American cheese	Intercept	2.378	2.95	0.0099	
	Cheese price	7.036	12.12	<.0001	
	Dry Whey price	3.783	2.47	0.0258	
	Dummy 1980-1988	-0.460	-4.19	0.0008	0.947
Premium for milk in other cheese	Intercept	1.369	2.43	0.0271	
	Class III price	-0.195	-4.04	0.0010	
	Trend	0.060	8.93	<.0001	0.838
Class III price-before reform	Intercept	0.372	0.74	0.4680	
	Butter price	0.003	1.07	0.2996	
	Cheese price	0.077	7.62	<.0001	
	NDM price	0.010	1.20	0.2499	0.976
CPI-other dairy products	Intercept	-3.847	-0.21	0.8346	
	Class II price at test	5.793	3.73	0.0018	
	Trend	2.140	7.48	<.0001	0.883
CPI-margarine	Intercept	-10.405	-3.73	0.0017	
	CPI-fat	1.105	48.84	<.0001	0.993
Retail price –ice cream	Intercept	-0.581	-3.99	0.0011	
	Class II price at test	0.067	5.49	<.0001	
	Retail price, lagged	0.917	23.35	<.0001	0.971

### **Other Milk Prices Formulas**

F.O. Blend Price plus premiums at 3.5 percent BF = Minimum Blend Price at 3.5 percent +  
((Class I premium\*Class I Use)/Total F.O. use) + (Class III premium\*((F.O. Class III  
use)//Total F.O. use)

F.O. Blend Price plus premiums at test (3.67 percent) = Minimum Blend Price at test + ((Class I  
premium\*Class I Use)/Total F.O. use) + (Class III premium\*((F.O. Class III use)//Total  
F.O. use)

California Milk Price used in Supply equation = (0.3\*Quota Pool Price) + (0.7\*Non-Quota Pool  
Price)

U.S. All-milk Price = ((California all-milk price\*California milk marketed) + (F.O. Blend price  
+ premiums\*Federal order plus other milk marketed))/(U.S. Total Milk Marketed)