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U.S. Milk Markets Under Alternative Federal Order Pricing Policies

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U.S. Milk Markets Under Alternative Federal Order Pricing Policies. Howard McDowell, Ann Fleming, and Felix Spinelli. Agriculture and Trade Analysis Division and Commodity Economics Division, Economic Research Service, U.S. Department of Agriculture. Staff Report No. AGES 9068.

Abstract

Federal milk marketing orders regulate about 80 percent of the Grade A milk marketed and about 70 percent of all milk marketed in the United States. The orders regulate fluid milk markets through classified pricing and pooling of revenues, and affect consumer and producer milk prices, interregional marketing patterns, and U.S. Government purchases of surplus dairy products. This study compares the U.S. milk markets under 1988 provisions against three alternative policies using an interregional trade model comprising 15 regions. The three policies--minimal regulation, multiple-base pricing, and multiple-base pricing with reconstitution--allow market forces to have greater effect on prices and marketing patterns. Minimal regulation allows market conditions to determine any Grade A price differential above manufacturing milk prices. Multiple-base pricing replaces the single-base (central Wisconsin) with price basing in all regions with sufficient fluid milk supplies. Reconstitution is simulated by modifying multiple-base pricing with the possibility of shipping fresh milk concentrates for reconstituting into fresh fluid products without penalty.

Keywords: Milk, dairy, marketing orders

1301 New York Avenue, NW
Washington, DC 20005-4788

November 1990

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Summary

Three alternative policies for setting minimum Class I differentials in fluid milk marketing orders are analyzed using the single-base pricing regulations and market conditions of 1988 as a base. A 15-region interregional trade model, incorporating classified pricing and revenue pooling, is used for the analysis. The alternative policies include:

(1) Minimal regulation, setting minimum Class I differentials equal to zero, allowing market forces to generate higher prices.

(2) Multiple-base pricing, setting minimum Class I differentials to $1.20 in nine regions, allowing market forces to generate higher prices.

(3) Reconstituting concentrated milk along with multiple-base pricing.

Fluid reserves at low and high levels are analyzed for each alternative policy.

Results indicate that under the alternative policies the following changes in national average market values could occur:

- Fluid milk price declines range from $1.89 to $0.82 per cwt.
- Grade A milk price declines range from $0.88 to $0.31 per cwt.
- Government surplus removal declines range from 6.2 billion pounds to 2.4 billion pounds.

While milk prices generally fall under all alternative policies, regions most affected are Texas, the Northeast, Mid-Atlantic, and the Southwest.

Shifting Federal milk marketing order policies to be consistent with market forces would alter interregional shipping patterns for fluid milk and shift the regional shares of manufactured dairy products. The study indicates that Lake State exports to deficit regions would be displaced by exports from the Corn Belt and Mid-Atlantic regions. Lake State milk available for manufactured products would increase, while significant reductions would occur in Texas, Corn Belt, Northeast, Mid-Atlantic, Northern Plains, and Southern Plains.

U.S. Milk Markets Under Alternative Federal Order Pricing Policies

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Ann Fleming
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Introduction

Federal dairy programs continue to play an important role in the pricing and marketing of milk and dairy products. The dairy price support program authorizes the Commodity Credit Corporation (CCC) to purchase manufactured dairy products at prices set to effectively support the prices paid for manufacturing milk. Federal milk marketing orders regulate the pricing of about 80 percent of Grade A milk and about 70 percent of all milk sold by farmers to plants and dealers. The Food Security Act of 1985 addressed the system of Federal milk marketing orders by increasing the minimum prices paid for fluid milk in most markets east of the Rocky Mountains. However, concerns over the regional dispersion of minimum prices and income shares continue to focus discussion on the system. These concerns have resulted in the call for national hearings conducted by the Dairy Division of USDA's Agricultural Marketing Service (AMS).

This paper analyzes Federal order policies that are more consistent with market forces than is the current single-base pricing system. Of key interest are the levels of fluid milk price differentials and their effects on regional milk prices and quantities, interregional fluid milk marketing, and government purchases of surplus dairy products. The study compares the 1988 regulated market performance against three alternative policies for setting minimum Class I differentials.

The alternative policies analyzed in this paper share key characteristics with the current system. Each policy employs a system of classified pricing and revenue pooling based upon the Minnesota-Wisconsin (M-W) manufacturing milk price. The first, minimal regulation, allows market forces to generate Class I differentials in the form of over-order payments in excess of the M-W price. The second, multiple-base pricing, establishes minimum Class I differentials of $1.20 in most regions, with further increases in regions where justified by market forces. Reconstitution is simulated with multiple-base pricing, assuming that reverse osmosis is used to create a fresh 50-percent concentrate to be transported to a distant market and reconstituted for fluid milk products.

Federal Milk Marketing Orders

Federal milk marketing orders are characterized by market differentiation and classified pricing of milk by use, and revenue pooling resulting in a uniform blend price for milk sold [3,4,6,8].[1] Minimum Federal order prices are based on the average market price paid for Grade B milk in Minnesota and Wisconsin (M-W price), establishing a direct link between the order system and the manufacturing milk market. Grade A milk used for fluid milk products is designated Class I (QI), for which a monthly minimum price, PI^{o}, is established by adding a differential to the M-W price lagged 2 months. A single-base pricing system is established for orders east of the Rocky Mountains by assigning the Upper Midwest order (Minneapolis, MN) the base Class I differential of $1.20 per hundredweight (cwt), with differentials increasing with distance to the east and south. Regulated Grade A milk in manufacturing uses is designated Class II (soft-product use) (QII) and Class III (hard-product use) (QIII). The minimum Class II price, PII^{o}, is the sum of the current M-W plus a differential of about $0.10, while the minimum Class III price, $PIII^{o}$, is the current M-W price.

Each Federal order establishes a monthly revenue pool for all milk pooled in the order. Processors pay into the pool the minimum prices for the milk they use in each class. An orderwide weighted average price, or "blend" price (Pblend), is paid to all producers or their cooperatives delivering milk. The price is calculated as follows:

$$Pblend = [PI^{o}*QI + PII^{o}*QII + PIII^{o}*QIII]/QP. \qquad (1)$$

This is the minimum price paid for milk marketed in the order, where QP is the amount of Grade A milk pooled on the order and is the sum of QI, QII, and QIII.

Over-order payments above the minimum prices are negotiated directly between buyers and sellers of raw milk for use in fluid and manufacturing dairy products. These payments provide the flexibility necessary for the markets to generate equilibrium market-clearing prices that cover marketing costs, including opportunity costs. The processor-level price or "effective market price" received by cooperatives or producers for delivering milk to processing plants are the weighted average Class I and II prices, including both minimum differentials and over-order payments (OOP), written as follows:

$$P = [(PI^{o}+OOPI)*QI + (PII^{o}+OOPII)*QII + (PIII^{o}+OOPIII)*QIII]/QP. \qquad (2)$$

Producers and their marketing cooperatives may market milk in any order and receive the monthly blend price if they meet the order's pooling qualifications. Pooling qualifications specify

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[1]Numbers in brackets represent items in the Bibliography.

the minimum proportions of pooled milk that must actually be delivered to a particular order during specific time periods. Regulated blend prices can be higher than necessary to attract sufficient quantities of Grade A milk to serve fluid needs, resulting in producers and cooperatives shipping milk to the market when consumer demand does not warrant it. This creates an incentive to allow the milk to be pooled on the market without necessarily being shipped. If such pooling requirements are established and are met, the milk can be pooled and eligible for the blend price, while avoiding the cost of transporting all the milk to the order. Thus, pooling qualification requirements can result in the proportional reduction of interregional marketing costs from a maximum level under which all milk pooled must actually be received in a pool or market. These regional average returns or effective blend prices are expected to differ by no more than the interregional marketing costs, as a result of cooperatives' competitive behavior in seeking profitable markets.

Model Overview

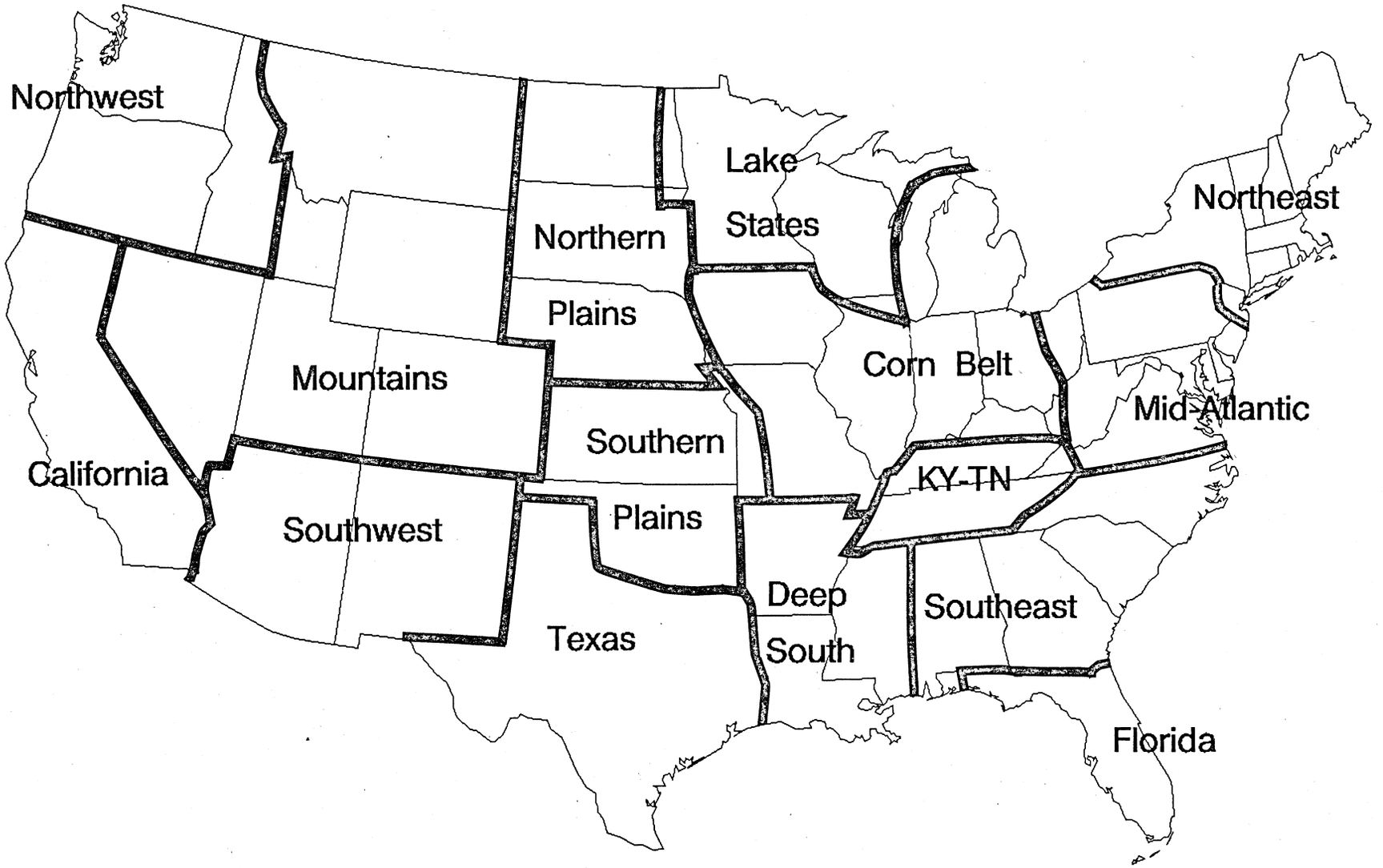
The analysis is accomplished with an interregional trade model including 15 regions of the contiguous United States (fig. 1), updating from a previous study [8]. The model, specified as a constrained nonlinear programming problem maximizing consumer and producer surplus, generates a set of interregional marketings consistent with 1988 levels of policy parameters, prices, and quantities. This solution is used as the base for comparing the alternative policies.

The manufacturing milk market is specified nationally with its demand a function of the M-W manufacturing milk price, the base price for the Federal milk marketing order system. The market is supplied by Grade B milk produced in 11 regions as a function of regional Grade B milk prices, Grade A milk produced in excess of fluid uses, and imports and beginning stocks.

The Grade A/fluid milk markets in each region include a fluid milk demand and a Grade A milk supply function. Base prices in the model explicitly incorporate 1988 Federal order or State-regulated minimum prices and over-order payments (3.5-percent butterfat). The Grade A/fluid milk markets in each region include a fluid milk demand and a Grade A milk supply function. Base prices in the model explicitly incorporate 1988 Federal order or State-regulated minimum prices and over-order payments (3.5-percent butterfat). Processor demand for fluid milk is specified at a price including three components: (1) the minimum Class I price, (2) average intraregional fluid milk marketing cost, and (3) any additional over-order payments necessary to attract local production or transport milk to equilibrate the market. These latter two components are presumed to be captured in the observed over-order payments and reflected in the prevailing prices paid by processors for both locally produced and imported milk. Milk prices at the cooperative/producer level are net of the fixed intraregional marketing costs but include the remaining over-order payments. Thus the regional supply

Figure 1

Milk marketing regions



functions for Grade A milk are specified in terms of a regional blend price that is net of the intraregional fluid milk marketing costs, but includes other over-order payments. These relationships are specified more formally below.

Regional minimum Class I and Class II prices (PI° and PII°) are calculated by adding weighted-average minimum Class I and Class II differentials (DIFI and DIFII) to the M-W price. In equation form:

$$PI^{\circ} = M\text{-}W + DIFI, \text{ and} \quad (3)$$
$$PII^{\circ} = M\text{-}W + DIFII. \quad (4)$$

Processor demand for fluid milk (QF) in each region is a function of the fluid milk price, PF, which is the sum of the three components discussed immediately above, the minimum Class I price, the fixed intraregional fluid milk marketing cost (FFMC), and any additional over-order payment (OOPI), or:

$$PF = PI^{\circ} + FFMC + OOPI. \quad (5)$$

The Class I price discussed from this point forward is the fluid milk price PF, net of intraregional marketing costs, which is the minimum Class I price plus the over-order payment, or:

$$PI = PI^{\circ} + OOPI. \quad (6)$$

The fluid quantity (QF) is identical to the Class I quantity (QI).

Milk supplied in the market beyond fluid needs is designated Class II (QII), for which processors pay PII, the minimum price plus over-order payments, or:

$$PII = PII^{\circ} + OOPII. \quad (7)$$

This Class II combines Federal order Class II and Class III. The price is a weighted average for each region. Thus, an "effective market price" analogous to equation 2 can be calculated with PF, PII, QI, QII, and QP.

The quantity of Grade A milk supplied in each region is specified as a function of PA, the blend price including minimum prices and over-order payments, net of the fluid milk marketing cost, or:

$$PA = [PI*QI + PII*QII]/QP \quad (8)$$

where PI and PII are as specified in equations 6 and 7.

The supply prices are assumed to include all costs of producing milk and assembling the product to a point at which it can be hauled directly to manufacturing or fluid processing plants. This supply price should be roughly equivalent to the average revenue received by a milk marketing cooperative, net of intraregional fluid marketing costs.

Spatial equilibrium is achieved when regional blend prices, net of intraregional fluid milk marketing costs, differ by no more than interregional marketing costs (IMC). The equilibrium condition can be written as follows:

$$PA_i + IMC_{ij} \geq PA_j \qquad (9)$$

or the average price in region i plus interregional marketing costs can be no less than the average price in region j, for all i and j. If this were not the case, increased shipments would be expected from region i to j, reducing over-order payments and/or Class I utilization and the average price in region j, and increasing over-order payments and/or Class I utilization and the average price in region i.

Base Simulation

The 1988 base data and simulation are summarized in this section. Regional data tables appear in the Appendix. The simulation is compared with the base data. Examination of the simulation provides insight into the economic performance of the regulatory system as currently configured.

Base Data

The usefulness of the model in analyzing alternative policies depends in part on its ability to simulate the base market equilibrium. This is achieved by positioning the supply and demand functions with observed prices and quantities along with the assumed elasticities, and accounting for interregional marketing and intraregional fluid milk marketing costs to the extent possible. The elasticities of supply and demand are consistent with the earlier study [8]. The demand for milk is assumed to be at the fluid or manufacturing milk plant level. The own-price elasticities of demand are -0.085 for fluid milk in each region and -0.245 for milk used in manufactured dairy products [5,6,7]. The regional supply elasticities are weighted aggregations of State elasticities and range from 1.00 in Florida to 0.22 in California (table 1), reflecting a 4-year adjustment period [1].

Grade A and Grade B quantities supplied in each region include the State milk marketings reported by USDA's National Agricultural Statistics Service (NASS). The fluid quantities demanded include Class I milk "in-area sales" as reported in Federal order and State regulatory statistics, and nonregulated consumption estimated by multiplying the known regional per capita consumption rate by the nonregulated populations within each region.

Regional, fluid, and Class I and Class II prices are developed from the average M-W price, minimum differentials, and over-order payments for each order. These prices, together with the average regional Class I utilizations, are used to arrive at regional average fluid milk prices paid at the processing plant levels.

In 1988, the average support price of $10.33 per cwt effectively supported the M-W price at $11.03 (3.5-percent butterfat). Consistent with current regulation, the base model uses the lagged-by-2-months annual average M-W price, $10.86, for Class I and the current annual average M-W price, $11.03, for Class II. Minimum Class I and Class II prices are calculated by adding the regional average Class I and Class II differentials to the appropriate average M-W price. Intraregional fluid milk marketing costs are assumed to be either $0.45 or $0.65 per cwt as explained below. Thus, fluid milk prices at the processor level and at the producer/cooperative level are calculated as in equations 6 and 7.

Regional Grade A supply prices are calculated as the effective Class I and Class II prices times their utilizations, after reducing the Class I price by the average intraregional fluid milk marketing cost (refer to equation 8). Regional Class I and Class II utilizations are calculated with total and Class I Federal (or reported State) order deliveries within each region, extrapolating to nonregulated areas in the region. These Class prices and utilizations are used to calculate the Grade A supply prices.

Intraregional fluid milk marketing costs are roughly derived from observed over-order payments (table 1). The data suggest that the Northeast and the Deep South are only slightly involved in the interregional trade of fresh milk. Therefore, their over-order payments of $0.67 and $0.66 are presumed to be primarily associated with intraregional fluid milk marketing costs. No lower payments exist east of Texas and the Mountain region, thus $0.65 is assumed to be the intraregional fluid milk marketing costs for these regions. For Texas and the four regions to the west, the cost is assumed to be $0.45, reflecting the payments in Texas and the Southwest. The amounts in excess of these assumed costs are presumed to be associated with the costs of interregional milk marketing or achieving interregional price alignment. California and the Northwest over-order payments are 0 and $0.16, respectively. It is assumed that costs beyond that are absorbed by the processors.

Interregional milk marketing costs include transportation costs and any "give-up costs" incurred by exporters in shifting milk from local manufacturing operations. The transportation costs are updated from the earlier study [8] to $0.355 per cwt per 100 miles. However, the base simulation must account for the unreported effects of pooling regulations and seasonal supply agreements between cooperatives and processors in surplus and deficit regions. It is assumed that the observed over-order payments generate equilibrium prices and the differences in prices among regions reflect equilibrium interregional marketing costs that explicitly include the institutional rules and actual transportation costs. Therefore, a simulated interregional product flow consistent with observed regional prices and quantities is achieved by setting base-simulation interregional marketing costs equal to observed interregional supply price differences.

Table 1--Grade A and fluid milk market parameters and base levels of variables, 1988

Region	Supply elasticity	Quantities			Class I use	Prices			Over-order payments		Assumed intraregional fluid marketing costs
		Supplied	Pooled	Class I		Supply	Class II	Class I	Class I	Class II	
		Million pounds			Percent	Dollars per cwt					
Northeast	0.607	18,672	18,933	8,520	45	12.52	11.30	14.67	0.67	0.23	0.65
Mid-Atlantic	.605	12,498	12,630	6,315	50	12.47	11.23	14.34	.74	.12	.65
Corn Belt	.501	15,381	15,229	7,462	49	12.04	11.25	13.53	.77	.19	.65
Kentucky-Tennessee	.923	3,033	2,037	1,548	76	13.08	11.31	14.29	.76	.24	.65
Southeast	.573	3,651	4,699	3,994	85	13.91	11.20	15.05	.76	.20	.65
Florida	1.003	2,340	2,916	2,479	85	14.97	11.36	16.26	1.51	.21	.65
Deep South	.651	2,339	2,258	1,716	76	13.54	11.16	14.94	.66	.11	.65
Lake States	.599	29,490	24,144	4,346	18	11.51	11.25	13.49	1.30	.19	.65
Northern Plains	.343	1,909	2,142	771	36	11.74	11.28	13.22	.71	.24	.65
Southern Plains	.575	3,585	3,809	1,752	46	12.20	11.12	14.05	.68	.07	.65
Texas	.710	4,753	5,520	3,091	56	12.73	11.13	14.59	.45	.06	.45
Mountains	.523	2,871	3,769	1,960	52	12.17	11.06	13.65	.60	.09	.45
Northwest	.398	7,141	6,234	2,182	35	11.67	11.12	13.17	.16	.07	.45
Southwest	.986	2,658	2,497	1,548	62	12.48	11.09	13.80	.47	.03	.45
California	.222	18,061	18,189	6,730	37	10.75	10.06	12.35	0	0	.45

Simulation Accuracy

The base simulation variables are given in table 2, and the percentage changes from actual levels appear in table 3. The model generates Grade A supply prices identical to actual levels and quantities supplied within 0.05 percent of actual values. The model generates shipments and quantities pooled such that simulated Class I utilization is within 3 percentage points of actual in all regions. The simulated Class I utilization in the Lake States is 2 percentage points lower than the observed level. This implies that the simulation is not capturing all the Grade A milk actually shipped out of the Lake States or sold instead in unregulated milk markets. This discrepancy is attributed primarily to problems in the data and, to a lesser extent, the annual model not fully capturing the seasonality of shipping into the deficit regions. The primary data problem is that of reconciling "pooled deliveries" from amounts that are actually transported. However, simulated Class I utilizations for other regions, prices, and quantities compare well with actual values. Furthermore, the Lake States region does not export at all in any of the alternative scenarios. Thus, it does not appear that this discrepancy undermines the usefulness of the model in analyzing effects of policy changes at this level of disaggregation.

Economic Effects

The observed 1988 data reflect the economic effects of maintaining a single price-basing region in the Lake States. Minimum Class I prices increase with distance east and south of the Lake States. In the Southeast, Florida, and the Deep South, Class I utilizations exceed 75 percent, indicating that milk is not in surplus and that relatively high minimum Class I differentials may be justifiable. The relatively high minimum Federal order differentials in several regions appear to be less justified on the basis of scarcity of milk for fluid use. The Northeast, Mid-Atlantic, and Southern Plains had Class I utilizations of 50 percent or less, while Texas and the Southwest were at 56 and 62 percent, respectively.

To the extent that Class I prices are higher than justified by the market, fluid milk consumers subsidize the manufacture of butter, skim milk powder, and cheese. If manufacturing milk prices were not supported, the subsidy would be passed along to manufactured product consumers in the form of lower prices and greater quantities. However, CCC purchases supporting the manufacturing milk price prevented prices from falling, resulting in costs borne by the U.S. Treasury. In 1988, CCC removals were 8.8 billion pounds (milk equivalent).

Primary net exporters are the Lake States and Kentucky-Tennessee, while primary importers are the Southeast, Florida, and Texas. Over-order payments for Class I milk exceed $1.00 in Florida and the Lake States. Florida is the region of highest Class I utilization percentages, Federal order minimum Class I differentials, and blend or supply prices, while the Lake States is the region of lowest. Thus, the regulated minimum price

Table 2--Simulated base levels of variables, 1988

Region	Quantities			Class I use	Prices		
	Supplied	Pooled	Class I		Supply	Class II	Class I
	----- Million pounds -----			Percent	----- Dollars per cwt -----		
Northeast	18,669	19,119	8,520	45	12.52	11.30	14.68
Mid-Atlantic	12,496	12,614	6,315	50	12.47	11.23	14.35
Corn Belt	15,379	15,465	7,462	48	12.04	11.25	13.53
Kentucky-Tennessee	3,032	2,042	1,548	76	13.08	11.31	14.29
Southeast	3,650	4,722	3,994	85	13.91	11.20	15.05
Florida	2,339	2,921	2,479	85	14.97	11.36	16.26
Deep South	2,339	2,260	1,716	76	13.54	11.16	14.94
Lake States	29,485	26,941	4,346	16	11.51	11.25	13.49
Northern Plains	1,909	2,178	771	35	11.74	11.28	13.22
Southern Plains	3,584	3,710	1,752	47	12.20	11.12	14.05
Texas	4,752	5,828	3,091	53	12.73	11.13	14.59
Mountains	2,871	3,808	1,960	51	12.17	11.06	13.66
Northwest	7,141	6,354	2,182	34	11.67	11.12	13.17
Southwest	2,657	2,523	1,548	61	12.48	11.09	13.80
California	18,062	17,877	6,730	38	10.75	10.06	12.35

Table 3--Percent differences between simulated and base variable levels

Region	Quantities			Class I use	Prices		
	Supplied	Pooled	Class I		Supply	Class II	Class I
				Percent			
Northeast	0	-1	0	0	0	0	0
Mid-Atlantic	0	0	0	0	0	0	0
Corn Belt	0	-2	0	2	0	0	0
Kentucky-Tennessee	0	0	0	0	0	0	0
Southeast	0	0	0	0	0	0	0
Florida	0	0	0	0	0	0	0
Deep South	0	0	0	0	0	0	0
Lake States	0	-12	0	11	0	0	0
Northern Plains	0	-2	0	3	0	0	0
Southern Plains	0	3	0	-2	0	0	0
Texas	0	-6	0	5	0	0	0
Mountains	0	-1	0	2	0	0	0
Northwest	0	-2	0	3	0	0	0
Southwest	0	-1	0	2	0	0	0
California	0	2	0	-3	0	0	0

Note: Data rounded to nearest whole percent.

surface appears to have shifted Florida's excess demand for fluid milk to the Lake States, even though sufficient milk supplies for fluid use would have been available from closer sources had the regulated minimum and blend prices been lower. Such sources include the Corn Belt and Mid-Atlantic regions.

Of interest are the differences between pool prices in the Lake States ($11.51), Florida ($14.97), and Texas ($12.73). Based on $0.355 per cwt per 100 miles, transportation costs are $4.77 from the Lake States to Florida and $4.09 from the Lake States to Texas (see mileage matrix in Appendix). The ratios of price differences to transportation costs are 0.73 for Lake States-Florida and 0.30 for Lake States-Texas {0.73 = [($14.97 - $11.51) / 4.77]; 0.30 = ($12.73 - $11.51) / 4.09]}. Actual transportation costs exceed the blend prices differences, counter to the theoretical rule for competitive markets that prices should differ by no more than transportation costs. Possible reasons for this include: (1) interregional marketing costs are less than the transportation costs assumed here, (2) interregional shipments are subsidized, and (3) transportation costs used here are higher than actual. Interregional marketing costs could be lower than transportation costs as a result of pooling provisions. If this were the total explanation, it would imply that 73 percent of the milk pooled in Florida, 30 percent in Texas, was actually shipped. The different proportions, 0.73 and 0.30, and their magnitudes suggest that marketing institutions are the major factors involved positively in the transporting from Lake States to Texas. Subsidization of interregional shipments could be justified and carried out by large organizations in implementing national marketing strategies. In such cases, the price differences may not reflect transportation costs.

Scenarios

The analysis compares three alternative policies to the 1988 milk market equilibrium. The alternative policies are designated (1) minimal regulation, (2) multiple-base pricing, and (3) reconstitution using reverse osmosis along with multiple-base pricing. The following key assumptions apply to each of the three alternative policies.

First, it is assumed that under the alternative policies, all milk shipped interregionally is actually transported and incurs the full transportation cost of $0.355 per cwt per 100 miles. If Class I price differences from manufacturing milk prices were cost-driven, then there would be no incentive to sell milk in a fluid milk market where it is not needed. Without the incentive to sell milk where it is not needed, there would be no need to provide additional provisions to avoid the cost of shipping such milk. This would eliminate the option of pooling milk on an order and receiving the blend price but using the milk locally for manufacturing products. This would also eliminate a portion of the revenue generating the so-called "give-up" cost equal to

the difference in blend and manufacturing milk prices. This assumption is explicitly addressed in the results.

Second, the relationship between the M-W price and the average support price is assumed to remain constant as long as CCC purchases exceed zero. The alternatives result in lower average prices and reduced surpluses, suggesting that the M-W price would increase. However, the supply of milk remaining available for manufacturing in the Lake States is increased under each scenario, applying downward pressure on the M-W price. Thus, the two forces are assumed to be offsetting. Furthermore, the support price is held constant under all scenarios, isolating the effects of Federal order Class I differentials, even though CCC removals may fall below the trigger level for increasing the support price.

Third, the current annual average M-W price, as opposed to the lagged-2-months price, is used as the base for Class I prices in all alternative policy scenarios. The current average is $0.17 higher than the lagged M-W price in 1988. In a long-term equilibrium, the two average prices should be equal. Furthermore, the lag in actual practice is a minimum price mover. Of analytical interest is the difference between fluid, manufacturing, and Grade A milk prices in the current period. Thus, the current M-W price is used for the alternatives.

Fourth, two levels of reserve requirements are imposed by not allowing Class I utilization to exceed certain percentages based upon actual 1988 levels. The "low-reserve option" requires that each region's Class I utilization not exceed Florida's 1988 level of 85 percent. The "high-reserve option" imposes the additional requirement that Class I utilization not exceed 75 percent in Kentucky-Tennessee and the Deep South, their approximate 1988 levels. Class II needs in these regions are assumed to be satisfied by these requirements. Thus, Class II prices are held at base levels in all alternative scenarios.

Fifth, State-regulated and unregulated markets are assumed to be changed to be consistent with Federal orders in each scenario, with the exception of California. California is assumed to remain out of the Federal order system and to be unaffected in any way by the changes.

Minimal Regulation

Under the minimal regulation scenario, Federal orders operate as under the base, except that minimum Class I and Class II prices in all regions are set equal to the M-W manufacturing milk price. Thus, milk prices would be at least the M-W price in all Federal orders. Over-order payments would be negotiated to cover intraregional fluid marketing costs and transportation costs associated with interregional milk marketing. It is assumed that sufficient competition would exist to generate competitive over-order payments and competitive average Grade A milk prices in all regions, given the support price. Of primary interest is the identification of regions where Class I over-order payments are

generated by market forces, given existing supply and demand functions, and transportation costs.

Multiple-Base Pricing

Under the multiple-base pricing scenario, Federal orders operate as under the base, except that Class I differentials are set at base levels in all regions having no shortage of milk available for fluid use, as simulated under minimal regulation. Regions generating no Class I over-order payment under minimal regulation are designated base-pricing regions and given the minimum Class I differential of $1.20 that was assigned to the Upper Midwest order by the Food Security Act of 1985. These regions include all but four: Kentucky-Tennessee, the Deep South, the Southeast, and Florida. The designated base-price regions had Class I utilizations under 62 percent in 1988, indicating that milk supplies were available to be bid away from manufacturing plants for fluid use elsewhere. Class I prices in other regions include the $1.20 plus the market-generated payments necessary to generate fluid milk imports.

Reconstitution with Multiple-Base Pricing

Reconstitution of milk components or concentrates has the potential to widen market areas by reducing transportation costs [2,9]. It is assumed that reverse osmosis would be used to concentrate fresh milk by 50 percent before transport, and that water would be added back in processing the product for consumption. The simulation begins with the Class I differentials generated by the multiple-base pricing simulation. The simulation assumes that reconstitution of fresh concentrated milk can take place without the current "down allocation" and "compensatory payments" that effectively eliminate reconstitution in most cases. The model is allowed to choose between shipping at an average cost of $0.355 per cwt per 100 miles, or shipping with reverse osmosis at an average transportation cost of $0.1775 per cwt per 100 miles and average fixed cost of about $0.37 per cwt for concentration and reconstitution. As above, minimum Class I differentials are allowed to fall to levels sufficient to generate imports for fluid markets.

Results

Results of the alternative policies are initially presented in general terms, emphasizing their effects on aggregate variables. Following are discussions of the specific policy scenarios, emphasizing their distinguishing characteristics. The minimal regulation scenario serves two purposes. First, it is a valid policy alternative under which minimum prices are set equal to the M-W average manufacturing milk price. Second, if greater regulation were determined to be necessary, the scenario could identify market forces and provide a basis for setting minimum prices in some regions higher than in others. This is the direction taken with multiple price basing and with reconstitution along with multiple price basing.

General Results

The three alternative policies deviate from the base in their use of market forces to determine fluid milk prices and interregional quantity flows or to determine the regions where fluid milk price differentials would exceed the base level of $1.20 per cwt. Aggregate variables are presented in table 4. Grade A milk price declines are roughly the Class I milk price declines times the Class I utilization. Minimal regulation and low reserve generate a Class I price decline of $1.89 and a Grade A milk price decline of about $0.87. Multiple price basing and high reserve generate declines of about $0.83 and $0.31 in Class I and Grade A milk prices.

The declines in production and increases in fluid milk consumption result in reductions in Grade A milk in Class II and CCC purchases of the same amount. Reductions in CCC surplus removals range from about 6 billion pounds under minimal regulation to between 2 and 3 billion pounds under multiple basing and reconstitution. CCC purchase reductions translate directly into reduced utilizations of manufacturing plant capacity. Six billion pounds represent about two-thirds of 1988 CCC purchases and about 7 percent of commercial consumption of manufacturing milk.

Interregional trade patterns are changed significantly (table 5). The Lake States region does not export fluid milk under the alternative policies. Reducing the Corn Belt Class I differential to the minimal levels and lowering the blend price allows the Southeast and Florida to be fully supplied by shipments from the Corn Belt and Kentucky-Tennessee. Lake State exports to the Northern and Southern Plains and Texas are no longer attracted with reductions in their Class I differentials to base levels.

Policy Scenarios

The regional effects of the alternative policies can most easily be examined by analyzing their effects on producer/cooperative-level Class I differentials net of intraregional fluid milk marketing costs (table 6), changes in Class I utilization (table 7), and changes in the Grade A blend price (table 8). The effective Class I price differentials in table 6 are in terms of the current M-W price, $11.03. Changes in minimum Class I differentials result in changes in actual fluid milk prices at the handler level and effective Class I prices received by producers net of intraregional fluid marketing costs. The changes in the regional Grade A blend prices reflect the changes in Class I prices and the Class I utilization, both directly related to interregional shipments. Stipulating that all milk pooled in an order must be shipped increases the interregional marketing costs over the base; that alone can result in higher prices in deficit regions.

Table 4--Aggregate variables, 1988

Item	Base	Minimal regulation		Multiple-base pricing		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
				Million pounds			
Marketings:							
Grade A	128,365	122,763	122,842	126,114	126,212	125,669	125,795
Grade B	14,724	14,724	14,724	14,724	14,724	14,724	14,724
Total	143,089	137,487	137,566	140,884	140,982	140,393	140,519
Consumption:							
Fluid	54,413	55,027	55,016	54,708	54,693	54,752	54,737
Manufacturing	82,536	82,536	82,536	82,536	82,536	82,536	82,536
Class II	73.952	67,736	67,826	71,452	71,565	70,917	71,058
CCC removals[1]	8,840	2,624	2,714	6,295	6,407	5,805	5,946
				Percent			
Class I use	42.4	44.8	44.8	43.4	43.3	43.6	43.5
				Dollars per cwt			
Average prices:							
Fluid	14.03	12.14	12.17	13.16	13.21	12.97	13.02
Class I	13.44	11.55	11.58	12.57	12.61	12.38	12.43
Class II	11.05	10.87	10.87	11.05	11.05	11.04	11.04
Grade A	12.02	11.14	11.15	11.68	11.71	11.60	11.62
Grade B	10.88	10.88	10.88	10.88	10.88	10.88	10.88
M-W	11.03	11.03	11.03	11.03	11.03	11.03	11.03
				Million dollars			
Expenditures:							
Fluid	7,633.4	6,679.5	6,698.0	7,200.2	7,223.2	7,102.0	7,127.4
Manufacturing	9,103.7	9,103.7	9,103.7	9,103.7	9,103.7	9,103.7	9,103.7
Interregional marketing costs[2]	54.5	37.9	42.4	28.6	23.0	28.7	58.9
				Million dollars			
Revenues:							
Class I	7,310.7	6,353.1	6,371.7	6,863.4	6,886.4	6,777.3	6,802.7
Class II	8,175.0	7,363.2	7,373.1	7,888.9	7,901.4	7,830.6	7,846.4
Grade A[3]	15,431.2	13,678.4	13,702.4	14,739.1	14,780.3	14,579.1	14,619.0
Grade B	1,602.6	1,602.6	1,602.6	1,602.6	1,602.6	1,602.6	1,602.6

[1]CCC removals are the sum of Grade A and Grade B marketings, less fluid and manufacturing milk consumption, net of 1988 levels of imports and commercial stocks.

[2]Interregional marketing costs include interregional transportation costs and the fixed costs associated with reconstitution.

[3]Grade A revenues are the sum of Class I and Class II revenues less interregional marketing costs.

Table 5--Net exports, simulated, 1988

Region	Base	Minimal regulation		Multiple-base pricing		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
				Million pounds			
Northeast	-450	0	0	0	0	0	0
Mid-Atlantic	-118	0	0	0	0	0	0
Corn Belt	-86	740	1075	232	650	876	1,130
Kentucky-Tennessee	990	999	751	1,160	918	1,042	797
Southeast	-1,072	-1,213	-1,213	-1,083	-1,080	-1,180	-1,178
Florida	-582	-613	-613	-490	-488	-739	-737
Deep South	79	88	-99	180	0	0	-12
Lake States	2,543	0	0	0	0	0	0
Northern Plains	-270	0	0	0	0	0	0
Southern Plains	-126	0	0	0	0	0	0
Texas	-1,076	0	99	0	0	0	0
Mountains	-938	-104	-104	-104	-104	-104	-104
Northwest	787	-47	-47	-47	-47	-47	-47
Southwest	134	-34	-34	-34	-34	-34	-34
California	185	185	185	185	185	185	185

Table 6--Class I price differentials, net of regional marketing costs, 1988

Region	Base	Minimal regulation		Multiple-base pricing		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
				Dollars per cwt in excess of $11.03			
Northeast	3.00	0	0	1.20	1.20	1.20	1.20
Mid-Atlantic	2.67	0	0	1.20	1.20	1.20	1.20
Corn Belt	1.85	0	0	1.20	1.20	1.20	1.20
Kentucky-Tennessee	2.61	1.26	1.44	2.05	2.31	1.44	1.61
Southeast	3.37	2.15	2.15	2.95	2.97	2.34	2.35
Florida	4.58	4.25	4.25	5.03	5.05	3.36	3.37
Deep South	3.26	.76	1.76	1.57	2.71	1.20	2.59
Lake States	1.81	0	0	1.20	1.20	1.20	1.20
Northern Plains	1.54	0	0	1.20	1.20	1.20	1.20
Southern Plains	2.37	0	0	1.20	1.20	1.20	1.20
Texas	3.11	0	0	1.20	1.20	1.20	1.20
Mountains	2.18	0	0	1.20	1.20	1.20	1.20
Northwest	1.69	0	0	1.20	1.20	1.2	1.20
Southwest	2.32	0	0	1.20	1.20	1.20	1.20
California	.87	.87	.87	.87	.87	.87	.87

Derived from Class I prices in appendix table 7.

Table 7--Class I use, simulated, 1988

Region	Base	Minimal regulation		Multiple-base pricing		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
				Percent			
Northeast	45	50	50	48	48	48	48
Mid-Atlantic	50	55	55	53	53	53	53
Corn Belt	48	54	55	50	52	52	53
Kentucky-Tennessee	76	85	75	85	75	85	75
Southeast	85	85	85	85	85	85	85
Florida	85	85	85	85	85	85	85
Deep South	76	85	75	85	75	80	75
Lake States	16	15	15	15	15	15	15
Northern Plains	35	42	42	41	41	41	41
Southern Plains	47	53	53	50	50	50	50
Texas	53	73	75	69	69	69	69
Mountains	51	70	70	67	67	67	67
Northwest	34	31	31	31	31	31	31
Southwest	61	66	66	61	61	61	61
California	38	38	38	38	38	38	38

Table 8--Grade A milk prices in excess of the M-W, $11.03, 1988

Region	Base	Minimal regulation		Multiple-base pricing		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
				Dollars per cwt in excess of $11.03			
Northeast	1.49	0	0	0.72	0.72	0.72	0.72
Mid-Atlantic	1.44	0	0	.73	.73	.73	.73
Corn Belt	1.01	0	0	.71	.72	.73	.74
Kentucky-Tennessee	2.05	1.08	1.08	1.79	1.80	1.27	1.28
Southeast	2.88	1.84	1.84	2.55	2.57	2.02	2.03
Florida	3.94	3.64	3.64	4.35	4.36	2.92	2.93
Deep South	2.51	.65	1.32	1.36	2.07	.99	1.98
Lake States	.48	0	0	.35	.35	.35	.35
Northern Plains	.71	0	0	.64	.64	.64	.64
Southern Plains	1.17	0	0	.65	.65	.65	.65
Texas	1.70	0	0	.86	.86	.86	.86
Mountains	1.14	0	0	.82	.82	.82	.82
Northwest	.64	0	0	.43	.43	.43	.43
Southwest	1.45	0	0	.76	.76	.75	.76
California	-.28	-.28	-.28	-.28	-.28	-.28	-.28

Derived from Grade A milk prices in appendix table 11.

Minimal Regulation

Market forces and the low-reserve requirement generate fluid milk prices in excess of the M-W price in four regions, Kentucky-Tennessee, the Southeast, Florida, and the Deep South, as reflected by changes in effective Class I prices (table 6). Net interregional shipments into the Southeast and Florida are supplied primarily by the Corn Belt and Kentucky-Tennessee. Regional supply prices differ by no more than transportation costs, and by exactly transportation costs where shipping occurs. Grade A milk prices (table 8) in these regions reflect the market-generated over-order payments and any changes in Class I utilization (table 7). Grade A milk prices decline by about $1.00 in the Corn Belt, Kentucky-Tennessee, and the Southeast, but by only 30 cents in Florida. In all other regions, Grade A blend prices fall to $11.03, equal to the M-W price.

The high-reserve requirement generates higher fluid and Class I prices in Kentucky-Tennessee and the Deep South. The Deep South shifts from a marginal exporter to a marginal importer. Examination of differences between blend prices (table 8) at base and high-reserve levels provides some indication of the effects of the current system on prices as compared with market generated. Using the high-reserve option for comparison yields more conservative indications of the effects than would the low-reserve option. The most seriously affected prices appear to be in Texas with a difference of $1.70 per cwt, the Northeast at $1.49, the Southwest at $1.45, and the Mid-Atlantic at $1.44. The least affected prices appear to be in Florida, with a difference of $0.30, and the Lake States at $0.48.

Multiple-Base Pricing

Using the minimal regulation price surface as a basis for creating a multiple-base pricing system results in a shipping pattern similar to that under minimal regulation, but with more milk produced and less consumed. Minimum Class I differentials in Kentucky-Tennessee, the Deep South, the Southeast, and Florida are initially set at levels high enough to provide each market with a Class I reserve of at least 15 percent and achieve equilibrium blend price alignment. Grade A milk prices in all regions are greater than under minimal regulation and, with the exception of Florida, are less than the base prices. The increase in the Florida price is attributed to the fact that the full transportation cost is incurred in interregional shipments.

As expected, interregional shipments are mainly Corn Belt and Kentucky-Tennessee exports to the Southeast and Florida, and are approximately 13 percent lower than under minimal regulation, reflecting the positive effects of higher minimum differentials on regional production. The results indicate that the Mid-Atlantic would likely be a supply region for the Southeast and Florida. Mid-Atlantic milk produced closer to the Southeastern border would be as competitive as milk from the Corn Belt. Higher reserve requirements result in higher Class I prices in Kentucky-Tennessee, the Southeast, and Deep South.

Class I utilization remains less than 55 percent in the Northeast, Mid-Atlantic, Corn Belt, Northern Plains, and Southern Plains, indicating that base-pricing status for these regions would not likely result in substantial Class I price variation through seasonal over-order payments. The exceptions could be the Corn Belt, an export supply region, and Texas, with a Class I utilization of around 75 percent.

Reconstitution with Multiple-Base Pricing

Reverse osmosis coupled with multiple-base pricing results in fluid and effective Class I milk price declines from base levels of about $1.00 in the Southeast and about $1.20 in Florida (table 6). Comparing the reverse osmosis with multiple-base pricing alone illustrates the effect of increasing mileage in spreading out the fixed costs of reverse osmosis. At the margin, reverse osmosis reduces the fluid price by about $0.60 in the Southeast and about $1.65 in Florida.

Shipments from the Corn Belt and Kentucky-Tennessee into the Southeast and Florida increase substantially under reverse osmosis. The Corn Belt is given some cost advantage over Kentucky-Tennessee by reverse osmosis, and export levels are comparable with those under minimal regulation. Fluid milk prices decline from multiple price-basing levels in Kentucky-Tennessee and the three deficit regions. Florida's prices fall below minimal-regulation levels, while prices in the Southeast approach them. As under multiple price basing, the results indicate that the Mid-Atlantic region would be a source of supplies for the Southeast and Florida using reverse osmosis.

Effects on Manufacturing Industry

Shifting Federal milk marketing order policies to be consistent with market forces would result in a shift in milk manufacturing to the Lake States from the Northeast, Mid-Atlantic, Corn Belt, Northern Plains, Southern Plains, and Texas. Reducing minimum Class I differentials results in increased fluid milk consumption, reduced production, and reduced shipments among these regions. All these factors contribute to reduced milk available for manufacturing (table 9). Setting Class I differentials to $1.20 results in manufacturing milk declines of about 10 percent in the Northeast, Mid-Atlantic, and Northern Plains. The Corn Belt declines range from 5 to 14 percent, increasing under the higher reserve option and with reverse osmosis. Declines in Texas are greatest at about 50 percent, indicating that milk manufacturing would be significantly reduced. The Lake States milk available for manufacturing milk would increase by as much as 7 percent.

However, the changes in the midwestern corridor may not be as great as indicated, depending on how much of the milk pooled in the importing regions is actually shipped in. It is possible that the actual changes in milk available would be more on the order of those in the Northeast and Mid-Atlantic. In addition, the reduction in the Corn Belt under reverse-osmosis and the

Table 9--Manufacturing milk (Grade B and Class II) available, 1988

Region	Base	Minimal regulation		Multiple-base pricing		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
				Million pounds			
Northeast	10,600	8,622	8,622	9,354	9,354	9,354	9,354
Mid-Atlantic	6,669	5,559	5,559	6,062	6,062	6,062	6,062
Corn Belt	9,970	8,399	8,064	9,431	9,022	8,800	8,552
Kentucky-Tennessee	742	513	762	512	760	513	762
Southeast	809	765	765	762	762	764	764
Florida	442	422	422	420	420	424	424
Deep South	588	340	615	339	612	472	612
Lake States	31,412	33,168	33,168	33,743	33,743	33,743	33,743
Northern Plains	2,556	2,238	2,238	2,280	2,280	2,280	2,280
Southern Plains	2,362	2,009	2,009	2,135	2,135	2,135	2,135
Texas	2,737	1,146	1,047	1,403	1,403	1,403	1,403
Mountains	2,091	1,088	1,088	1,206	1,206	1,206	1,206
Northwest	5,016	5,668	5,668	5,792	5,792	5,792	5,792
Southwest	975	817	817	988	988	988	988
California	11,706	11,706	11,706	11,706	11,706	11,706	11,706

high-reserve option would likely be smaller as the result of some of the exports being displaced by the Mid-Atlantic, as discussed above.

The fact that milk supplies are increasing in the Lake States under all scenarios places downward pressure on the M-W price. This also shifts any over-order payments associated with give-up charges to the Corn Belt and Mid-Atlantic regions. To the extent that these regions are already more oriented toward fluid markets, however, it is likely that give-up charges will be lower than base levels in the Lake States.

Conclusions

Results of this study indicate that market forces would generate Grade A milk prices significantly higher than manufacturing price levels in regions south of the Corn Belt and east of Texas. Fluid milk consumers and Grade A milk producers would generally face lower prices than under 1988 regulated conditions. The most significant price reductions would occur in Texas, the Northeast, and the Mid-Atlantic, followed by reductions in the Southeast, Florida, and Deep South. Seasonal fluctuations and concerns over market stability could justify higher fluid milk prices in other regions. A regulated multiple-base pricing system could enhance stability through a minimum Class I price in all regions, and allow differentials to increase if and where market forces justify it. Allowing reverse osmosis in addition to multiple-base pricing would further decrease milk prices in deficit regions.

The manufacturing milk market would undergo significant change if market forces were allowed to determine fluid milk prices given the manufactured milk price support system. Surpluses would fall and regional shares of the market could change significantly. Producers in the Lake States and Corn Belt would lose export sales to fluid markets, but would gain increased shares in the manufactured product market. Milk available for manufactured uses could be reduced in the Northeast, Mid-Atlantic, Southern Plains, and Texas, unless a means to generate higher prices in the manufacturing milk market could be found, such as with premium products.

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Appendix table 1--Grade A milk marketings

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
				Million pounds			
Northeast	18669	17290	17290	17962	17962	17962	17962
Mid-Atlantic	12496	11604	11604	12061	12061	12061	12061
Corn Belt	15379	14720	14720	15188	15197	15202	15208
Kentucky-Tennessee	3032	2825	2825	2977	2980	2866	2868
Southeast	3650	3492	3492	3601	3603	3520	3522
Florida	2339	2292	2292	2404	2406	2180	2182
Deep South	2339	2124	2203	2207	2289	2164	2279
Lake States	29485	28747	28747	29288	29288	29288	29288
Northern Plains	1909	1869	1869	1905	1905	1905	1905
Southern Plains	3584	3383	3383	3496	3496	3496	3496
Texas	4752	4293	4293	4528	4528	4528	4528
Mountains	2871	2727	2727	2831	2831	2831	2831
Northwest	7141	6982	6982	7090	7090	7090	7090
Southwest	2657	2353	2353	2513	2513	2513	2513
California	18062	18062	18062	18062	18062	18062	18062

Appendix table 2--Pooled market deliveries 1/

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
				Million pounds			
Northeast	19120	17290	17290	17962	17962	17962	17962
Mid-Atlantic	12614	11604	11604	12062	12062	12062	12062
Corn Belt	15465	13981	13646	14956	14547	14325	14077
Kentucky-Tennessee	2042	1825	2073	1817	2063	1824	2071
Southeast	4722	4705	4705	4684	4684	4700	4700
Florida	2921	2905	2905	2893	2893	2919	2919
Deep South	2260	2036	2302	2028	2289	2164	2291
Lake States	26941	28747	28747	29289	29289	29289	29289
Northern Plains	2179	1869	1869	1905	1905	1905	1905
Southern Plains	3711	3383	3383	3496	3496	3496	3496
Texas	5828	4293	4194	4528	4528	4528	4528
Mountains	3808	2831	2831	2935	2935	2935	2935
Northwest	6354	7030	7030	7137	7137	7137	7137
Southwest	2523	2387	2387	2547	2547	2547	2547
California	17877	17877	17877	17877	17877	17877	17877

1/ Pooled market deliveries of Grade A milk in Class I and Class II uses. The difference between these pooled deliveries and marketings in Appendix table 1 are net imports or exports.

Appendix table 3--Class I quantities

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
		Million pounds					
Northeast	8520	8668	8668	8608	8608	8608	8608
Mid-Atlantic	6315	6415	6415	6370	6370	6370	6370
Corn Belt	7462	7549	7549	7492	7492	7492	7492
Kentucky-Tennessee	1548	1560	1559	1553	1551	1559	1557
Southeast	3994	4021	4021	4003	4003	4017	4017
Florida	2479	2483	2483	2473	2473	2495	2495
Deep South	1716	1740	1731	1733	1721	1736	1723
Lake States	4346	4396	4396	4363	4363	4363	4363
Northern Plains	771	779	779	773	773	773	773
Southern Plains	1752	1777	1777	1764	1764	1764	1764
Texas	3091	3147	3147	3125	3125	3125	3125
Mountains	1960	1986	1986	1972	1972	1972	1972
Northwest	2182	2206	2206	2189	2189	2189	2189
Southwest	1548	1570	1570	1559	1559	1559	1559
California	6730	6730	6730	6730	6730	6730	6730

Appendix table 4--Class II quantities

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
		Million pounds					
Northeast	10600	8622	8622	9354	9354	9354	9354
Mid-Atlantic	6299	5189	5189	5692	5692	5692	5692
Corn Belt	8003	6432	6097	7464	7055	6833	6585
Kentucky-Tennessee	494	265	514	264	512	265	514
Southeast	728	684	684	681	681	683	683
Florida	442	422	422	420	420	424	424
Deep South	544	296	571	295	568	428	568
Lake States	22595	24351	24351	24926	24926	24926	24926
Northern Plains	1408	1090	1090	1132	1132	1132	1132
Southern Plains	1959	1606	1606	1732	1732	1732	1732
Texas	2737	1146	1047	1403	1403	1403	1403
Mountains	1848	845	845	963	963	963	963
Northwest	4172	4824	4824	4948	4948	4948	4948
Southwest	975	817	817	988	988	988	988
California	11147	11147	11147	11147	11147	11147	11147

Appendix table 5--Grade B milk marketings

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
		Million pounds					
Northeast	0	0	0	0	0	0	0
Mid-Atlantic	370	370	370	370	370	370	370
Corn Belt	1967	1967	1967	1967	1967	1967	1967
Kentucky-Tennessee	248	248	248	248	248	248	248
Southeast	81	81	81	81	81	81	81
Florida	0	0	0	0	0	0	0
Deep South	44	44	44	44	44	44	44
Lake States	8817	8817	8817	8817	8817	8817	8817
Northern Plains	1148	1148	1148	1148	1148	1148	1148
Southern Plains	403	403	403	403	403	403	403
Texas	0	0	0	0	0	0	0
Mountains	243	243	243	243	243	243	243
Northwest	844	844	844	844	844	844	844
Southwest	0	0	0	0	0	0	0
California	559	559	559	559	559	559	559

Appendix table 6--Fluid milk prices, handler level 1/

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
		Dollars per hundredweight					
Northeast	14.68	11.68	11.68	12.88	12.88	12.88	12.88
Mid-Atlantic	14.35	11.68	11.68	12.88	12.88	12.88	12.88
Corn Belt	13.53	11.68	11.68	12.88	12.88	12.88	12.88
Kentucky-Tennessee	14.29	12.94	13.12	13.73	13.99	13.12	13.29
Southeast	15.05	13.83	13.83	14.63	14.65	14.02	14.03
Florida	16.26	15.93	15.93	16.71	16.73	15.04	15.05
Deep South	14.94	12.44	13.44	13.25	14.39	12.88	14.27
Lake States	13.49	11.68	11.68	12.88	12.88	12.88	12.88
Northern Plains	13.22	11.68	11.68	12.88	12.88	12.88	12.88
Southern Plains	14.05	11.68	11.68	12.88	12.88	12.88	12.88
Texas	14.59	11.48	11.48	12.68	12.68	12.68	12.68
Mountains	13.66	11.48	11.48	12.68	12.68	12.68	12.68
Northwest	13.17	11.48	11.48	12.68	12.68	12.68	12.68
Southwest	13.80	11.48	11.48	12.68	12.68	12.68	12.68
California	12.35	12.35	12.35	12.35	12.35	12.35	12.35

1/ Fluid milk prices are the sum of minimum Class I prices and over-order payments.

Appendix table 7--Class I milk prices, cooperative/producer level 1/

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
		Dollars per hundredweight					
Northeast	14.03	11.03	11.03	12.23	12.23	12.23	12.23
Mid-Atlantic	13.70	11.03	11.03	12.23	12.23	12.23	12.23
Corn Belt	12.88	11.03	11.03	12.23	12.23	12.23	12.23
Kentucky-Tennessee	13.64	12.29	12.47	13.08	13.34	12.47	12.64
Southeast	14.40	13.18	13.18	13.98	14.00	13.37	13.38
Florida	15.61	15.28	15.28	16.06	16.08	14.39	14.40
Deep South	14.29	11.79	12.79	12.60	13.74	12.23	13.62
Lake States	12.84	11.03	11.03	12.23	12.23	12.23	12.23
Northern Plains	12.57	11.03	11.03	12.23	12.23	12.23	12.23
Southern Plains	13.40	11.03	11.03	12.23	12.23	12.23	12.23
Texas	14.14	11.03	11.03	12.23	12.23	12.23	12.23
Mountains	13.21	11.03	11.03	12.23	12.23	12.23	12.23
Northwest	12.72	11.03	11.03	12.23	12.23	12.23	12.23
Southwest	13.35	11.03	11.03	12.23	12.23	12.23	12.23
California	11.90	11.90	11.90	11.90	11.90	11.90	11.90

1/ Class I prices are minimum Class I prices plus over-order payments (net of intra-regional fluid milk marketing costs).

Appendix table 8--Class II milk prices 1/

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
		Dollars per hundredweight					
Northeast	11.30	11.03	11.03	11.30	11.30	11.30	11.30
Mid-Atlantic	11.23	11.03	11.03	11.23	11.23	11.23	11.23
Corn Belt	11.25	11.03	11.03	11.25	11.25	11.25	11.25
Kentucky-Tennessee	11.31	11.03	11.03	11.31	11.31	11.31	11.31
Southeast	11.20	11.03	11.03	11.20	11.20	11.20	11.20
Florida	11.36	11.03	11.03	11.36	11.36	11.36	11.36
Deep South	11.16	11.03	11.03	11.16	11.16	11.16	11.16
Lake States	11.25	11.03	11.03	11.25	11.25	11.25	11.25
Northern Plains	11.28	11.03	11.03	11.28	11.28	11.28	11.28
Southern Plains	11.12	11.03	11.03	11.12	11.12	11.12	11.12
Texas	11.13	11.03	11.03	11.13	11.13	11.13	11.13
Mountains	11.06	11.03	11.03	11.06	11.06	11.06	11.06
Northwest	11.12	11.03	11.03	11.12	11.12	11.12	11.12
Southwest	11.09	11.03	11.03	11.09	11.09	11.09	11.09
California	10.06	10.06	10.06	10.06	10.06	10.06	10.06

1/ Class II prices are minimum Class II prices plus over-order payments.

Appendix table 9--Class I over-order payments 1/

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
		Dollars per hundredweight					
Northeast	0.67	0.00	0.00	0.00	0.00	0.00	0.00
Mid-Atlantic	0.74	0.00	0.00	0.00	0.00	0.00	0.00
Corn Belt	0.77	0.00	0.00	0.00	0.00	0.00	0.00
Kentucky-Tennessee	0.76	1.26	1.44	0.05	0.31	0.24	0.41
Southeast	0.76	2.15	2.15	0.05	0.07	0.09	0.10
Florida	1.51	4.25	4.25	0.08	0.10	0.11	0.12
Deep South	0.66	0.76	1.76	0.07	1.21	0.00	1.39
Lake States	1.30	0.00	0.00	0.00	0.00	0.00	0.00
Northern Plains	0.71	0.00	0.00	0.00	0.00	0.00	0.00
Southern Plains	0.68	0.00	0.00	0.00	0.00	0.00	0.00
Texas	0.45	0.00	0.00	0.00	0.00	0.00	0.00
Mountains	0.60	0.00	0.00	0.00	0.00	0.00	0.00
Northwest	0.16	0.00	0.00	0.00	0.00	0.00	0.00
Southwest	0.47	0.00	0.00	0.00	0.00	0.00	0.00
California	0.00	0.00	0.00	0.00	0.00	0.00	0.00

1/ Over-order payments for the Base are assumed to include an intraregional fluid milk marketing cost of $0.65 per cwt for all regions except Texas, Mountains, Northwest, Southwest, and California. In these five regions the cost is assumed to be $0.45 per cwt. For the Northwest and California the marketing cost in excess of the over-order payment is assumed to be included in the fluid milk price, PF (Appendix table 7).

Appendix table 10--Class II over-order payments

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
		Dollars per hundredweight					
Northeast	0.23	0.00	0.00	0.23	0.23	0.23	0.23
Mid-Atlantic	0.12	0.00	0.00	0.12	0.12	0.12	0.12
Corn Belt	0.19	0.00	0.00	0.19	0.19	0.19	0.19
Kentucky-Tennessee	0.24	0.00	0.00	0.24	0.24	0.24	0.24
Southeast	0.20	0.00	0.00	0.20	0.20	0.20	0.20
Florida	0.21	0.00	0.00	0.21	0.21	0.21	0.21
Deep South	0.11	0.00	0.00	0.11	0.11	0.11	0.11
Lake States	0.19	0.00	0.00	0.19	0.19	0.19	0.19
Northern Plains	0.24	0.00	0.00	0.24	0.24	0.24	0.24
Southern Plains	0.07	0.00	0.00	0.07	0.07	0.07	0.07
Texas	0.06	0.00	0.00	0.06	0.06	0.06	0.06
Mountains	0.09	0.00	0.00	0.09	0.09	0.09	0.09
Northwest	0.07	0.00	0.00	0.07	0.07	0.07	0.07
Southwest	0.03	0.00	0.00	0.03	0.03	0.03	0.03
California	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Appendix table 11--Grade A milk prices, cooperative/producer level 1/

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
	Dollars per hundredweight						
Northeast	12.52	11.03	11.03	11.75	11.75	11.75	11.75
Mid-Atlantic	12.47	11.03	11.03	11.76	11.76	11.76	11.76
Corn Belt	12.04	11.03	11.03	11.74	11.75	11.76	11.77
Kentucky-Tennessee	13.08	12.11	12.11	12.82	12.83	12.30	12.31
Southeast	13.91	12.87	12.87	13.58	13.60	13.05	13.06
Florida	14.97	14.67	14.67	15.38	15.39	13.95	13.96
Deep South	13.54	11.68	12.35	12.39	13.10	12.02	13.01
Lake States	11.51	11.03	11.03	11.38	11.38	11.38	11.38
Northern Plains	11.74	11.03	11.03	11.67	11.67	11.67	11.67
Southern Plains	12.20	11.03	11.03	11.68	11.68	11.68	11.68
Texas	12.73	11.03	11.03	11.89	11.89	11.89	11.89
Mountains	12.17	11.03	11.03	11.85	11.85	11.85	11.85
Northwest	11.67	11.03	11.03	11.46	11.46	11.46	11.46
Southwest	12.48	11.03	11.03	11.79	11.79	11.78	11.79
California	10.75	10.75	10.75	10.75	10.75	10.75	10.75

1/ Grade A milk prices reflect Class I price (net of intraregional fluid milk marketing cost) and Class II price, and Class I and II utilizations.

Appendix table 12--Grade B milk prices

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
	Dollars per hundredweight						
Mid-Atlantic	10.99	10.99	10.99	10.99	10.99	10.99	10.99
Corn Belt	10.86	10.86	10.86	10.86	10.86	10.86	10.86
Kentucky-Tennessee	10.62	10.62	10.62	10.62	10.62	10.62	10.62
Southeast	10.71	10.71	10.71	10.71	10.71	10.71	10.71
Deep South	10.23	10.23	10.23	10.23	10.23	10.23	10.23
Lake States	11.02	11.02	11.02	11.02	11.02	11.02	11.02
Northern Plains	10.77	10.77	10.77	10.77	10.77	10.77	10.77
Southern Plains	10.62	10.62	10.62	10.62	10.62	10.62	10.62
Mountains	10.68	10.68	10.68	10.68	10.68	10.68	10.68
Northwest	10.65	10.65	10.65	10.65	10.65	10.65	10.65
California	9.84	9.84	9.84	9.84	9.84	9.84	9.84

Appendix table 13--All-milk price, plant level 1/

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
		Dollars per hundredweight					
Northeast	12.81	11.36	11.36	12.06	12.06	12.06	12.06
Mid-Atlantic	12.74	11.38	11.38	12.07	12.07	12.07	12.07
Corn Belt	12.18	11.32	11.32	11.93	11.94	11.95	11.96
Kentucky-Tennessee	13.25	12.42	12.39	13.05	13.03	12.59	12.57
Southeast	14.39	13.38	13.38	14.07	14.09	13.56	13.57
Florida	15.52	15.22	15.22	15.93	15.95	14.51	14.51
Deep South	13.96	12.19	12.79	12.89	13.53	12.49	13.44
Lake States	11.47	11.10	11.10	11.38	11.38	11.38	11.38
Northern Plains	11.55	11.10	11.10	11.49	11.49	11.49	11.49
Southern Plains	12.32	11.29	11.29	11.86	11.86	11.86	11.86
Texas	12.97	11.36	11.37	12.20	12.20	12.20	12.20
Mountains	12.30	11.29	11.29	12.04	12.04	12.04	12.04
Northwest	11.69	11.12	11.12	11.50	11.50	11.50	11.50
Southwest	12.75	11.33	11.33	12.06	12.06	12.06	12.06
California	10.89	10.89	10.89	10.89	10.89	10.89	10.89
U.S. average	12.17	11.38	11.39	11.85	11.87	11.78	11.80

1/ All-milk prices at the plant level including the entire over order payment on Class I milk, calculated as (PB*QB+PF*QI+PII*QII)/(QI+QII+QB).

Appendix table 14--All-milk price, using producer/cooperative level Class I price 1/

Region	Base	Minimal Regulation		Multiple Base		Reconstitution	
		Low reserve	High reserve	Low reserve	High reserve	Low reserve	High reserve
		Dollars per hundredweight					
Northeast	12.52	11.03	11.03	11.75	11.75	11.75	11.75
Mid-Atlantic	12.43	11.03	11.03	11.74	11.74	11.74	11.74
Corn Belt	11.91	11.01	11.01	11.64	11.65	11.66	11.67
Kentucky-Tennessee	12.89	11.99	11.99	12.65	12.66	12.17	12.18
Southeast	13.84	12.82	12.82	13.52	13.54	13.00	13.01
Florida	14.97	14.67	14.67	15.38	15.39	13.95	13.96
Deep South	13.48	11.65	12.31	12.35	13.05	11.98	12.96
Lake States	11.40	11.03	11.03	11.30	11.30	11.30	11.30
Northern Plains	11.38	10.93	10.93	11.33	11.33	11.33	11.33
Southern Plains	12.04	10.99	10.99	11.57	11.57	11.57	11.57
Texas	12.73	11.03	11.03	11.89	11.89	11.89	11.89
Mountains	12.05	11.00	11.00	11.76	11.76	11.76	11.76
Northwest	11.56	10.99	10.99	11.37	11.37	11.37	11.37
Southwest	12.48	11.03	11.03	11.79	11.79	11.78	11.79
California	10.72	10.72	10.72	10.72	10.72	10.72	10.72
U.S. average	11.94	11.14	11.16	11.62	11.64	11.55	11.57

1/ All-milk prices using producer/cooperative level Class I prices net of fixed intra-regional fluid milk marketing costs, calculated as (PB*QB+PI*QI+PII*QII)/(QI+QII+QB).

Appendix table 15--Interregional mileage matrix

	NE	MA	CB	KT	SE	FL	DS	LS	NP	SP	TX	MNT	NW	SW	CA
								Miles							
Northeast	0	167													
Mid Atlantic	167	0	566		563										
Corn Belt		566	0	304			490	319		630					
KY-Tenn			304	0	214		341								
Southeast		563		214	0	506	336								
Florida					506	0									
Deep South			490	341	336		0			480	372				
Lake States			319					0	432						
N. Plains								432	0	514		555			
S. Plains			630				480		514	0	207	672		552	
Texas							372			207	0			650	
Mountains									555	672		0	320	435	686
Northwest												320	0		649
Southwest										552	650	435		0	815
California												686	649	815	0

Appendix table 16--Simulation regions

Region	Demand areas		Supply areas
	Federal orders	Other	
Northeast	New England New York-New Jersey	Remainder of New England, NY, NJ	New England, NY, NJ(58%), PA(29%)
Mid-Atlantic	Mid-Atlantic E.Ohio-W.PA	Remainder of MD, PA, VA, WV	DE, MD, PA(71%), VA(81%), WV(61%), NJ(42%), OH(46%)
Corn Belt	S.MI, IA, Cent.IL, S.IL-E.MO, IN, OH Valley, Lvl.-Lex.-Evl.	IL(90%), remainder of MI, IA, MO, IL, IN, OH	OH(54%), MI(99%), IN, IL(56%), IA(80%), KY(64%) MO(43.6%),WV(39%)
Kentucky-Tennessee	Paducah, TN Valley, Nashville, Memphis	Remainder of KY, TN, MS	KY(36%), TN, VA(19%), MS(5%), AR(5%)
Southeast	Georgia, AL-W.FL	NC, SC, remainder of GA	NC, SC, GA, AL
Florida	Upper FL, Tampa, S.E. FL		FL
Deep South	Cent.AR, New Orleans-MS, Gtr.LA	Remainder of AR	AR(95%), LA, MS(95%)
Lake States	Upper Midwest, Chicago Regional, MI-U.P.	IL(10%) remainder of WI	MN, WI, IL(44%), ND(77%), SD(35%), IA(10%), MI(1%)
Northern Plains	E. SD, Black Hills, NE-W.IA	Remainder of ND, SD, NE	NE, ND(23%), SD(65%), IA(10%)
Southern Plains	Greater KS City, S.W. Plains	Remainder of KS	OK, KS(94.6%), MO(56.4%)
Texas	Texas	Remainder of TX	TX(98.3%)
Mountains	E.CO, W.CO, Great Basin	ID(10%), remainder of MT, WY, CO, NV, UT	MT, WY, CO, UT,NV, KS(5.4%)
Northwest	Puget Sound-Inland, OR-WA, S.W.ID-E.OR	ID(90%), remainder of WA, OR	ID, WA, OR
Southwest	Rio Grande Valley, Cent. AZ, TX-Pan., Lubbock-Plnvw	Remainder of NM, AZ	AZ, NM, TX(1.7%)
California		California	CA

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U.S. Department of Agriculture
Economic Research Service
1301 New York Avenue, NW.
Washington, DC 20005-4788