IMPACT OF ALTERNATIVE CLASS I PRICING SYSTEMS ON THE LOCATION AND STRUCTURE OF THE U.S. DAIRY INDUSTRY

by

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ABSTRACT

The projected regional and aggregate impacts on the dairy industry of continued classified pricing under the Federal milk marketing order program and under elimination of Federal milk orders are evaluated. The effects are measured on milk production, fluid consumption, and price, with special emphasis on industry location and structure.

Impact of Alternative Class I Pricing Systems on the Location and Structure of the U.S. Dairy Industry

The effects of Government regulation on the dairy industry should be periodically reviewed in order that policymakers can make better informed decisions. Federal milk marketing orders and the classified pricing system have been the focus of a number of studies in recent years. Most of these studies have focused on the social costs of the classified pricing system and the undergirding of cooperative monopoly power by Federal milk orders (Kwoka, Masson, Ippolito, Eisenstat). In addition, Cook, Blakley, and Barry critiqued some of these studies and Dobson and Buxton evaluated the general impact of Federal milk orders.

In response to this growing concern, ERS initiated a study of the economic impact of classified pricing under the Federal milk marketing order program. The study projected the regional and aggregate impacts to 1985 of several alternative pricing structures on farm prices and income, milk production, fluid milk and manufactured dairy product prices and consumption, social welfare, and industry structure. This paper reports on two of these pricing systems--continuation of current programs and the elimination of Federal and State minimum Class I price differentials. Projected regional effects on production, fluid consumption, and prices are compared with special emphasis on the resultant impact on industry structure.

Pricing changes would not be expected to equally affect the structure and location of all sectors of the dairy industry. Regional changes in prices would alter regional farm income, the location of milk production, and the number and location of producers.

The fluid milk processing industry, with plants generally located close to consumption areas due to product perishability and high transportation costs, is generally considered to have local or regional markets. As a result, plant location would be relatively unaffected by changes in milk production location since the differences in transportation costs of bulk versus packaged fluid milk are relatively minor. Ice cream and cottage cheese plants, which generally have first call on raw milk after fluid needs are satisfied, are often closely associated with fluid milk processing and would also be relatively unaffected.

The remaining two principal manufactured dairy products, cheese and butter, have national or even international markets due to a longer storage life and high final product value relative to transportation costs. As a result, plant location should be highly dependent on accurate projections of residual raw milk supplies for manufacturing.

The importance of having sufficient raw milk supplies for efficient plant operations was supported by findings of Lasley and Sleight. Regression analysis indicated that an overall reduction of 10 percentage points in a plant's volume results in an increase of 14 percent in its average unit cost. The relative increase was naturally less at the upper ranges of capacity utilization and more at the lower levels.

Under the Federal order system, minimum prices are established for milk for fluid use and for regulated fluid grade milk used in manufactured products. In 1976, milk regulated under Federal orders was about 80 percent of fluid grade milk marketings and 65 percent of all milk

marketed (Shaw).

In 1976, minimum Class I prices per hundredweight set in most Federal milk marketing orders exceeded the Minnesota-Wisconsin manufacturing price by about 90 cents at Eau Claire, Wis., plus 15 cents per 100 miles distance from Eau Claire. Effective Class I prices paid by handlers in most markets were somewhat above this minimum level, but still followed this general pricing structure.

For this study the continental United States was divided into nine geographic regions, based on relatively homogeneous milk supply areas (fig. A). An economic model encompassing the nine regions was developed to estimate the impact of changing the Federal milk order pricing policy on regional milk supplies, fluid demands, regional producer and Class I milk prices, and the overall level of milk prices as reflected by the Minnesota-Wisconsin manufacturing milk price (Buxton). Regional supply and fluid demand was forecast using updated supply (Hallberg, 1976) and demand (Boehm, 1976) models, trend analysis, and careful evaluation of factors that were difficult to quantify. Fluid milk movements and Class I price differentials were evaluated through use of Riley's reactive programming model. Markov chain analysis was used to assist in projecting regional dairy herd and dairy plant size distribution.

Projections to 1985 and comparative analysis. Results of two alternative model projections to 1985--continued minimum Federal milk order price structures and elimination of Federal milk orders are shown in table 1. By eliminating Federal milk orders the effective Class I price surface is lowered across the country, and to the greatest extent

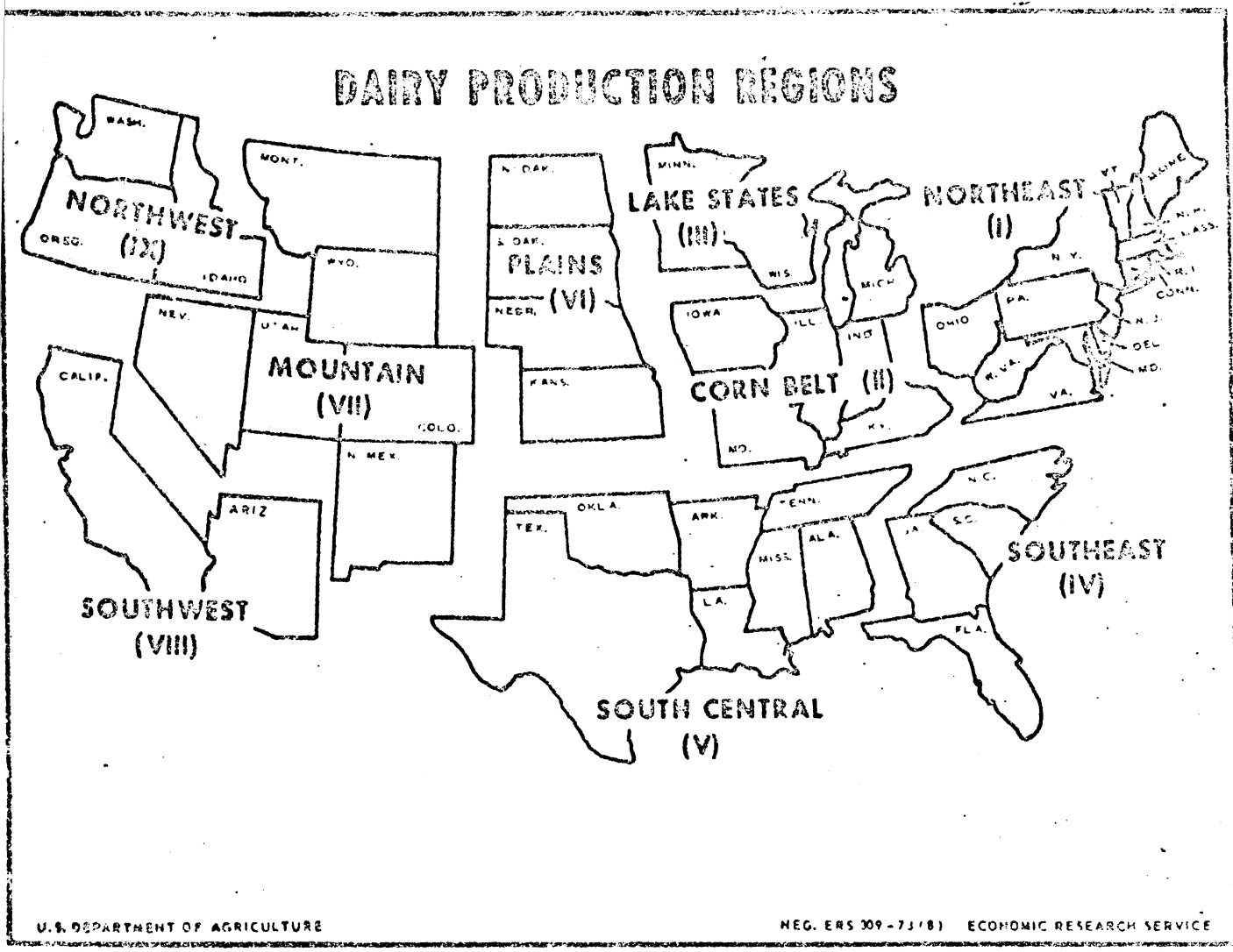
DAIRY PRODUCTION REGIONS
NORTHWEST (IX)
MOUNTAIN (VII)
PLAINS (VI)
LAKE STATES (III)
CORN BELT (II)
NORTHEAST (I)
SOUTHEAST (IV)
SOUTH CENTRAL (V)
SOUTHWEST (VIII)
WASH.
OREG.
IDAHO
MONT.
WYO.
NEV.
UTAH
CALIF.
ARIZ
COLO.
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Figure A

Table 1 --Milk production, fluid consumption, all wholesale milk prices, and prevailing Class I prices, by region, 1976 actual and 1985 projected for continuing programs and eliminating programs

Region	Actual 1976	Projected 1985			Actual 1976	Projected 1985		
		Continued program	Eliminate program	Change from continued program		Continued program	Eliminate program	Change from continued program
	Million pounds			Percent	Dollars per cwt.			Percent
	MILK PRODUCTION				ALL WHOLESALE MILK PRICE			
Northeast	31,006	31,789	30,767	-1,022	-3.21	10.19	13.40	13.19	-0.21	-1.57
Corn Belt	18,866	16,805	17,103	298	1.77	9.48	12.59	12.80	.21	1.67
Lake States	29,535	31,294	32,666	1,372	4.38	9.01	12.15	12.65	.50	4.12
Southeast	5,525	6,285	5,546	-739	-11.76	11.15	14.65	14.07	-.58	-3.96
South Central	9,725	9,608	9,123	-485	-5.05	10.34	13.62	13.35	-.27	-1.98
Plains	5,332	4,227	4,293	66	1.56	9.10	12.40	12.62	.22	1.77
Mountain	2,737	2,986	2,946	-40	-1.34	9.97	13.20	13.24	.04	.30
Southwest	12,457	16,256	15,978	-278	-1.71	9.29	12.95	12.85	-.10	-.77
Northwest	5,009	5,605	5,576	-29	-.52	9.54	12.76	12.83	.07	.55
United States 1/	120,192	124,855	123,998	-857	-.69	9.67	12.93	12.97	.04	.31
	FLUID CONSUMPTION				PREVAILING CLASS I PRICE			
Northeast	19,376	20,322	20,574	252	1.24	11.43	14.86	13.76	-1.10	-7.40
Corn Belt	10,072	10,638	10,741	103	.97	10.53	14.50	13.66	-.84	-5.79
Lake States	2,723	2,904	2,912	8	.28	10.08	13.51	13.21	-.30	-2.22
Southeast	4,823	5,423	5,519	96	1.77	11.98	15.91	14.76	-1.15	-7.23
South Central	7,413	7,634	7,761	127	1.66	11.20	15.34	14.16	-1.18	-7.69
Plains	1,271	1,222	1,236	14	1.15	10.50	14.46	13.61	-.85	-5.88
Mountain	1,871	2,200	2,215	15	.68	11.01	14.44	13.86	-.58	-4.02
Southwest	6,045	6,617	6,694	77	1.16	9.83	14.26	13.21	-1.05	-7.36
Northwest	1,804	1,874	1,894	20	1.07	10.65	14.08	13.21	-.87	-6.18
United States 1/	55,398	58,834	59,546	712	1.21	10.98	14.77	13.78	-.99	-6.70
Minn.-Wis. Mfg. price						8.48	11.91	12.56	0.65	+5.46

1/ Prices are a weighted average.

in the Northeast, South, and West. In general, lowering the Class I differential increases the Minnesota-Wisconsin manufacturing milk price (the basic mover of all prices) and has only a minor impact on the overall U.S. milk price received by dairy farmers. However, dairy farmers in regions such as the Lake States, Corn Belt, and Plains, with a high proportion of their milk being utilized in manufactured dairy products, would receive a higher price than under continued current policy. Alternatively, farmers in the Northeast, South, and Southwest areas would receive somewhat lower prices. Impacts on farm prices and other target variables of increasing effective Class I differentials across the country are not covered in this paper, but would be essentially a mirror image of the impacts of decreasing differentials.

Total U.S. milk production is expected to increase from 120.2 billion pounds in 1976 to 124.9 billion pounds in 1985 under continued programs (table 1). The aggregate increase would be slightly less if Federal and State minimum Class I price differentials were eliminated, but important regional shifts in production (and milk cows and farms) would occur. The Lake States, Corn Belt and Plains regions would be the chief gainers, while the Northeast, Southern, and Western areas would be the principal losers. Among the four regions that would gain milk production under a policy of eliminating Federal and State minimum class prices would be the Lake States, where nearly 80 percent of the gain would occur. The Northeast, the biggest loser among the six regions with lower production in 1985, would incur nearly 40 percent of the overall loss in production.

Regional gains and losses in cow numbers and milk producers would closely parallel the changes in production (table 2). The trend toward fewer and larger producers would be accelerated in the Northeast and South and slowed particularly in the Lake States.

Fluid milk consumption is expected to increase about 6 percent on a product pound basis in 1985, compared with 1976. This is primarily due to increased population offsetting the decline in per capita consumption. All regions are expected to have increased fluid milk consumption. The Mountain region leads the way with an expected 18 percent increase in consumption from 1976 to 1985, followed by the Southeast (12 percent) and the Southwest (9 percent).

Fluid milk consumption in the absence of minimum Class I differentials would be up slightly more than 1 percent in 1985, compared with consumption in 1985 under continued current policy. Fluid milk consumption would be up in all regions, but would be up most in the Southern and Northeast Regions where Class I differentials are projected to decrease the most. In turn, consumption of manufactured dairy products in all regions would be down due to increased prices of manufactured milk.

Dairy product processing structure. Projected regional production, number of plants, and average plant size is shown for butter for 1985 in table 3. Both continued programs and eliminating minimum Federal and State Class I price differentials are presented. Butter production is projected to be 865 million pounds, a decline of about 12 percent of

Table 2—Number of farms and milk cows, by region, 1975 actual and 1985 projected under continued programs and under eliminating Federal and State minimum Class I differentials

Region	Actual 1975	Projected 1985		
		Continued programs	No minimum class price	Change from continued programs
FARMS REPORTING MILK COWS (Number)				
Northeast	86,561	53,370	51,650	-1,720
Corn Belt	85,118	42,729	43,483	754
Lake States	85,924	57,663	60,189	2,526
Southeast	20,687	11,904	10,504	-1,400
South Central	59,836	28,717	27,268	-1,449
Plains	28,716	10,180	10,339	159
Mountain	14,650	8,355	8,243	-112
Southwest	6,592	5,320	5,229	-91
Northwest	14,612	5,758	5,728	-30
United States	402,696	223,996	222,633	-1,363
MILK COWS (Thous.)				
Northeast	2,816	2,535	2,454	-81
Corn Belt	1,882	1,433	1,458	25
Lake States	2,696	2,579	2,692	113
Southeast	537	493	435	-58
South Central	1,108	826	784	-42
Plains	576	371	377	6
Mountain	239	198	195	-3
Southwest	867	984	967	-17
Northwest	419	374	372	-2
United States	11,140	9,793	9,734	-59
MILK PRODUCTION (Mil. lbs.)				
Northeast	31,006	31,789	30,767	-1,022
Corn Belt	18,866	16,805	17,103	298
Lake States	29,535	31,294	32,666	1,372
Southeast	5,525	6,285	5,546	-739
South Central	9,725	9,608	9,123	-485
Plains	5,332	4,227	4,293	66
Mountain	2,737	2,986	2,946	-40
Southwest	12,457	16,256	15,978	-278
Northwest	5,009	5,605	5,576	-29
United States	120,192	124,855	123,998	-857

Table 3--Butter production, number of plants, and average plant size, by region, for 1975 and projected to 1985 under continued programs and under eliminating Federal and State minimum Class I price differentials

Region	Actual, 1975 1/			Continuing programs, 1985			No minimum class prices, 1985		
	Production	Number of plants	Average plant size	Production	Number of plants	Average plant size	Production	Number of plants	Average plant size
	Thous. lbs.		Thous. lbs.	Thous. lbs.		Thous. lbs.	Thous. lbs.		Thous. lbs.
Northeast	83,714	50	1,674	87,000	21	4,143	73,000	20	3,650
Corn Belt	137,848	55	2,506	89,000	20	4,450	97,000	20	4,850
Lake States	432,137	105	4,116	336,000	55	6,109	346,000	55	6,291
Southeast	---	---	---	---	--	---	---	--	---
South Central	43,786	15	2,919	41,000	8	5,125	23,000	6	3,833
Plains	67,666 2/	47	1,440	32,000	12	2,667	33,000	12	2,750
Mountain	15,196	20	760	14,000	8	1,750	13,000	7	1,857
Southwest	135,649	22	6,166	205,000	26	7,885	202,000	26	7,769
Northwest	53,380	36	1,483	51,000	18	2,833	51,000	18	2,833
Other 3/	11,401	16	713	10,000	8	1,250	9,000	8	1,125
Total U.S.	980,477	366	2,679	865,000	176	4,915	847,000	172	4,924

1/ Source of production and plant numbers for 1975: Dairy Products Annual Summary 1975, Stat. Rptg. Serv., USDA.

2/ North Dakota butter production assumed at 23,000 thousand pounds and number of plants assumed to be 22.

3/ Other States include those for which information was not published separately. Most of these are in the Northeast Region.

1975 production. All regions showed declines in production except the Northeast, which held about the same, and the Southwest, which increased substantially. One factor in the Southwest increase is the continuation of past steadily increasing trends in milk production and the expectation of substantial increases in milk in excess of fluid needs in that region by 1985. In addition, future butter production is expected to be highly dependent on excess cream available as a result of the declining fat content of fluid milk products. Regions in which heavy amounts of cream from this source are expected--and which will substantially affect butter production--are the Northeast, the Corn Belt, and the Southwest.

The cheese industry would likely be faced with the most severe structural adjustments under any change in classified pricing policy. Regional production, number of plants, and average plant size is shown for cheese for 1975 and projected to 1985 under both continued programs and under elimination of minimum class prices (table 4). Cheese production under continued programs is projected to be 4,506 million pounds, an increase of about 60 percent over 1975 production with all regions increasing production. The region with the largest proportional increase is the Southwest which is projected to produce 230 million pounds in 1985. Although this region has a substantial established cheese industry, large increases in production are expected as a result of projected large increases in milk supplies in excess of needs for fluid milk products. Even with the increases in the Southwest, 1985 production represents only about 5 percent of the U.S. total. Other regions with expected large increases in cheese production are the

Table 4--Cheese production, number of plants, and average plant size, by region, for 1975 and projected to 1985 under continued programs and under eliminating Federal and State minimum Class I price differentials (alternative #1)

Region	Actual 1975 1/			Continuing programs, 1985			No minimum class prices, 1985		
	Production	Number of plants	Average plant size	Production	Number of plants	Average plant size	Production	Number of plants	Average plant size
	Thous. lbs.		Thous. lbs.	Thous. lbs.		Thous. lbs.	Thous. lbs.		Thous. lbs.
Northeast	419,229	136	3,083	650,000	111	5,856	530,000	92	5,761
Corn Belt	408,561	100	4,086	530,000	76	6,974	567,000	81	7,000
Lake States	1,406,167	420	3,348	2,383,000	381	6,268	2,451,000	391	6,268
Southeast	---	---	---	---	---	---	---	---	---
South Central	60,764	26	2,337	77,000	14	5,500	43,000	8	5,375
Plains	199,250	60	3,321	270,000	44	6,136	252,000	41	6,146
Mountain	59,757	13	4,597	89,000	12	7,417	80,000	11	7,273
Southwest	92,877	34	2,732	230,000	37	6,216	221,000	36	6,139
Northwest	121,288	29	4,182	200,000	26	7,692	201,000	26	7,731
Other 2/	43,285	20	2,164	72,000	16	4,500	70,000	16	4,375
Total U.S.	2,811,178	838	3,355	4,506,000	717	6,285	4,415,000	702	6,289

1/ Source of production and plant numbers for 1975: Dairy Products Annual Summary 1975, Stat. Rptg. Serv., USDA.

2/ Other States include those for which information was not published separately. Most of these are in the Northeast Region.

Northeast, the Lake States, and the Northwest.

Although the Plains Region has increased cheese production substantially in recent years, this trend is expected to turn around due to declining milk supplies.

The number of cheese plants under continued programs is expected to decline from 838 in 1975 to 717 in 1985. Declines are expected in all regions except the Southwest, where plant numbers have been increasing in recent years.

The 1985 projections under the alternative of eliminating Federal and State minimum Class I price differentials primarily represent reallocation of production among regions, although total U.S. cheese production is expected to decline slightly to 4.4 billion pounds. Regions with the greatest gains in cheese production, as a result of changes in regional supplies of excess milk, are the Corn Belt and the Lake States. Regions with the greatest losses in production are the Northeast and the South Central. Thus, the major forces for structural adjustment in the cheese industry resulting from altering classified pricing policy would impact on the Northeast, South Central, Corn Belt and Lake States Regions. In fact, it is estimated that some 25 fewer cheese plants would be needed in the Northeast and South Central Regions under the new policy. This decline in plant numbers would be offset by the need for an estimated 15 additional plants in the Lake States and Corn Belt Regions.

Conclusions. Federal milk marketing orders have had a major impact on the location and structure of the dairy farm and manufactured dairy

products industries. Dairy farmers, analysts, industry decisionmakers, and policymakers should be aware of effects of altering the milk pricing, pooling, and marketing system. A tremendous amount of capital has already been invested--and is currently being invested-- in milk production and manufactured dairy product processing facilities based on past and current price signals. Any major alteration in pricing and pooling policy is likely to result in the need for substantial new adjustment in location and investment in milk production and processing facilities and, in turn, obsolescence of facilities in areas exiting from milk production.

A structure of prices more in line with long-run equilibrium conditions may be in the best interest of the industry and society, but if adjustments are needed it may be best to phase in the adjustments over time so the industry can anticipate the forces that will impact on long-run structural adjustment. This also points up that potential social gains of altering the Class I price structure that have been emphasized by results of welfare models do not take into account the costs that would be associated with structural adjustments in the industry. In the short run, costs of structural adjustment may even exceed social cost gains resulting from altering the Class I price surface.

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