October 1982

A.E. Res. 82-32

A FURTHER ANALYSIS OF THE COMPARATIVE COST OF RECONSTITUTING BEVERAGE MILK PRODUCTS

by

Andrew Novakovic

Department of Agricultural Economics
Cornell University Agricultural Experiment Station
New York State College of Agriculture and Life Sciences
A Statutory College of the State University
Cornell University, Ithaca, New York 14853

the USDA publication Dairy Market News. As discussed later in this report, these price announcements may or may not correspond to the actual price paid, but it is felt that they are a reasonably good indicator of the magnitude of the prices processors actually pay for raw milk. To the extent that they are not accurate it is probable that actual prices are lower. Given that the over-order prices used in this study probably represent the highest prices likely to be paid by processors and the federal order minimum prices are (in general) the lowest prices paid by processors, the costs calculated under these price levels should bracket the actual cost advantage to reconstitution.

Given the caveat about the source of over-order prices, the fourth case is the best estimate of the comparative cost of reconstituting milk in the current regulatory environment. It assumes current pricing provisions prevail and it uses prices which represent the best information readily available on prices actually paid by processors.

The Possible Cost Advantage to Reconstitution

As has been explained elsewhere (1, 4, 5), federal milk marketing order pricing provisions currently require that processors pay the equivalent of the Class I differential on any reconstituted milk used in a Class I product. This penalty is intended to make the cost of reconstituted milk more or less equivalent to the cost of fresh milk; in practice it makes reconstituted milk more expensive than fresh milk.

The comparative cost of reconstituted milk for four cases is reported in Table 3. Cases 1 and 2 are based on federal order minimum prices; whereas cases 3 and 4 rely on over-order prices. Current pricing provisions are assumed to prevail under Cases 2 and 4 but are ignored under cases 1 and 3.

Table 3. The Comparative Cost of Reconstituted Milk in Six Cities for 1980 and 1981.

	Case 1	Case 3	Case 2	Case 4
	(unregulated)		(regulated)	
	(minimum)	(over-order)	(minimum)	(over-order)
Boston				
1980	-2.9	-3.6	7.1	6.4
1981	-4.9	-5.8	5.9	5.0
Chicago				
1980	1.7	-0.6	4.3	2.0
1981	-0.6	-2.6	2.6	0.6
Dallas				
1980	-0.3	-1.4	5.0	4.0
1981	-1.5	-2.8	4.3	3.0
Jacksonville				
1980	-0.7	-6.8	9.1	3.0
1981	-2.7	-9.51	8.0	1.2
Knoxville				
1980	0.6	-2.6	4.6	1.9
1981	-1.2	-3.5	3.9	1.7
New York				
1980	-1.8	N.A.	7.1	N.A.
1981	-3.9	N.A.	6.1	N.A.

The results in Table 3 lead to the same general conclusion as was reached in the previous study. Under current regulations (Cases 2 and 4), there are no incentives to reconstitute (the comparative cost of reconstituted milk is positive). When current pricing provisions are ignored, cost incentives to reconstitute exist virtually everywhere.

Preface

Andrew Novakovic is an Assistant Professor in the Department of Agricultural Economics at Cornell University. He was assisted in this study by James Pratt, Research Associate. Robert Boynton provided helpful comments on an earlier draft of this report.

This report is an extension of an earlier study conducted with Richard Aplin. The related publications are:

Andrew Novakovic and Richard Aplin, Some Findings on The Comparative Cost of Reconstituting Beverage Milk Products: Reconstitution vs. Fresh Milk Processing, A.E. Res. 81-15, Department of Agricultural Economics, Cornell University, August 1981.

Andrew Novakovic and Richard Aplin, What is the Difference Between the Costs of Reconstitution vs. Fresh Milk Processing?, A.E. Ext. 81-19, Department of Agricultural Economics, Cornell University, September 1981.

Some of the highlights of this study are contained in:

Andrew Novakovic, An Analysis of the Impact of Deregulating the Pricing of Reconstituted Milk Under Federal Milk Marketing Orders, Staff Paper No. 82-6, Department of Agricultural Economics, Cornell University, March 1982.

Copies of any of these reports can be obtained from the author or:

Publications Office
Department of Agricultural Economics
Cornell University
442 Warren Hall
Ithaca, New York 14853-0398

Table of Contents

Appendix
Tables
(continued) Page

Figure

Introduction

This report updates and extends a previous study of the cost of reconstituting beverage milk products (2, 3).[1] The impetus for these studies is the recent policy debate over federal milk marketing order pricing provisions related to reconstituted milk products. This debate and the attendant policy issues are discussed in the aforementioned reports and elsewhere (4, 5).

The purpose of this study is to provide some additional depth to our previous analysis by improving the model and expanding the range of the price data. This responds to many, but not all, of the suggestions for further research made in the earlier report.

The general methodology used for this study is briefly reviewed, primarily emphasizing the modifications made to the earlier model. The remainder of the report focuses on results and their implications.

---

[1]Reconstituted or partially reconstituted milk products can be made in several ways and can refer to various and quite different products. In this study, the term reconstituted milk denotes fluid milk products that are made from condensed, dried, or other manufactured milk products and contain no fresh milk. For example, mixtures of water and nonfat dry milk or water and condensed skim milk are referred to as reconstituted skim milk. Using our terminology, milk products made by mixing reconstituted skim milk and fresh milk products are called blended milk products. For example, reconstituted skim milk can be mixed with fresh cream or fresh whole milk to produce blended whole milk or blended lowfat milk. This terminology, which is also described by Novakovic and Story (3), is not used universally. Others may use the terms reconstituted and blended milk interchangeably or they may have different definitions of one or the other. Throughout this report we will use the terms as they have been defined above, although the numbers we report as the comparative cost of reconstituting milk refer to the comparative cost of producing blended milk products (not just the reconstituted skim milk component of the blend).

Methodology and Assumptions

Ultimately, policy analysts will wish to compare the cost of reconstituting milk products with the cost of processing comparable fresh milk products. Hence, this study uses the approach of directly measuring the difference between the cost of producing fresh milk products and the cost of producing partially reconstituted milk products. This difference is denoted as the comparative cost of producing reconstituted milk, and it refers to the added or incremental cost that would be incurred by a fresh fluid milk bottler who replaced part of his output with blended or partially reconstituted milk products. If the cost of reconstituting beverage milk products exceeds the cost of processing fresh beverage milk products, the comparative cost of reconstituting milk, i.e., the difference between the two, is positive. If fresh milk costs more to process than reconstituted milk, then the comparative cost of reconstituted milk is negative.

An economic-engineering framework is used to estimate the cost advantage of reconstituted milk over fresh milk.[2] The cost figure is intended to be comprehensive in that it includes all sources of costs that would be incurred from the point raw products are received, through processing, to the point finished products are loaded. These costs can be separated into four major components, as follows:

Processing Costs: processing costs are the costs incurred due to added labor, heat, and electricity needed in plants that reconstitute milk as compared to otherwise comparable plants that do not reconstitute milk.

---

[2]The cost model described by Novakovic and Aplin (2, pp.21-31) is essentially unchanged. Cream prices were adjusted when heavy cream was used instead of light cream. The model used to calculate quantities of milk and dairy products used or produced in plants deviates only slightly from the earlier model (2, Appendix A). Calculations were adjusted when heavy cream was used; in addition, the butterfat and solids-not-fat content of raw milk was assumed to be variable.

Capital Costs: most plants that replace part of their fresh product output with blended milk require additional equipment and expanded plant space. The cost of new investments in plant and equipment is based on the purchase prices of new capital goods, salvage values at the end of the operating lives of the new capital goods, and appropriate interest rates to determine the annualized values of capital goods over their operating life.

Raw Ingredients and Milk Costs: raw ingredients are defined herein as raw milk, water, nonfat dry milk, and condensed skim milk. Changes in the cost of acquiring raw ingredients are due to changes in the amounts of raw ingredients required and/or the prices of raw ingredients. The comparative cost of raw ingredients will vary with Federal Order pricing policy. Under current rules, plants must pay the Class I differential on all reconstituted milk used in Class I, thus adding to raw ingredients costs. Under the proposals advanced by the Community Nutrition Institute and others, this added charge is eliminated.

Revenue Losses: totally fresh milk plants generate a surplus of cream under the plant designs and assumptions of this study. Plants that blend milk products require some or all of the surplus cream as a high quality source of butterfat to blend with reconstituted skim milk. Consequently, revenues from the sale of excess cream drop. Another revenue loss that can be reflected in the comparative cost of reconstituting milk is the change in revenues that would result if the price of blended milk products was less than the price of fresh milk products, as some have suggested would happen.

The comparative cost of reconstituting milk as reported here includes adjustments for income taxes. Although most cost studies ignore taxes, income taxes are a necessary and relatively easily measured expense associated with any business operation. The absolute values of the before-tax comparative costs are greater than the numbers reported herein.

The cost figure reported here refers only to in-plant costs; costs associated with assembly and distribution are not measured (receiving costs are determined from the point at which the product enters the plant and loading costs are measured up to the point that trucks leave the loading dock). It is hypothesized that the fluid milk bottler who replaces part of his fresh milk output with blended milk products might achieve reduced per-unit assembly costs and increased per-unit distribution costs. However, the potential reduction in assembly costs and the increase in distribution costs are probably very small, and they offset one another. It is hypothesized that they would have a negligible impact if they were included in our cost calculations.

In the earlier study by Novakovic and Aplin, the cost advantage of reconstituted milk was calculated for plants of two sizes located in six cities across the U.S. and under various assumptions about the relative amount of blended milk produced, the solids-not-fat content of blended milk products, the prices paid for variable factors, and other aspects of the processing or economic environment.

In this study, the assumptions about the processing environment are reduced to describe a representative plant for each of the six cities, that is, the type of plant and processing environment that would be most likely in each of the six geographic locations, given the range of the original assumed characteristics. Table 1 summarizes the characteristics of the representative plants for Boston, Chicago, Dallas, Jacksonville, Knoxville, and New York.

The plant size chosen for the representative plant in each city was primarily based on the size of the city. Although plant capacity in the U.S. averages not quite 30,000 gallons/day, the large majority of the beverage milk produced is processed in much larger plants. Hence, only the two smaller cities, which are less likely to be dominated by very large plants, are represented by the smaller plant size.

Table 1. Characteristics of Representative Plants by Location

City	Plant Size (gallons/day)	Raw Ingredient	Blended Volume
Boston	100,000	condensed skim	10%
Chicago	100,000	condensed skim	50%
Dallas	100,000	nonfat dry milk	50%
Jacksonville	30,000	nonfat dry milk	10%
Knoxville	30,000	nonfat dry milk	50%
New York	100,000	condensed skim	10%

Raw ingredients and blended milk volumes were chosen to maximize the cost advantage of reconstitution given the pre-selected plant size and the costs estimated in the earlier study.

In addition to these characteristics, all plants are assumed to standardize blended milk at the prevailing legal minimum of 8.25 percent solids-not-fat (SNF) instead of the U.S. average SNF content of fresh beverage milk of 8.7 percent. As is explained in the earlier report, the lower SNF standard reduces the comparative cost by about 2 cents per gallon of blended milk. This result is virtually constant across all combinations of other assumptions, hence, it is not explored further here.

Finally, all plants are assumed to separate and use heavy cream, not light cream as was assumed in the earlier report. The implications of using heavy cream are discussed in Appendix A.

Analysis

Comparative costs of reconstitution are estimated for each representative plant-location for four combinations of assumptions as shown in Table 2.[3]

Table 2. Assumptions Describing the Test Cases

Case	Class I Price	Reconstituted Pricing
1	order minimum prices	unregulated
2	order minimum prices	regulated
3	over-order prices	unregulated
4	over-order prices	regulated

The first case is the standard against which the others are compared.

Case 2 is identical to Case 1 except current pricing provisions affecting reconstituted milk are assumed to prevail. The difference between the comparative costs of reconstitution calculated for these two cases is a measure of the cost imposed by the regulated pricing system.

The third case is intended to assess the impact of over-order prices on the comparative cost of reconstituted milk. In our earlier study, it was assumed that the appropriate Class I price was the federal order minimum. With the exception of those in New York, processors typically pay Class I prices greater than federal order minimums. When minimum Class I prices are used in the analysis, the cost advantage of reconstitution for processors who actually pay higher prices for raw milk are underestimated. The over-order prices used are the Class I prices announced by the major cooperative in each city, as reported in

---

[3]A complete description of the assumptions underlying these cases and other data used in the analyses is provided in Appendix B.

the USDA publication Dairy Market News. As discussed later in this report, these price announcements may or may not correspond to the actual price paid, but it is felt that they are a reasonably good indicator of the magnitude of the prices processors actually pay for raw milk. To the extent that they are not accurate it is probable that actual prices are lower. Given that the over-order prices used in this study probably represent the highest prices likely to be paid by processors and the federal order minimum prices are (in general) the lowest prices paid by processors, the costs calculated under these price levels should bracket the actual cost advantage to reconstitution.

Given the caveat about the source of over-order prices, the fourth case is the best estimate of the comparative cost of reconstituting milk in the current regulatory environment. It assumes current pricing provisions prevail and it uses prices which represent the best information readily available on prices actually paid by processors.

The Possible Cost Advantage to Reconstitution

As has been explained elsewhere (1, 4, 5), federal milk marketing order pricing provisions currently require that processors pay the equivalent of the Class I differential on any reconstituted milk used in a Class I product. This penalty is intended to make the cost of reconstituted milk more or less equivalent to the cost of fresh milk; in practice it makes reconstituted milk more expensive than fresh milk.

The comparative cost of reconstituted milk for four cases is reported in Table 3. Cases 1 and 2 are based on federal order minimum prices; whereas cases 3 and 4 rely on over-order prices. Current pricing provisions are assumed to prevail under Cases 1 and 3 but are ignored under cases 2 and 4.

Table 3. The Comparative Cost of Reconstituted Milk in Six Cities for 1980 and 1981.

	Case 1	Case 3	Case 2	Case 4
	(regulated)		(unregulated)	
	(minimum)	(over-order)	(minimum)	(over-order)
		Boston		
1980	-2.9	-3.6	7.1	6.4
1981	-4.9	-5.8	5.9	5.0
		Chicago		
1980	1.7	-0.6	4.3	2.0
1981	-0.6	-2.6	2.6	0.6
		Dallas		
1980	-0.3	-1.4	5.0	4.0
1981	-1.5	-2.8	4.3	3.0
		Jacksonville		
1980	-0.7	-6.8	9.1	3.0
1981	-2.7	-9.51	8.0	1.2
		Knoxville		
1980	0.6	-2.6	4.6	1.9
1981	-1.2	-3.5	3.9	1.7
		New York		
1980	-1.8	N.A.	7.1	N.A.
1981	-3.9	N.A.	6.1	N.A.

The results in Table 3 lead to the same general conclusion as was reached in the previous study. Under current regulations (Cases 2 and 4), there are no incentives to reconstitute (the comparative cost of reconstituted milk is positive). When current pricing provisions are ignored, cost incentives to reconstitute exist virtually everywhere.

The previous study indicated that the latter was not universally true. This conclusion was based on federal order minimum prices. As shown by the Case 3 results, it is always advantageous to reconstitute when over-order prices are used. Even the Case 1 results generally agree with that conclusion, including those for Chicago where more recent prices indicate a trend favoring reconstitution. In fact this trend shows in each city.

Thus it appears unequivocal. Current federal order pricing provisions eliminate incentives that would otherwise exist to reconstitute milk. Processors could save as little as two or three cents per gallon on blended milk in Chicago, Dallas, and Knoxville; four to six cents per gallon in Boston and New York; and perhaps up to nine cents per gallon in Jacksonville.

The Cost of Regulation

It is possible to calculate the cost imposed by current regulations by comparing the regulated and unregulated cases, as is shown in Table 4. The difference between the costs calculated for Case 2 and Case 1 is solely attributable to federal order pricing provisions.[4] Table 4 illustrates that the additional cost to reconstitution imposed by marketing orders increases with the Class I differential. The lowest cost penalty is imposed in Chicago and equals approximately three cents per gallon of blended milk. The highest penalties are imposed in

---

[4]The reader can verify that these differences are identical to those between the costs calculated for Cases 3 and 4.

Boston, Jacksonville, and New York, all of which equal about ten cents per gallon of blended milk. As one might surmise, this penalty is closely correlated with the Class I differential.

Table 4. The Comparative Cost of Reconstituted Milk in Six Cities With and Without Current Federal Order Pricing Provisions for Reconstituted Milk for 1980 and 1981.

City	Case 1 (unregulated)		Case 2 (regulated)		Case 2 - Case 1	
	1980	1981	1980	1981	1980	1981
	(cents per gallon of blended milk)					
Boston	-2.9	-4.9	7.1	5.9	10.0	10.8
Chicago	1.7	0.6	4.3	2.6	2.6	3.2
Dallas	-0.3	-1.5	5.0	4.3	5.3	5.8
Jacksonville	-0.7	-2.7	9.1	8.0	9.8	10.7
Knoxville	0.1	-1.2	4.6	3.9	5.1	4.8
New York	-1.8	-3.9	7.1	6.1	8.9	10.0

The Impact of Over-Order Prices

Since the mid-1960s, dairy cooperatives have routinely negotiated prices for raw milk that are higher than federal order minimum prices. These over-order prices are the prices actually paid by processors, which makes some attempt to take them into account highly relevant for this analysis. Although the compensatory payment imposed by marketing orders on reconstituted milk is based on the minimum Class I price, the existence of over-order prices makes reconstitution all the more attractive to the cost minimizing processor.

The actual prices paid by processors are not generally public information. The prices for Class I milk that are announced by major cooperatives and reported by the USDA in the Dairy Market News were used as approximations of the actual prices paid. Prices are announced for Boston, Chicago, and Dallas but not for the other locations. The announced premiums for Miami and Louisville were added to the minimum prices for Jacksonville and Knoxville, respectively, to approximate cooperative prices in those locations. It is felt that this is a reasonable approximation for these cities. The premiums that actually apply to these locations may be slightly lower, but probably not by enough to change the implications of the results. Cooperatives in New York State have not generally been successful in negotiating over-order prices on a routine basis; hence over-order prices were ignored for New York City.

The comparative costs of reconstitution when over-order prices prevail (Case 3) are compared to the Case 1 costs in Table 5. The differences between Case 3 and Case 1 costs are a measure of the additional incentives to reconstitute that exist when over-order prices are taken into account.[5] The additional incentives due to over-order prices range from about one to seven cents per gallon of blended milk.

Seasonality in Cost Savings

Novakovic and Aplin reported some results for New York using prices from October 1980 and May 1981 that suggested that the greatest incentives for reconstituting milk occur in late Spring and the least

---

[5]The reader can verify that these differences are identical to those measured by comparing Cases 2 and 4.

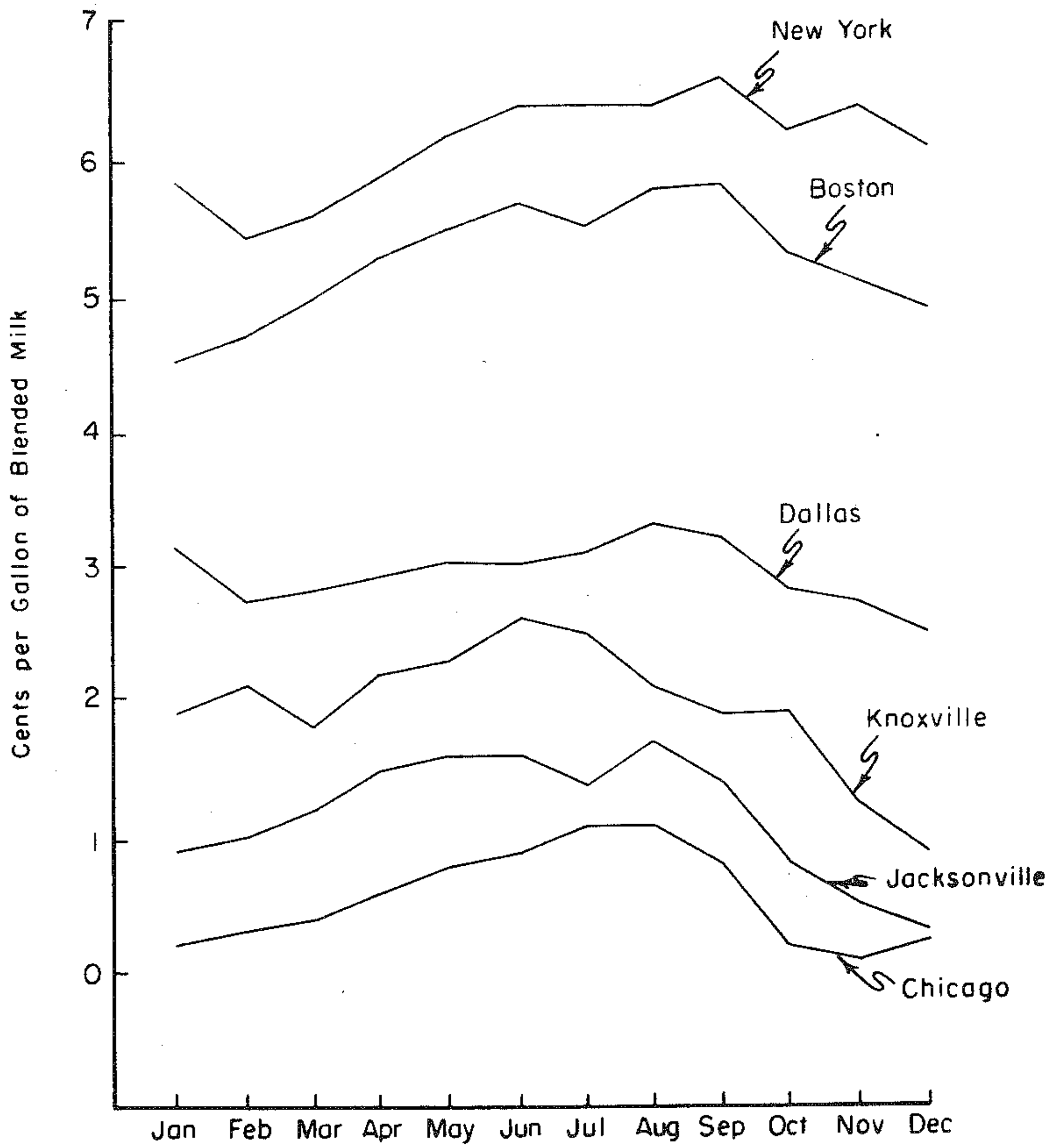
incentives occur in Autumn (2,3). Examples were shown in which the seasonality of the cost of reconstituting milk could be such that there were incentives to reconstitute in the Spring and no incentives in the Autumn.

Table 5. The Comparative Cost of Reconstituted Milk in Five Cities With and Without Over-Order Prices for 1980 and 1981.

City	Case 1 (minimum)		Case 3 (over-order)		Case 1 - Case 3	
	1980	1981	1980	1981	1980	1981
	(cents per gallon of blended milk)					
Boston	-2.9	-4.9	-3.6	-5.8	0.7	0.9
Chicago	1.7	-0.6	-0.6	-2.6	2.3	2.0
Dallas	-0.3	-1.5	-1.4	-2.8	1.1	1.3
Jacksonville	-0.7	-2.7	-6.8	-9.5	6.1	6.8
Knoxville	0.1	-1.2	-2.6	-3.5	2.7	2.3

A more complete analysis of the seasonality of the comparative cost of reconstitution was conducted for this study. Results for 1981 data are illustrated in Figure 1. Two important findings were made that alter or make moot the earlier, preliminary results. First, in the previous work it was assumed that the butterfat content of milk was constant in May and October. For this study, butterfat varied monthly according to the average reported for each federal order market corresponding to the six cities. The nonfat solids content of milk also varied proportionately with butterfat, using a relationship estimated from California data from January 1976 to October 1981 (see Appendix B). The variation in the butterfat and nonfat solids content of milk

FIGURE I. MONTHLY VARIATIONS IN THE COMPARATIVE COST OF RECONSTITUTING MILK BY CITIES IN 1981



countered the seasonal variation in the difference between raw milk and concentrated milk prices. Taking this into account, the greatest incentives to reconstitute occur in the last and first quarters of the year and the least cost advantage to reconstituting occurs from July to September. This is almost opposite the findings of the earlier study.

The second and more important point is that there are no significant contradictions in the seasonal incentives. Situations in which there may be incentives to reconstitute in one season but not in another, as was suggested earlier, did not occur when the new data were thoroughly examined. Given this and the rather narrow seasonal range in comparative costs from a low range of 0.8 cents per gallon of blended milk in Dallas to a high range of 1.7 cents per gallon in Knoxville, it is concluded that the magnitude and timing of the seasonal differences in the cost advantages to reconstitution do not appear to be an important concern.

Regulatory Alternatives for Equalizing the Costs of Fresh and Blended Milk Products

To date the policy debate has focused on current regulations versus essentially eliminating all federal order pricing of reconstituted milk products. The following section explores two other intermediate alternatives intended to more nearly equalize fresh milk and reconstituted milk costs, which is the objective of current regulations. The author does not endorse any particular alternative nor does he wish to suggest that deregulation is less preferable than either of the following.

Table 6. Reductions in Class I Prices Required to Equate the Costs of Fresh and Blended Milk, Based on Annual Average Costs for 1980 and 1981.

City	Minimum Class I Price		Estimated Over-Order Class I Price		Breakeven Class I Price		Reduction in Minumum Price		Reduction in Over-Order Price	
	1980	1981	1980	1981	1980	1981	1980	1981	1980	1981
	($/cwt.)									
Boston	14.59	15.50	14.79	15.74	13.79	14.16	.80	1.34	1.01	1.58
Chicago	12.93	13.84	13.83	14.64	13.57	13.58	0	.26	.26	1.06
Dallas	13.99	14.90	14.41	15.43	13.87	14.28	.12	.62	.54	1.15
Jacksonville	14.51	15.43	16.07	17.15	14.33	14.73	.18	.70	1.74	2.42
Knoxville	13.75	14.68	14.85	15.61	13.77	14.18	.0	.50	1.08	1.43
New York	14.28	15.26	N.A.	N.A.	13.80	14.24	.48	1.02	N.A.	N.A.

Breakeven Class I Prices

If the price paid for Class I milk is reduced, the advantage of reconstituting milk is reduced. (This is the central point of the studies by Hammond et al. and the USDA.) Table 6 reports the prices for Class I milk that would eliminate the incentives for fresh milk processors to convert part of their output mix to blended milk products even when reconstituted milk is deregulated. The differences between the breakeven prices and actual minimum Class I prices and estimated over-order prices are both reported. In 1981, the differences between breakeven prices and federal order minimum prices range from a relatively low 25 cents per cwt. in Chicago to over $1 per cwt. in New York and Boston. Taking over-order prices into account, the differences increase to a low of about $1 in Chicago (and New York) to a high of over $2 in Jacksonville.

It is tempting to argue that reducing federal order minimum prices by one or the other figure would equalize the costs of fresh milk and blended milk processing; however, it is advisable to make such interpretations cautiously. First, reductions in prices through changes in federal order minimums would not eliminate the incentives to reconstitute unless the reductions also compensated for prevailing over-order premiums. In addition, one-time reductions in minimum Class I prices of the magnitudes suggested in Table 6 would not guarantee that fresh versus blended milk processing costs would always be more or less equalized. As shown in Table 6, there can be sizeable year-to-year variation in the differences between "breakeven prices" and Class I prices as currently derived. If one wanted to ensure that Class I prices stayed in line with the cost of blended milk it might be more appropriate to adjust federal order Class I prices to changes in the price of nonfat dry milk.

This leads to another caveat. The breakeven analysis reported above assumes that Class I prices are reduced while all other prices are held constant. This assumption ignores some secondary impacts that would tend to increase the price of nonfat dry milk and condensed skim milk which in turn would raise the cost of reconstituted skim milk.

For example, the demand for nonfat dry milk would increase if a substantial volume of milk were reconstituted. If half of the fluid milk currently consumed were made from reconstituted milk, the production of nonfat dry milk would have to more than double. Initially, the increased demand could be met from existing stocks, but in less than a year production of nonfat dry milk would have to increase substantially. Some have argued that this would strain the available drying capacity. Given that powder plants are typically operated at far less than capacity except during the flush milk production season, this may not be a problem. More importantly, this tremendous increase in demand should have an upward impact on the price of nonfat dry milk. Given that the price of nonfat dry milk is currently supported well above market clearing levels, an increase in demand now may do little more than reduce or even eliminate government purchases, but that alone would be highly significant. In more normal times one could expect a significant increase in the price of nonfat dry milk.

In addition to this demand effect, it seems likely that there would be some supply effect, especially when one considers that most of the dry and condensed skim milk is produced by cooperatives. If minimum Class I differentials were reduced by half or more, as implied by

Table 6, there would be a significant impact on blend prices. Again, a reduction might be warranted given the current over supply of milk, but one would expect dairy farmers to take steps to protect their overall price. This could result in further compensating increases in the price of nonfat dry milk negotiated by dairy cooperatives for the purpose of maintaining overall price levels, much as over-order premiums on Class I milk are currently used by dairy cooperatives.

It is difficult to judge the magnitude or even the likelihood of some of these secondary repercussions. In Table 7, the percentage declines in the Class I prices paid by processors that would have equalized fresh and blended milk processing costs in 1980 and 1981 under Case 3 conditions (i.e., when reconstituted milk is deregulated and over-order prices prevail) are compared to the percentage increases in the prices of nonfat dry milk or condensed skim milk that would also have equalized these costs (i.e., make the comparative cost of reconstitution equal zero). These results illustrate that a one percent decrease in the Class I price has about the same impact on the comparative cost of reconstitution as a two percent increase in the price of dry or condensed skim milk. Perhaps more importantly, they show that rather modest increases in the price of concentrated milk would neutralize the advantages to reconstitution, ceteris paribus. Long run price increases of this magnitude seem plausible given the potential shift in demand for concentrated milk if deregulation occurred.

Again, these calculations are made assuming all other prices are held constant e.g., the nonfat dry milk price that would result in a zero comparative cost of reconstitution was calculated holding all other prices constant. If reconstituted milk were actually deregulated, one might expect changes in Class I prices and concentrated milk product prices somewhere between the limits suggested in Table 7.

Changing the Compensatory Payment

An alternative to deregulation or reducing Class I prices would be to simply reduce the so-called compensatory payments charged on reconstituted milk. A reduction in the compensatory payment that would more nearly equalize the costs of blended and fresh beverage milk products would be more equitable than the current policy It would change the price of beverage milk less than the other alternatives. The purpose of this section is to discuss how much of a reduction would be required to eliminate the cost incentives which now exist. Before that, it may be appropriate to digress briefly on the specifics of federal order provisions.

The pricing provisions that affect the cost of reconstituted milk have been explained elsewhere (1,4). There are two principal features: down-allocation and compensatory payments. Down-allocation refers to the procedure whereby reconstituted milk is assigned to the lowest use classes, regardless of the class in which it is actually used. Any reconstituted milk that is down-allocated implies that an equal volume of producer milk is up-allocated, such that the processor will be required to pay the Class I price for that volume of producer milk. If a processor uses more reconstituted milk than he has volume of Class III milk, such that all the reconstituted milk cannot be down-allocated, then the excess volume of reconstituted milk is charged a compensatory payment equal to the Class I differential. For all of the previous

Table 7. The Percentage Changes in Class I Prices Paid by Processors or in the Prices of Dry or Condensed Skim Milk that Would Equalize Fresh and Blended Milk Processing Costs Under Case 3 Conditions.

	Percentage Decrease in the Class I Price	Percentage Increase in Concentrated Skim Price
Boston		
1980	7	13
1981	10	20
Chicago		
1980	2	3
1981	7	14
Dallas		
1980	4	7
1981	7	14
Jacksonville		
1980	11	22
1981	14	29
Knoxville		
1980	7	14
1981	9	18
New York		
1980	3	6
1981	7	13

analyses (herein) in which reconstituted milk is regulated, it has simply been assumed that a compensatory payment is charged on all reconstituted milk. Since the effect of down-allocation is to simply shift producer milk from Class III to Class I and thereby force the processor to increase his price for this milk by the Class I differential, this assumption is valid. However, a policy change that would reduce the compensatory payment but keep the down-allocation provision would imply that processors would pay the Class I differential on the volume of down-allocated milk but a lesser penalty on any additional reconstituted milk. In this case, the cost model would have to be modified. In the following discussion, the costs are calculated with the same model as before; hence it is best to interpret the results as deriving from a policy that reduced the compensatory payment, eliminated the down-allocation procedure, and assessed all reconstituted milk. If down-allocation were kept, the calculated compensatory payment could be higher.

With this caveat, compensatory payments that would equate the costs of fresh and blended milk processing were calculated for the conditions under Case 4 and are reported in Table 8. The differences between actual and breakeven compensatory payments range from 10 percent (Jacksonville, 1981) to 80 percent (New York, 1980). On average, the breakeven compensatory payment equals about 30 percent of the actual compensatory payment in New York, 40 percent in Boston and Dallas, 60 percent in Knoxville, and 75 percent in Jacksonville. Due to the constant price of nonfat dry milk in Chicago in 1980 and 1981, the breakeven compensatory payment there was very low in 1980 (24 percent of the actual) and much higher in 1981 (81 percent of the actual).

Table 8 also records a compensatory payment based on the difference between blend prices and Class III prices for the respective cities. This figure is shown for two reasons. One, it is used under federal orders to calculate compensatory payments for different categories or types of milk; hence, there is some precedence for a compensatory payment calculated in this way. Two, it is an easier figure to calculate than a "breakeven" price; hence federal order provisions could easily be modified to change the compensatory payment charged on reconstituted milk in this fashion.[6]

As the figures in Table 8 show, a compensatory payment based on the difference between blend prices and Class III prices is much closer to the calculated breakeven compensatory payment than is the payment actually used, however it falls short of equalizing costs. Some would view this as an improvement over the current situation; however it might not be enough to satisfy the objectives of those seeking changes. It might be preferable to calculate breakeven compensatory payments as needed; however, it may be difficult to devise a procedure for calculating a breakeven payment (or price) that would be easy to compute on a timely basis.

A Caveat About Demand

An implicit assumption behind these analyses is that blended milk and fresh milk are perfect substitutes. As explained in the predecessor study, blended milk is assumed to be formulated so as to yield the most palatable substitute to fresh milk possible (2). Some have even argued that reconstituted milk, formulated in a variety of ways, would not exhibit visual or organoleptic differences discernible to the majority of milk drinkers. Conclusive evidence on this hypothesis has not been found. The point to be made is that if blended milk products are viewed as inferior to fresh milk products and this is reflected in a lower retail price for blended milk, then the incentives to reconstitute milk

[6]In this case, it would not be necessary to eliminate down-allocation provisions. Rather, they would be modified so that reconstituted milk would be allocated pro rata according to handler or market class utilizations.

that are reported here are essentially biased upward, and the reported reductions in Class I prices and/or compensatory payments or the increases in concentrated milk prices that would equalize fresh and blended milk processing costs are overstated.

Table 8. Reductions in Compensatory Payments for Reconstituted Skim Milk that Equate the Costs of Fresh and Blended Milk Processing When Reconstituted Milk is Unregulated and Over-Order Prices Prevail.

	Current Compensatory Payment	Breakeven Compensatory Payment	Compensatory Payment Based on Blend Prices
	($/cwt.)		
Boston			
1980	2.71	.97	1.65
1981	3.60	1.56	1.80
Chicago			
1980	1.05	.25	.45
1981	1.27	1.03	.50
Dallas			
1980	2.11	.53	1.63
1981	2.33	1.13	1.77
Jacksonville			
1980	2.48	1.72	2.25
1981	2.71	2.41	2.43
Knoxville			
1980	1.87	1.07	1.39
1981	2.11	1.41	1.53
New York			
1980	2.32	.46	1.01
1981	2.61	1.01	1.15

If the likely difference between the prices for blended and fresh milk products were known, their impact could be calculated with the model developed herein. Unfortunately, these differences are not known. In the previous study, decreases in blended milk prices relative to fresh milk prices were calculated that would offset the incentives to reconstitute milk for selected situations (2). This analysis was not extended for this study, but the original analysis suggests that price differences up to ten cents per gallon would be required. It seems possible that if blended milk were priced five to ten cents per gallon less than fresh milk that this could provide sufficient incentive to entice consumers to purchase blended milk products even if they preferred fresh milk otherwise. On the other hand, this difference is not so large as to make it totally implausible that demand for blended milk would be so weak relative to fresh milk that even higher price differences would have to be offered before consumers would purchase blended milk, in which case it would no longer be profitable to reconstitute milk.

This discussion obviously does not resolve the question, but the reader/analyst should be aware of the potential implications of imperfect substitution in demand between fresh and blended milk products.

Conclusions

This study provides further evidence supporting the conclusion that current federal order pricing provisions impose significant penalties on the production of reconstituted milk. The cost of these regulations was estimated to range from 2.6 cents per gallon of blended milk in Chicago using 1980 price data to 10.8 cents per gallon of blended milk in Boston using 1981 price data. (The low in 1981 was 3.2 cents in Chicago.)

In addition, the incentives to reconstitute that were added by over-order premiums on Class I milk were also estimated. These added incentives range from about one to seven cents per gallon of blended milk.

If reconstituted milk prices were deregulated but over-order prices continued at previous levels, the only savings gained would be that associated with the cost of regulation. However, it is difficult to use these results to draw specific conclusions about the impact of deregulating reconstituted milk. A host of important questions remain unanswered. What would happen to over-order premiums on Class I milk? Would prices for concentrated milk products increase due to increased demand and/or due to price increases by cooperative manufacturers not totally associated with changes in demand? How well would consumers accept blended milk products, and what would their acceptance imply for retail prices of such products relative to fresh milk products?

This study also analyzed some of the implications of alternatives to the current policy other than total deregulation. These alternatives focused on methods to more nearly equalize the costs of fresh milk processing and producing blended milk products. Estimates of reduced Class I prices that would exactly equalize these costs were calculated for each plant-location using 1980 and 1981 data and assuming current regulations remained in force. Similarly, reduced compensatory payments associated with reconstituted milk were calculated that would equalize fresh and blended milk processing costs, assuming over-order prices were in effect.

The breakeven Class I prices were about $1 to $2 per cwt. lower than over-order prices in 1980 and 1981. Breakeven compensatory payments were about 50 cents to $2.40 per cwt. lower than prevailing compensatory payments in 1980 and 1981. Although such breakeven prices can be calculated for a given set of data and assumptions, it might be difficult to incorporate such a procedure in federal orders and to update the data as often as might be required for use in setting federal order prices or payments (monthly). Basing compensatory payments on the difference between blend prices and Class III prices might be a more easily administered procedure, but it was found that this fell short of the objective of equalizing fresh and blended milk costs for the 1980 and 1981 data analyzed.

References

1. Jerome W. Hammond, Boyd M. Buxton, and Cameron S. Thraen. Potential Impacts of Reconstituted Milk on Regional Prices, Utilization and Production, Station Bulletin 529, University of Minnesota, 1979.
2. Andrew Novakovic and Richard Aplin. Some Findings on the Comparative Cost of Reconstituting Beverage Milk Products: Reconstitution vs. Fresh Milk Processing, A.E. Res. 81-15, Department of Agricultural Economics, Cornell University, August 1981.
3. Andrew Novakovic and Richard Aplin. What Is the Difference Between the Costs of Reconstitution vs. Fresh Milk Processing? A.E. Ext. 81-19, Department of Agricultural Economics, Cornell University, September 1981.
4. Andrew Novakovic and Robert Story. Federal Milk Marketing Order Provisions Regarding Reconstituted Milk: The Issues and Some Possible Consequences of Change, A.E. Ext. 80-1, Department of Agricultural Economics, Cornell University, January 1980.
5. U.S. Department of Agriculture, Agricultural Marketing Service, "Handling of Milk in Federal Milk Marketing Areas: Request for Public Comments on Preliminary Impact Statement on Proposed Amendments to Tentative Marketing Agreements and Orders," Federal Register, Vol. 45, No. 223, November 17, 1980.

Appendix A

The Implications of Using Heavy Cream

This appendix examines the implications of the assumption regarding the use of cream separated at plants. The earlier study assumed milk was separated into light cream and skim milk and light cream was used in the reconstitution process; however, subsequent reviews suggested that the use of heavy cream would be more common. Thus, Case one-L is intended to measure the impact on the comparative cost of reconstitution of changing this assumption about the operating procedures of processing plants.

The comparative costs of reconstituted milk in the six test cities under Cases one and one-L are compared in Table A1. The results indicate that using heavy cream in the plant instead of light cream permits a very small additional cost advantage for reconstitution of 0.2 to 0.5 cents per gallon of blended milk. The additional savings attributed to the use of heavy cream appear to be invariant with price changes from 1980 to 1981, but they increase as the spread between Class I and Class II prices becomes greater.

Coupled with the fact that transportation costs for disposing of any surplus cream are lower for heavy cream, this suggests that the rational plant manager would use heavy cream in the plant instead of light cream but the difference between the two has little effect on the comparative cost of reconstituting milk.

Table A1. The Comparative Cost of Reconstituted Milk in Six Cities Under Two Assumptions About the Use of Cream in Processing Plants for 1980 and 1981.

City	Case 1 (Heavy Cream)		Case 1-L (Light Cream)		Case 1 - Case 1-L	
	1980	1981	1980	1981	1980	1981
	(cents per gallon of blended milk)					
Boston	-2.9	-4.9	-2.5	-4.4	-0.4	-0.5
Chicago	1.7	-0.6	1.9	-0.4	-0.2	-0.2
Dallas	-0.3	-1.5	-0.1	-1.3	-0.2	-0.2
Jacksonville	-0.7	-2.7	-0.4	-2.3	-0.3	-0.4
Knoxville	0.1	-1.2	0.3	-1.0	-0.2	-0.2
New York	-1.8	-3.9	-1.5	-3.5	-0.3	-0.4

Appendix B

Model Assumptions and Basic Data

Various assumptions were made about the characteristics and dimensions of the production process and the economic environment. Some of these assumptions define model parameters and are variable. Other assumptions help to define model structure and are held constant; these include the following:

1. Plants are operating normally in their market, exhibit typical current technology, produce with average to high efficiency, and generate a profit.

2. Bottling plants are assumed to produce beverage milk products and byproducts normally associated with bottling plants, including chocolate milk and drinks, cream, buttermilk, and fruit juices and drinks. Byproduct volume equals 20 percent of a plant's total capacity and this volume remains constant.

3. The typical plant has sufficient plant and equipment to reconstitute all byproducts plus an additional volume of reconstituted milk equal to at least 10 percent of the total beverage milk output but not as much as 50 percent of the beverage milk output.

4. The beverage milk product mix of the typical plant includes whole milk, lowfat milk and skim milk. Based on sales figures and average fat content of packaged milk products sold by handlers regulated under Federal Milk Marketing Orders in 1979, it is assumed that 60 percent of the typical plant's volume is whole milk, 24 percent is 2% BF milk, and 16 percent is 1% BF milk and skim milk, such that the average fat content of all beverage milk products is 2.605 percent.

5. Beverage milk products are standardized by mixing raw milk and skim milk. Skim milk and heavy cream can be separated from raw milk at yields of 81.65 pounds of skim milk and 18.35 pounds of light cream <u>or</u> 91.05 pounds of skim milk and 8.95 pounds of heavy cream per 100 pounds of raw milk. Light cream is 20 percent BF and 7.2 percent SNF. Heavy cream is 40 percent BF and 5.4 percent SNF. Skim milk is 0.1 percent BF and 8.94 percent SNF.

6. Total output of each product type (whole, 2%, 1%, and skim milk) is assumed constant across plants having the same capacity. Plants that reconstitute milk replace fresh milk volume with blended milk volume.

7. Beverage milk is packaged in gallon plastic containers and half-gallon, quart, and half-pint paper containers. Blended milk products are not mingled with fresh milk products, and there are separate and appropriately labeled bottles and cartons for each product type.

8. Butterfat for blended milk is assumed to be obtained solely from fresh cream or raw milk. Although it is technically possible to reconstitute whole or lowfat milk products from other sources of butterfat, such as butter or anhydrous butterfat, products made from non-cream sources are not as likely to have desirable organoleptic qualities and be competitive with fresh milk as blended milk made with cream.

9. Blended milk products are made from reconstituted skim milk and only as much cream and raw milk as are needed to supply the butterfat required for the final blended product. If the cream separated in conjunction with the quantity of skim milk used in fresh products (see item 5 above) does not provide enough butterfat for the blended milk volume, then raw milk is added to the blend until the 2.605 percent BF level is reached. Given 1) the SNF level desired in the blended milk, 2) the SNF content of the cream and raw milk used, and 3) the SNF content of dry or condensed skim milk, the quantity of dry or condensed skim milk required to provide sufficient SNF is calculated. Water is added to dry or condensed skim milk, making reconstituted skim milk, in sufficient quantity to provide the necessary total volume for the final product.

10. Nonfat dry milk used for reconstituting beverage milk must be Grade A and of the low heat type, and it is assumed to be 97.5 percent solids-not-fat (SNF).

11. Condensed skim milk used for reconstituting is assumed to be 32 percent SNF. This is considered to be the highest concentration of solids that can be shipped in fluid form without causing unloading problems, such as solids precipitating out of solution and caking in the bottom of truck tanks.

12. The water used to reconstitute milk can affect the flavor of the reconstituted product. It is assumed that the typical plant already has sufficient equipment for filtering and removing odors from water, if the normal water supply so requires.

13. The butterfat content of raw milk is based on averages reported for the relevant federal order markets. The solids-not-fat content varies with butterfat content according to the following relationship estimated from California data.

$$SNF = .0702355 + 0.435 \times BF$$

14. Nonfat dry milk and condensed skim milk are purchased at prevailing market prices in truckload quantities of 45,000 pounds and 5,292 gallons, respectively. These load sizes comply with typical road limits. Given the current state of technology for handling bulk powder, it is assumed nonfat dry milk is shipped in 50-pound paper bags.

The comparative cost of reconstitution in the various cities is calculated for a given set of price data and other economic assumptions, in addition to the other modeling assumptions. The assumed input price data and other economic factors are given in Table B1. Raw milk prices and nonfat dry milk or condensed skim milk prices, as appropriate, are given in Tables B2 through B7.

Other factors describing the model, the procedure used to calculate quantities of milk and milk products used or needed, and the method used to calculate costs are as described elsewhere by Novakovic and Aplin (2).

Table B1. Basic Price Data and Other Economic Assumptions for Plants in Six Cities.

	Boston	Chicago	Dallas	Jacksonville	Knoxville	New York
Price of Labor ($/hour)	10.45	12.52	8.59	7.02	9.71	16.50
Price of Heat ($/MBH)	1.86	1.86	1.86	1.86	1.86	1.86
Price of Electricity (¢/KWH)	7.0	3.32	3.81	8.03	4.73	9.0
Price of Water (¢/gallon)	0.4	0.4	0.4	0.4	0.4	0.4
Price of Nonfat Dry Milk (¢/lb.)	96.1	94.75	96.73	96.73	96.73	96.1
Price of 32% Condensed Skim Milk (¢/lb. of wet solids)	95.0	92.0	102.0	103.0	98.0	93.6
Difference Between Wholesale Prices of Fresh and Blended Beverage Milk ($/gallon)	0.0	0.0	0.0	0.0	0.0	0.0
Operating Life of New Physical Capital (years)	15	15	15	15	15	15
Discount Rate (nominal) (percent)	14	14	14	14	14	14
Number of Plant Operating Days Per Year	312	312	312	312	312	312
Marginal Tax Rate (percent)	54.3	50.0	46.0	51.0	52.0	52.5
Operating Life Assumed for Tax Purposes (years)	5	5	5	5	5	5

[a] Factor prices are from JAI Engineers.

Table B2. Raw Milk and Concentrated Milk Prices and the Butterfat Content of Milk for Boston, 1980 and 1981.

	Minimum Class I Price ($/cwt.)	Over-Order Class I Price ($/cwt.)	Class II Price ($/cwt.)	Wholesale Price of Condensed Skim Milk (¢/lb. SNF)	Butterfat Content of Milk (%)
1980					
January	14.19	14.41	11.40	85.23	3.68
February	14.26	14.48	11.37	85.17	3.68
March	14.29	14.48	11.54	86.60	3.70
April	14.27	14.46	11.59	89.49	3.63
May	14.51	14.70	11.54	90.01	3.60
June	14.60	14.79	11.57	89.95	3.51
July	14.58	14.77	11.76	90.35	3.49
August	14.60	14.79	11.96	90.35	3.47
September	14.65	14.85	12.13	90.50	3.54
October	14.78	14.98	12.48	93.33	3.69
November	14.99	15.19	12.58	94.33	3.75
December	15.34	15.58	12.67	94.61	3.73
Average	14.59	14.79	11.88	89.99	3.62
1981					
January	15.44	15.68	12.67	94.86	3.75
February	15.53	15.77	12.68	95.00	3.67
March	15.56	15.80	12.62	95.00	3.66
April	15.58	15.82	12.55	95.00	3.63
May	15.59	15.83	12.49	95.00	3.62
June	15.56	15.80	12.48	95.00	3.53
July	15.53	15.77	12.56	95.11	3.50
August	15.51	15.75	12.57	96.00	3.51
September	15.45	15.69	12.52	96.00	3.58
October	15.39	15.63	12.58	96.10	3.71
November	15.38	15.62	12.58	95.50	3.72
December	15.44	15.68	12.62	95.50	3.74
Average	15.50	15.74	12.58	94.42	3.64

Table B3. Raw Milk and Concentrated Milk Prices and the Butterfat Content of Milk for Chicago, 1980 and 1981.

	Minimum Class I Price ($/cwt.)	Over-Order Class I Price ($/cwt.)	Class II Price ($/cwt.)	Class III Price ($/cwt.)	Wholesale Price of Condensed Skim Milk (¢/lb. SNF)	Butterfat Content of Milk (%)
1980						
January	12.53	13.44	11.47	11.37	93.0	3.79
February	12.60	13.44	11.45	11.35	93.0	3.79
March	12.63	13.44	11.69	11.59	93.0	3.78
April	12.61	13.59	11.78	11.68	93.0	3.74
May	12.85	13.89	11.76	11.66	93.0	3.66
June	12.94	13.89	11.78	11.68	93.0	3.58
July	12.92	13.89	11.83	11.73	93.0	3.50
August	12.94	13.89	11.96	11.86	93.0	3.54
September	12.99	13.89	12.17	12.07	93.0	3.67
October	13.12	13.89	12.52	12.42	93.0	3.81
November	13.33	14.31	12.65	12.52	93.0	3.85
December	13.68	14.34	12.70	12.61	93.0	3.82
Average	12.93	13.83	11.98	11.88	93.0	3.71
1981						
January	13.78	14.60	12.75	12.64	93.0	3.77
February	13.87	14.64	12.80	12.66	93.0	3.74
March	13.90	14.64	12.90	12.67	93.0	3.72
April	13.92	14.64	12.90	12.64	93.0	3.68
May	13.93	14.64	12.77	12.61	93.0	3.65
June	13.90	14.64	12.74	12.59	93.0	3.55
July	13.87	14.64	12.76	12.53	93.0	3.50
August	13.85	14.64	12.76	12.47	93.0	3.53
September	13.79	14.64	12.76	12.46	93.0	3.66
October	13.73	14.64	12.75	12.52	93.0	3.81
November	13.72	14.64	12.66	12.52	93.0	3.83
December	13.78	14.64	12.62	12.56	93.0	3.81
Average	13.84	14.64	12.76	12.57	92.0	3.69

Table B4. Raw Milk and Concentrated Milk Prices and the Butterfat Content of Milk for Dallas, 1980 and 1981.

	Minimum Class I Price ($/cwt.)	Over-Order Class I Price ($/cwt.)	Class II Price ($/cwt.)	Class III Price ($/cwt.)	Wholesale Price of Nonfat Dry Milk (¢/lb.)	Butterfat Content of Milk (%)
1980						
January	13.59	14.02	11.47	11.37	87.33	3.69
February	13.66	14.09	11.78	11.35	87.27	3.70
March	13.69	14.12	11.69	11.59	88.08	3.57
April	13.67	14.09	11.78	11.68	90.02	3.48
May	13.91	14.32	11.76	11.66	90.64	3.43
June	14.00	14.42	11.78	11.68	91.52	3.41
July	13.98	14.39	11.83	11.73	91.38	3.36
August	14.00	14.41	11.96	11.86	92.57	3.39
September	14.05	14.46	12.17	12.07	93.75	3.47
October	14.18	14.59	12.52	12.42	97.15	3.61
November	14.39	14.80	12.65	12.52	97.47	3.71
December	14.74	15.15	12.70	12.61	97.50	3.72
Average	13.99	14.41	11.98	11.88	92.06	3.55
1981						
January	14.84	15.25	12.75	12.64	97.44	3.66
February	14.93	15.45	12.80	12.66	97.02	3.64
March	14.96	15.45	12.90	12.67	96.73	3.53
April	14.98	15.45	12.90	12.64	96.50	3.42
May	14.99	15.45	12.77	12.61	96.50	3.44
June	14.96	15.45	12.74	12.59	96.50	3.42
July	14.93	15.45	12.76	12.53	96.83	3.39
August	14.91	15.45	12.76	12.47	97.25	3.40
September	14.85	15.45	12.76	12.46	97.25	3.49
October	14.79	15.45	12.75	12.52	97.30	3.62
November	14.78	15.45	12.66	12.52	97.25	3.70
December	14.84	15.45	12.62	12.56	96.32	3.69
Average	14.90	15.43	12.76	12.57	96.91	3.53

Table B5. Raw Milk and Concentrated Milk Prices and the Butterfat Content of Milk for Jacksonville, 1980 and 1981.

	Minimum Class I Price ($/cwt.)	Over-Order Class I Price ($/cwt.)	Class II Price ($/cwt.)	Wholesale Price of Nonfat Dry Milk (¢/lb.)	Butterfat Content of Milk (%)
1980					
January	14.12	15.75	11.52	87.33	3.51
February	14.19	15.75	11.50	87.27	3.45
March	14.22	15.75	11.74	88.08	3.37
April	14.20	15.75	11.83	90.02	3.36
May	14.44	15.45	11.81	90.64	3.34
June	14.53	15.75	11.83	91.52	3.37
July	14.51	15.75	11.88	91.38	3.38
August	14.53	16.20	12.01	92.57	3.43
September	14.58	16.20	12.22	93.75	3.45
October	14.71	16.45	12.57	97.15	3.52
November	14.92	16.75	12.67	97.47	3.62
December	15.27	17.00	12.76	97.50	3.62
Average	14.51	16.07	12.03	92.06	3.45
1981					
January	15.37	17.10	12.79	97.44	3.56
February	15.46	17.10	12.81	97.02	3.59
March	15.49	17.10	12.82	96.73	3.47
April	15.51	17.10	12.79	96.50	3.39
May	15.52	17.10	12.79	96.50	3.37
June	15.49	17.10	12.74	96.50	3.35
July	15.46	17.20	12.68	96.83	3.42
August	15.44	17.20	12.62	97.25	3.42
September	15.38	17.20	12.61	97.25	3.49
October	15.32	17.20	12.67	97.30	3.52
November	15.31	17.20	12.67	97.25	3.64
December	15.37	17.20	12.71	96.32	3.63
Average	15.43	17.15	12.72	96.91	3.49

Table B6. Raw Milk and Concentrated Milk Prices and the Butterfat Content of Milk for Knoxville, 1980 and 1981.

	Minimum Class I Price	Over-Order Class I Price	Class II Price	Class III Price	Wholesale Price of Nonfat Dry Milk	Butterfat Content of Milk
	($/cwt.)	($/cwt.)	($/cwt.)	($/cwt.)	(¢/lb.)	(%)
1980						
January	13.37	14.50	11.47	11.37	87.33	3.86
February	13.44	14.50	11.45	11.35	87.27	3.88
March	13.47	14.50	11.69	11.59	88.08	3.82
April	13.45	14.50	11.78	11.68	90.02	3.67
May	13.69	14.80	11.76	11.66	90.64	3.57
June	13.78	14.80	11.78	11.68	91.52	3.55
July	13.76	14.80	11.83	11.73	91.38	3.56
August	13.78	14.95	11.96	11.86	92.57	3.50
September	13.83	14.95	12.17	12.07	93.75	3.58
October	13.96	14.95	12.52	12.42	97.15	3.74
November	14.17	15.25	12.65	12.52	97.47	3.83
December	14.52	15.60	12.70	12.61	97.50	3.89
Average	13.75	14.85	11.98	11.88	92.06	3.70
1981						
January	14.62	15.70	12.75	12.64	97.44	3.92
February	14.71	15.70	12.80	12.66	97.02	3.88
March	14.74	15.70	12.90	12.67	96.73	3.77
April	14.76	15.70	12.90	12.64	96.50	3.65
May	14.77	15.70	12.77	12.61	96.50	3.59
June	14.74	15.55	12.74	12.59	96.50	3.56
July	14.71	15.55	12.76	12.53	96.83	3.51
August	14.69	15.55	12.76	12.47	97.25	3.52
September	14.63	15.55	12.76	12.46	97.25	3.57
October	14.57	15.55	12.75	12.52	97.30	3.71
November	14.56	15.55	12.66	12.52	97.25	3.77
December	14.62	15.55	12.62	12.56	96.32	3.83
Average	14.68	15.61	12.76	12.57	96.91	3.69

Table B7. Raw Milk and Concentrated Milk Prices and the Butterfat Content of Milk for New York, 1980 and 1981.

	Minimum Class I Price ($/cwt.)	Class II Price ($/cwt.)	Wholesale Price of Condensed Skim Milk (¢/lb. SNF)	Butterfat Content of Milk (%)
1980				
January	13.88	11.48	85.14	3.65
February	13.95	11.45	85.23	3.67
March	13.98	11.62	85.30	3.68
April	13.96	11.67	89.02	3.64
May	14.20	11.62	90.13	3.58
June	14.29	11.65	90.44	3.52
July	14.27	11.84	90.98	3.50
August	14.29	12.04	92.14	3.50
September	14.34	12.21	93.09	3.55
October	14.47	12.56	96.63	3.69
November	14.68	12.66	97.00	3.76
December	15.03	12.75	97.00	3.73
Average	14.28	11.96	91.46	3.62
1981				
January	15.13	12.61	97.00	3.72
February	15.22	12.76	96.54	3.67
March	15.25	12.70	96.10	3.66
April	15.27	12.63	95.88	3.64
May	15.28	12.57	95.88	3.61
June	15.25	12.56	95.88	3.54
July	15.22	12.64	95.96	3.49
August	15.20	12.65	96.25	3.51
September	15.37	12.60	96.38	3.58
October	15.31	12.66	96.35	3.69
November	15.30	12.66	96.25	3.69
December	15.36	12.70	96.32	3.69
Average	15.26	12.65	96.23	3.62