University of Wisconsin-Madison
Department of Agricultural Economics
Marketing and Policy Briefing Paper Series

Department of Agricultural Economics, College of Agricultural and Life Sciences, University of Wisconsin-Madison Cooperative Extension Service, University of Wisconsin-Extension

Paper No. 49
November 1994

USDA's Recommended Decision on Multiple Component Pricing for Midwestern Federal Milk Marketing Orders

by

Edward V. Jesse and Robert A. Cropp

Paper No. 49
November 1994

USDA's Recommended Decision on Multiple Component Pricing for Midwestern Federal Milk Marketing Orders

Ed Jesse and Bob Cropp[1]

INTRODUCTION

On October 28, the Secretary of Agriculture, signed a recommended decision on Multiple Component Pricing (MCP) for five Midwestern milk orders. The decision was based on a hearing held in Minneapolis in January 1994.[2] It affects the pricing of milk in the Chicago Regional, Upper Midwest, Iowa, Nebraska-Western Iowa, and Eastern South Dakota federal milk marketing orders. Together, these five orders accounted for about 26 percent of all milk pooled under federal orders in 1993.

With this decision, the five Midwestern orders join several others that have adopted MCP since 1988. However, the type of MCP that will be used in the Midwestern orders is unique in separately pricing three milk components: butterfat, protein, and other non-fat, non-protein solids. The proposed plan also includes a unique method of fixing order-imposed premiums and deductions for milk quality as measured by Somatic Cell Count.

---

[1]Professors and Extension Dairy Marketing Specialists, Department of Agricultural Economics, University of Wisconsin-Madison/Extension. We gratefully acknowledge the assistance of the Chicago Regional Federal Milk Marketing Order Administrator's Office in reviewing this paper.

[2]For a discussion of proposals considered at this hearing, see Marketing and Policy Briefing Paper No. 45, ***Proposals for Multiple Component Pricing in Midwest Federal Milk Marketing Orders***, February 1994. For a broader discussion of MCP concepts, see Marketing and Policy Briefing Paper No. 26, ***Pricing Milk to Farmers on a Multiple Component Basis***, August 1988.

MCP will bring a different look to dairy farmers' milk checks, since they will be paid for the pounds of butterfat, protein, and other solids that they market instead of hundredweight of milk adjusted for butterfat value. MCP could also bring a different milk check value, since there will be an explicit payment for protein, instead of protein being valued through various plant protein premium programs. There will be gainers and losers with MCP, but the industry, as a whole, will benefit by having a pricing system that more closely aligns milk component values with the demand for these components.

In this paper, we briefly discuss the rationale for adopting MCP in federal orders and the history of its use. We then describe, in detail, the manner in which producer and handler prices will be established. Finally, we discuss the likely impact of the Midwestern MCP proposal on producers and handlers.

WHY USE MCP?

Major shifts in consumer demand for beverage milk and manufactured dairy products over the years have reduced the value of butterfat relative to the value of solids-not-fat in milk. Consumers continue to switch from whole milk (minimum 3.25 percent butterfat) to low-fat (2-percent and 1-percent butterfat) and skim milk. From 1972 to 1993, per capita consumption of whole milk declined 58 percent, from 191.3 pounds to 78.73 pounds, and per capita consumption of low-fat and skim milk increased 141 percent, from 51.6 pounds to 130.6 pounds[3]. While raw milk has an average butterfat test of about 3.67 percent, the weighted average butterfat content of all beverage milk is only about 2 percent. Converting the difference between butterfat in raw milk and butterfat in beverage milk products to a butter equivalent yields nearly 2 pounds of butter for every hundredweight of beverage milk sales. Increasing amounts of excess butterfat are being generated from the beverage use of milk, but this excess is not being fully absorbed in commercial butter sales. Per capita butter consumption has declined from 4.9 pounds in 1972 to 4.5 pounds in 1993.

Surplus butterfat is also being generated from cheese sales. While the consumption of all cheese has shown strong growth in the last two decades, the largest growth has come in "other" varieties, primarily Italian, which have considerably lower butterfat content than traditional American varieties. The butterfat content of full-fat American cheese is about 33 percent; the fat content of Italian cheeses is in the low 20 percent range. During the 1972-93 period, per capita consumption of American cheeses increased 48 percent, 7.71 pounds to 11.4 pounds, and per capita consumption of Italian cheeses increased 276 percent, 2.61 pounds to 9.82 pounds. This lower butterfat Italian cheese production results in large quantities of both sweet cream and whey cream butter.

[3]USDA,ERS, *Dairy Yearbook 1994,* Statistical Bulletin No. 889, pp 20-23

Another source of surplus butterfat comes from increasing production and sales of reduced-fat versions of several conventional higher-fat manufactured dairy products. These include "low-fat" forms of cheese, yogurt, cottage cheese, sour cream, and other products that are replacing substantial volumes of their conventional counterparts. All of these consumption trends imply a serious potential problem of excess butterfat. To avoid this problem, the ratio of butterfat to protein (or solids-not-fat) in raw milk must be reduced to correspond to the ratio in the mix of dairy products that can find a commercial home. As a first step in altering the butterfat to protein ratio, dairy producers must know the relative values of fat and protein. MCP accomplishes this.

Surplus butterfat is purchased as butter by the Commodity Credit Corporation (CCC) under the federal dairy price support program. In the mid-1980's, the dairy industry was faced with a major milk surplus situation. Farm level milk prices were at support and the CCC was purchasing the related milk surplus in the form of large quantities of butter, nonfat dry milk and cheddar cheese. Since 1998, milk surpluses have essentially disappeared, but butterfat surpluses remain. That is, the CCC continues to purchase large volumes of butter, but little or no cheese or nonfat dry milk.

In response to a growing surplus butter problem and the need to reduce federal costs of the dairy price support program, the U.S. Secretary of Agriculture has used his authority to lower the support price for butter and correspondingly increase the support price for nonfat dry milk. While the support price for manufacturing milk has remained at $10.10 per hundredweight since 1990, the Secretary of Agriculture has reduced the purchase price for butter from $1.0925 per pound to $0.65 per pound and increased the purchase price for nonfat dry milk from $0.79 per pound to $1.034 per pound. And since butter has been in surplus, wholesale butter prices have followed these decreases in CCC purchase prices. At the same time, the butterfat differential paid to producers, which is determined from the Chicago Mercantile Exchange Grade A butter price, has declined from about 13 cents to around 6 cents for each point (1/10th of one percent) of butterfat test.

Despite this major decline in butterfat value and in the butterfat differential, dairy producers still place major emphasis on butterfat tests in their feeding and breeding programs. This is because federal order volume/butterfat pricing adjusts producer pay prices only for butterfat test. Under this method of pricing, there is no assurance that producers with high nonfat solids milk are appropriately compensated for the value of their milk. With the lower butterfat differential that now exists, producers with butterfat tests below 3.5 percent actually receive a higher price for their milk than what they would have under the higher butterfat differential and those with butterfat tests above receive less. This is because deducts and premiums for butterfat tests below and above 3.5 percent are less. Unless producer milk is paid for on the basis of protein or solids-not-fat and butterfat, there is no assurance that milk with both high butterfat and protein content will receive a fair compensation.

The decline in butterfat value over the past 33 years has completely reversed the relative value of butterfat and skim in 100 pounds of milk. In 1960, the M-W averaged $3.13 per hundredweight and the butterfat differential was \$0.068. Butterfat value accounted for 77 percent of the \$3.13 and skim milk value 23 percent.[4] In 1993, the M-W averaged \$11.80 per hundredweight and the butterfat differential was the same as 1960, \$0.068. But the butterfat value accounted for just 23 percent of the M-W, with skim milk accounting for 77 percent.

Under volume/butterfat pricing, producers may be encouraged to strive for increased milk volume and butterfat test, ignoring other milk components and their value. In fact, volume/butterfat pricing may actually encourage the production of water. In Table 1, note that producers A and B market exactly the same total pounds of milk solids (butterfat and protein). Producer B's milk has lower butterfat and protein tests; hence more pounds of milk (water) had to be produced and marketed to achieve the same pounds of milk solids. Producer B receives \$1.35 more for the same amount of milk solids than producer A. If this milk was used to make cheese, both A's and B's milk yield the same total pounds of cheese, yet B's milk contains more water that must be hauled and removed in the manufacturing process!

Table 1. How Volume/butterfat Pricing Encourages Production of Water

Producer	A	B
Pounds of milk sold	100.00	114.29
Butterfat percent	4.00	3.50
Pounds Butterfat sold/Cwt. of Milk	4.00	4.00
Protein percent	3.50	3.06
Pounds Protein sold/Cwt. of Milk	3.50	3.50
3.5% Milk Price/Cwt.*	\$11.80	\$11.80
Butterfat Differential**	\$0.068	\$0.068
Total Milk Value	\$12.14	\$13.49

* 1993 M-W Average
** 1993 Average Federal Order Butterfat Differential

[4]Source: USDA, AMS, *Dairy Market News* and *Federal Order Statistics.*

Not only can volume/butterfat pricing be unequitable to dairy producers, it can be unequitable to milk plants. Note that in table 2, two producers with the same butterfat test, 4.0 percent, have different protein tests. Under volume/butterfat pricing both producers would receive the same price per hundredweight, in this case $12.14. But the higher protein test milk yields 10.95 pounds of cheese compared to just 9.72 pounds for the low protein test milk. As a result, the raw milk cost to the plant to make the cheese is lower for the high protein milk, $1.11 per pound of cheese, than for the low protein milk, $1.25 per pound of cheese.

Table 2. An Example of the Inequity in Volume/Butterfat Milk Pricing to Cheese Plants.

% Butterfat	% Protein	Milk Cost per Cwt.*	Predicted Cheese Yield Per Cwt.	Milk Cost per Pound of Cheese
4.00	3.50	$12.14	10.95	$1.11
4.00	3.00	$12.14	9.72	$1.25

*1993 M-W Average of $11.80 and 1993 Average Federal Milk Marketing Order Butterfat Differential of $0.068

The above example uses highly-divergent fat-to-protein ratios in milk, but it is not wholly unrealistic. While butterfat and solids-not-fat content of cows' milk are correlated, the ratio of butterfat and solids-not-fat (and protein) varies considerably with season and among individual cows and herds. In a sample of 43 producers shipping to the Chicago Regional Federal Milk Market with the same butterfat test of 3.71 percent, protein tests ranged from 2.87 to 3.42 percent.[5] The solids-not-fat content ranged from 8.29 to 8.87 percent. The low protein content milk would yield about 9.63 pounds of cheddar cheese per hundredweight while the high protein milk would yield 10.38 pounds, a difference of 0.75 pounds. If nonfat dry milk were made from this milk, the yield range per hundredweight would be 0.62 pounds, from 8.88 to 9.50 pounds.

The decline in butterfat value, the variation in the ratio of butterfat and protein, and the significant variation in the yield of manufactured dairy products clearly demonstrate the economic rationale for MCP. Appropriately structured MCP payment plans are more equitable to both producers and milk plants. MCP can give the proper economic signals to producers to produce the kind of milk components milk plants need to profitably and efficiently provide consumers with the types of dairy products they are demanding and accomplish this in a manner that is equitable to both milk plants and dairy producers.

[5]Information provided by the Chicago Regional Federal Market Administrator's office.

It is argued that MCP does not make economic sense for milk used for Class I (beverage) purposes. This is because the additional protein or solids-not-fat in milk does not yield any more glass of beverage milk to sell. Although consumer taste panels have demonstrated that consumers prefer a higher solids beverage milk, they have not demonstrated the willingness to pay for it. Therefore, Class I milk handlers are not able to capture from the marketplace the payments to producers for additional protein. Because of this argument, existing federal order MCP plans apply only to Class III and Class II uses of milk. There is no change in Class I milk pricing. The recommended decision for MCP for the five orders discussed here is the same.

Nevertheless, MCP makes a lot of sense for most federal milk marketing orders. This is because the majority of the milk is used for manufacturing purposes (Class II and III) and not Class I. The average Class I utilization for the 38 federal orders in effect during 1993 was 43.1 percent[6] This means that 57 percent was used for manufacturing purposes. Average Class I utilization during 1993 for the five orders under the recommended decision were:

Chicago Regional	18.8%
Nebraska-Western Iowa	34.8%
Upper Midwest	19.0%
Eastern South Dakota[7]	66.4%
Iowa	30.2%

The predominate use of Grade A milk under these five orders is manufacturing. About 86 percent of the milk used for manufacturing is used to make cheese.[8] Hence MCP makes a lot of economic sense for the five Midwestern orders.

The question is often asked, why do we need to amend federal milk marketing orders to allow for MCP? Most producers are already eligible for MCP payment plans offered by their milk plant.

It is true that nationwide, over 75 percent of all producer milk is eligible to be priced under some MCP plan. The problem is that most of these MCP plans are industry sponsored, voluntary programs that do not adequately match component prices and values. Without amending federal orders, it is difficult for these voluntary MCP programs to be true MCP programs. Federal orders establish minimum prices that milk handlers must pay producers for milk. Federal orders that have not adopted MCP only provide for a butterfat adjustment to producer milk above and below 3.5 percent butterfat test. There is no problem for a handler to

[6]USDA, AMS, *Federal Milk Order Market Statistics*, 1993 Annual Summary, Statistical Bulletin No. 886, p 48.

[7]Includes the Greater Kansas and Black Hills orders. Individual data for the Eastern South Dakota order is not published because of confidentiality restrictions.

[8]USDA, AMS, *Recommended Decision*, p 14.

pay a premium for above average protein test. But a handler could be in violation of minimum pricing rules if deductions were made for low protein tests. Hence, most voluntary MCP plans only pay premiums for above-average protein tests with no deduction for below average tests. Further, voluntary MCP programs often are based more on competition than on economic differences in milk value. Consequently, there is little consistency among MCP programs, and dairy producers are often confused when comparing milk prices among competing milk handlers.

Some voluntary MCP programs establish eligibility requirements for producers to receive premiums for protein or solids-not-fat. A common practice is to establish quality standards, somatic cell count (SCC) being most common, for eligibility for protein premiums. If the standard is not met, the producer does not receive a premium for above average protein test, or the premium payment is reduced. Although most producers ship their milk to a milk handler that offers MCP, far fewer producers actually receive the MCP premiums because of these quality standards. The result is that those producers with above average milk composition but with high SCC count lose their protein premiums, but those producers with low milk composition and high SCC do not receive any deducts. This is further illustration of pricing inequity.

There are strong arguments for amending federal orders to provide for MCP. MCP is necessary to allow for both premiums and deducts for above average and below average milk composition other than butterfat and to provide for consistency among MCP programs among different handlers.

Currently, seven of the 38 federal milk marketing orders have implemented MCP (Table 3). In addition, a hearing has been held to amend the Southern Michigan Order to include MCP pricing. The 14 orders with existing or pending MCP plans accounted for 57 percent of all milk under federal order regulation and 72 percent of the federal order milk used in manufactured products in 1993.

The current federal order MCP plans include either protein or solids-not-fat as the priced nonfat solids component. The component selected depends upon the primary use of milk for manufacturing. If the primary use is cheese, protein is priced since protein influences cheese yield. If nonfat dry milk is the primary manufactured product in the market, then solids-not-fat is priced since it affects the yield of nonfat dry milk. In contrast to the recommended decision for the five Midwestern orders (and the major proposal in the Southern Michigan hearing), none of the existing orders price more than two components.

Table 3. Current Multiple Component Pricing Under Federal Orders

Order	Priced Components	Date Enacted
Great Basin	fat, SNF	4/88
Middle Atlantic	fat, protein	1/92
Indiana*	fat, protein	10/93
Ohio Valley*	fat, protein	10/93
Eastern Ohio- Western Pennsylvania*	fat, protein	10/93
Pacific Northwest	fat, SNF	5/94
Southwestern Idaho- Eastern Oregon	fat, protein	5/94

* Include a quality payment based on Somatic Cell Count

The existing MCP plans all derive nonfat solids prices as a residual to the M-W price. In other words, protein or SNF prices are calculated by subtracting the value of butterfat from the M-W price and dividing by protein or SNF tests. All derive the butterfat value from the Chicago Mercantile Exchange price for Grade A butter. The recommended decision for the five Midwestern orders proposes deriving protein values from cheese prices and other solids value as a residual to the M-W price after accounting for butterfat and protein value.

Among existing federal order MCP plans, a milk quality adjustment is included in the Indiana, Ohio Valley, and Eastern Ohio-Western Pennsylvania orders. The quality adjustment is based on somatic cell count (SCC) and applied to the protein price. Hence, Class I milk is exempt from any quality adjustment. In the recommended decision for the Midwestern orders, the SCC producer pay adjustment is applied to the volume of milk marketed. The recommended decision thus recognizes that milk quality effects all uses of milk.

THE MIDWEST MCP PLAN

The recommended decision prices three milk components to producers and to handlers of Class III (hard manufactured) and Class II (soft manufactured) products. The priced components are butterfat, protein, and other solids (solids-not-fat other than protein). In addition to the value of these components as measured by order-determined prices, producers also receive a producer price differential, expressed on a per hundredweight basis, that represents the value of Class I and II differentials. A further per-hundredweight adjustment is made for somatic cell count of producer milk relative to a base of 350,000. Class I (fluid milk) handlers will not pay for milk on the basis of protein and other solids; they will continue to pay according to skim milk and butterfat value.

The recommended decision strikes a compromise between the relative protein and other solids values supported in the two major proposals at the MCP hearing in January 1994. Both of the proposals involved direct determination of butterfat and protein prices based on product prices and derivation of an other solids price by subtracting butterfat and protein value from the Class III price. National All-Jersey's proposal used block cheddar prices and whey protein concentrate prices to establish a relatively high protein value and, thus, a relatively low value for other solids. The Central Milk Producers Cooperative proposal used barrel cheddar prices and no additional value for whey protein to derive a relatively low protein value and high other solids value. The recommended decision uses the block cheddar price, but no whey value, to derive the MCP protein price.

PROTEIN PRICE

The proposed Midwestern MCP plan is the first federal order MCP plan to directly derive a protein price. Other plans calculate protein price as a residual value after accounting for the value of butterfat in the M-W price. The formula used to derive the protein price is:

Protein Price per Pound = 1.32 X National Cheese Exchange Block Price per Pound

The National Cheese Exchange (NCE) block cheddar price will be the monthly average price as reported by USDA's *Dairy Market News*. This is a time-weighted average of weekly Exchange "opinions."

The factor, 1.32, is the approximate yield of cheddar cheese at 38 percent moisture per pound of protein in milk. In other words, one pound of protein in cows' milk will yield about 1.32 pounds of 38 percent moisture cheddar cheese. The factor is derived from the Van Slyke cheese yield formula, which projects theoretical cheese yield based on the butterfat and protein content of milk and the moisture content of cheese.

The monthly average NCE cheddar block price for October 1994 was $1.3269 per pound. Hence, if the Midwestern MCP plan had been in effect in October, the protein price (for all five affected orders) would have been $1.7515 per pound.

BUTTERFAT PRICE

The value of butterfat in the proposed plan is the same as under the current order pricing. Butterfat value will be based on the butterfat differential that is currently used to adjust the blend price for producer butterfat tests above or below 3.5 percent. The butterfat differential is the difference in value between 0.1 pounds of butterfat and 0.1 pounds of skim milk. Hence, it is related to both butter prices and the M-W price. The specific formula that is used to calculate the butterfat differential is 0.138 times the average monthly price for Grade A butter on the Chicago Mercantile Exchange (CME) minus 0.0028 times the M-W Price ("at test;" i.e., at average butterfat percent) for the month. For October 1994 (CME price = $0.71/Lb.; M-W = $12.54/Cwt.), this formula yields a butterfat differential of 0.063 per point (.1 percent) of butterfat. The butterfat differential is expressed rounded to three decimal points.

The MCP plan prices butterfat per pound instead of through an adjustment to a milk price. Converting the butterfat differential to a per pound value for butter yields the following formula for deriving the MCP butter price:

Butterfat Price/Lb. = [(965 X Butterfat Differential) + (M-W Price)]/100[9]

For October 1994, this formula yields a butterfat price of $0.7309/Lb.

OTHER SOLIDS PRICE

Other milk solids besides butterfat and protein consist mainly of lactose (milk sugar) and ash. These components have limited market value compared to fat and protein.

The other solids price under the proposed Midwestern MCP plan is calculated as a residual value to the Class III price after accounting for fat and protein value. The specific formula is:

	Class III price (currently the M-W price)
-	3.5 X Butterfat price[10]
-	M-W Protein percent X Protein price
=	Other solids value per hundredweight of milk
÷	M-W other solids percent
=	Other solids value per pound

[9]For those interested in the mathematics of this formula, note that the butterfat differential (BFD) is equal to the difference between the value of 0.1 pound of butter and 0.1 pound of skim milk (0.1B-0.1S). Skim milk value per hundredweight under orders is the M-W price minus 35 times the butterfat differential (S = M-W - 35BFD). Rearranging terms, the butter price can be expressed as B = BFD/0.1 + (M-W-35BFD)/100; or 100B = 965BFD + M-W.

[10]Technical federal order language specifies that the skim milk price multiplied by 0.965 will be adjusted by the protein value to derive the total other solids value in milk. The procedure shown here is conceptually identical and yields identical other solids prices except for differences due to rounding.

This formula relies on reported protein and other solids (solids-not-fat minus protein) percentages from plants in the M-W survey. USDA does not routinely report these values for the current month, but has been collecting them since May 1994.[11]

Using the October 1994 M-W protein and solids-not-fat percentages (3.32 and 8.60, respectively), the October other solids price would be calculated as:

	\$12.29	October M-W price per hundredweight
-	3.5 X \$0.7309	3.50 pounds of butterfat @ butterfat price
-	<u>3.32 X \$1.7515</u>	3.32 pounds of protein @ protein price
=	\$3.9169	Other solids value per hundredweight
÷	5.28	Pounds other solids per hundredweight (8.60 - 3.32)
=	\$0.7418/Pound	Other solids price per pound

The MCP other solids price cannot be negative. Hence, in the rare event that the value of butterfat and protein exceeded the Class III price, the protein price would be adjusted downward to make the other solids price equal zero.

PRODUCER PRICE DIFFERENTIAL

The combined value of butterfat, protein, and other solids equals the Class III price. There is additional value to milk pooled under federal orders from Class I and Class II sales, which are normally priced higher than Class III. However, Class I and II milk is priced at the Class III price *for the second preceding month* plus a fixed differential per hundredweight. Hence, the "added" value of Class I and II sales is negative whenever the Class III price shows a 2-month increase that is larger than the respective differential.

Recently, USDA adopted a III-a classification for milk used to make nonfat dry milk (see Marketing and Policy Briefing Paper No. 46). The III-a price is a product formula price that has been averaging substantially under the Class III price. Hence, Class III-a sales reduce the pooled value of producer milk.

To account for these producer price adjustments, the proposed MCP plan uses a ***producer price differential***, which is expressed per hundredweight of milk. The producer price differential

[11]USDA also collects and reports protein and solids-not-fat from its base month M-W survey, which is reported one month after the M-W price. USDA has recommended adoption of a replacement for the current M-W price as the federal order Class III price (see Marketing and Policy Briefing Paper No. 48). The replacement would be the base month M-W adjusted by a product price formula. Adoption of this replacement would permit direct use of the reported base month M-W protein and solids-not-fat percentages in calculating the other solids price. Alternatively, USDA may continue to use the unreported M-W values for the current month to ensure more up-to-date test values.

is a weighted average of the differences between the Class I, Class II, and Class III-a prices and the Class III price. The weights are the percentages of producer milk utilized in the three classes.

An illustration may help to clarify how the producer price differential will be calculated. For the Chicago Regional order, Class I, II, and III-a prices and utilization for October 1994 are shown below:

Class	Actual Price ($/Cwt)	Actual Price Minus Class III ($/Cwt)	Utilization (%)	Value (+/-)
I	13.13	0.84	21	$0.1764
II	12.15	$(0.14)	8	$(0.0112)
III-a	10.36	$(1.93)	3	$(0.0579)

Weighted Average Value: $0.1073

The market-wide producer price differential in this example is $0.1073, representing the weighted average value of Class I, II, and III-a sales in the Chicago market relative to the Class III price. There are several other factors that contribute to the producer price differential. Adjustments include such things as shrinkage and overage, inventory reclassification, receipts of "other source" milk allocated as Class I, receipts from unregulated supply plants, and, in the Chicago order, transportation and assembly credits. These adjustments involve technical aspects of federal order accounting rules that we will not attempt to explain in this paper.

The producer price differential per hundredweight will be the same for all producers, representing their share of milk sales other than Class III. In addition, each producer will have a further per-hundredweight adjustment based on Somatic Cell Count. There is substantial evidence that the somatic cell count (SCC) of milk influences yields of cheese and other manufactured dairy products. SCC may also affect the shelf life and quality of some products. Hence, the level of SCC affects the value of producer milk to the extent that SCC influences the yield and quality of manufactured products.

The proposal involves a positive or negative adjustment per hundredweight for SCC relative to a base of 350,000. The adjustment per 1,000 SCC is equal to 0.0005 times the National Cheese Exchange block cheddar price. For October 1994, this amounts to 0.066 cents per 1,000 SCC. Based on recent cheese prices, the adjustment will range from 0.06 to 0.07 cents per 1,000 SCC.

The producer adjustment for SCC is calculated by subtracting monthly average SCC tests in 1,000 cells per milliliter from 350 and multiplying by the adjustment per 1,000 SCC. Hence, producers with SCC tests higher than 350,000 will receive a negative adjustment (deduction); producers with SCC tests lower than 350,000 will receive a positive adjustment (premium). Using the October 1994 unit adjustment of 0.066 cents per 1,000 SCC, the SCC adjustment for a producer with a SCC test of 500,000 would be *negative* 10.0 cents per hundredweight (350-500 = -150 X 0.066 = -10.0). A producer with a SCC test of 100,000 would have a *positive* adjustment of 16.5 cents per hundredweight (350 - 100 = 250 X 0.066 = 16.5).

The producer SCC adjustment "institutionalizes" quality premiums/deductions linked to SCC. This has some positive and negative aspects. On the positive side, explicitly including a conservative SCC adjustment should serve to reduce some of the extreme and economically unjustified quality premiums currently offered by some Wisconsin and other Midwestern plants. But the effect of SCC on cheese yield is not well-understood. Fixing a value presumes more than we know, and imposing a linear adjustment may fail to adequately reflect how cheese yields are influenced by SCC. Even less is known about the effect of SCC on yield and quality of other manufactured dairy products. A SCC value purportedly based on cheese yield could be economically irrelevant to other manufacturers.

EFFECT ON PRODUCERS

Compared to current pricing, the recommended MCP for the five federal orders redistribute revenue among producers depending on the composition of their milk. The objective of MCP is to make producer payments more equitable based on the value of dairy products that can be made from each individual producer's milk. With the implementation of MCP, some producers should experience a lower milk check and others a larger milk check. Those producers with relatively high milk solids composition and low SCC should receive a larger milk check. But those producers with relatively low milk solids composition and high SCC will likely receive less. Therefore, some producers will be very pleased with MCP and others not pleased at all.

Because most producers already ship their milk to a milk plant that offers some type of voluntary MCP program, the impact of the recommended decision on individual producers cannot be very precisely determined. It is very unlikely that the full impact of MCP will be felt. Most plants pay producers substantially more than the order minimum blend price. Consequently, they have some flexibility to redistribute revenues to mitigate extreme differences that may result from the application of MCP.

Some insight into individual producer effects are offered by an analysis conducted by the Chicago Regional Market Administrator's (MA) office to calculate the impact of the National All Jersey's (NAJ) MCP plan on 6,793 producers during 1992. The NAJ proposal involved a higher protein price than the recommended decision proposal, and did not involve an adjustment for

SCC. Nevertheless, the results give us some indication of differences in producer pay prices resulting from the application of MCP.

The impact on the majority of producers will likely be less than $.26 per hundredweight (Table 4). The standard deviation was $.2616 per hundredweight. This means that two-thirds of the producers would receive, through the order, between $.2616 per hundredweight more or less than they now receive under current pricing. Almost 32 percent of the producers would receive between $ .01 and $ .30 per hundredweight more than they do under the current pricing system. About 10 percent would receive $.31 to $.60 per hundredweight more; almost 2 percent $ .61 to $ .80 per hundredweight more; less than 1 percent $ .81 and $$1.00 per hundredweight more; less than 1 percent more than $1.00 per hundredweight more.

Table 4. Average change in producer pay price under the Chicago Regional Federal Order with the National All Jersey MCP, 6,793 producers, 1992.

Price Change per Cwt.	Percent of Producers
$Increase:	
1.01 - 1.31	0.8
0.81 - 1.00	0.8
0.61 - 0.80	1.7
0.31 - 0.60	10.2
0.01 - 0.30	31.5
No Change:	1.3
$ Decrease:	
0.01 - 0.30	38.1
0.31 - 0.60	13.6
0.61 - 0.80	1.5
0.81 - 1.00	0.3
1.01 - 1.31	0.1
Standard Deviation = $0.2616 per Hundredweight	

Source: Chicago Regional Market Administrator’s office.

Thirty-eight percent of the producers would receive $ .01 to $.30 per hundredweight less; 13.6 percent would receive $ .31 to $.60 less; 1.5 percent $ .61 to $ .80 per hundredweight less; .3 percent $ .81 to $1.00 per hundredweight less; and just .1 percent $1.00 or more per hundredweight less.

The average SCC is less than 300,000 for producers shipping to handlers under the Chicago Regional Order. Producers will receive a premium or deduct of about $.0006 to $.0007 for each 1,000 SCC above or below 350,000. Hence, the "average producer shipping to a plant regulated under the Chicago order will receive a premium of about 3 cents per hundredweight.

The impact of the recommended decision on individual producers is further illustrated below. The Chicago Regional order prices for October, 1994 and October component values are used in the example. The October blend price was $12.56 per hundredweight with a butterfat differential of $ .063. This implies a producer price differential under the proposed MCP plan of $0.27 per hundredweight. Note that differs from the producer price differential calculated above, which was only $0.11 per hundredweight. The difference is attributable to the blend price adjustments for the Chicago order that were noted earlier, which will also apply when MCP is implemented.

Producer A:

Producer A Markets 60,000 pounds of milk in October having 4.0% butterfat, 3.3% protein, 5.45% other solids and a SCC of 200,000.

a) Milk Check under current system:

	$12.5600	Blend Price
+	.3150	Butterfat (4.0%-3.5%= 5 points X $ .063)
=	$12.8750	Pay Price Per Hundredweight
X	600.0	Hundredweight marketed
=	$7,725.00	Milk check

b) Milk Check under MCP:

	$1,754.16	2,400# of butterfat @ $ .7309 per pound
+	$3,467.97	1,980# of protein @ $1.7515 per pound
+	$2,425.69	3,270# of other solids @ $.7418 per pound
+	$ 162.00	600 Cwt. @ $ .27 Producer Price Differential
+	$ 59.40	SCC adjustment: (350-200) X $ .00066 = $ .099 per hundredweight X 600 Cwt. (premium)
=	$7,869.22	Milk Check

c) Difference: Producer A receives $144.22 more under MCP of which $59.40 is due to low SCC.

Producer B:
Markets 60,000 pounds of milk in October having 3.3% butterfat, 2.9% protein, 5.45% other solids, and with a SCC of 500,000.

a) Milk Check under current system:

	$12.5600	Blend Price
-	$ .1260	Butterfat (3.5%-3.3%) = 2 points X $ .063
=	$12.4340	Pay price per Hundredweight
X	600.0	Hundredweight marketed
=	$7,460.40	Milk check

b) Milk Check under MCP

	$1,447.18	1,980# butterfat @ $0.7309 per pound
+	$3,047.61	1,740# protein @ $1.7515 per pound
+	$2,425.69	3,270# other solids @ $ .7418 per pound
+	$ 162.00	600 Cwt. @ $ .27 Producer Price Differential
-	$ 59.40	SCC Adjustment: (350-500) X $ .00066 =($ .099) per hundredweight X 600 Cwt. (deduct)
=	$7,023.08	Milk Check

c) Difference: Producer B receives $437.32 less under MCP of which $59.40 is a deduct for high SCC.

The illustration above compares *base prices* generated by federal order pricing rules. Most dairy producers in the Midwest receive more than the base price in the form of various premiums. We cannot predict at this time how the premium structure of plants will change with implementation of MCP. Some plants may offer protein and quality premiums on top of the order-mandated values. Others may adhere to the order prices for components and SCC and alter plant premiums or volume premiums. Still others may elect to partially or completely ignore the order component prices in an attempt to mitigate any effect that MCP might have on large volume, low-solids producers.[12] Given the uncertainty about how plants may choose to alter

[12]Cooperatives are exempt from paying minimum order prices on grounds that they are business extensions of their dairy farm members. A major dairy cooperative in the Indiana order elected to pay substantially under the order price for protein when MCP was introduced in that order, instead augmenting the weighted average differential paid to producers.

their payment plans with the implementation of MCP, the comparisons shown above should be viewed as highly tentative.

MCP makes producers aware that protein is the most important component in that it receives the highest price per pound. Protein will account for between 40 and 50 percent of the value of most producer’s milk checks. Butterfat and other solids receive about the same price per pound, and together account for about 50 to 55 percent of the milk check. That leaves milk volume, the producer price differential, accounting for a rather small share of the milk check. Under MCP in federal order markets where the primary use of milk is for manufacturing, producers can improve their milk check by feeding and breeding for high protein composition milk with low SCC. Caution should be noted however, that producers will be paid for *pounds* of protein marketed and not for *percent* of protein.

Producers can change milk composition in two ways, by genetics or by feeding. Feeding is the quickest way to alter milk composition. Altering milk composition is easier for some components than others. Changing diet can alter fat content by as much as 3 percentage units (which means total fat percentage can range from 2% to 5%), but diet changes can only alter protein content by about 0.6 percentage units.[13] It is also easier to depress protein content through feeding than to increase protein. Further, it costs about twice as much to feed for a pound of protein as it does to feed for a pound of fat. Therefore, producers need to be adequately compensated for increasing protein composition. The value per pound of protein under the recommended decision provides for that compensation. The value per pound of protein is more than twice the value of a pound of butterfat.

Milk composition can also be altered through genetics. The advantage of genetics over feeding is that it is permanent and cumulative. But it is also a rather slow process. Although protein composition is just as inheritable as butterfat composition, it takes longer to change protein composition than butterfat composition.[14] This is because of smaller deviation of protein content than butterfat content among sires.

Yield traits have a high positive correlation with each other. Selection for milk yield trait will indirectly result in increased yield for butterfat and protein. If protein yield is selected, there will be an increase in butterfat and milk yield. However, there is a negative correlation between milk yield and *percent* butterfat and protein. Selection for increased milk yield will generally result in lower fat and nonfat solids tests. Likewise, selection for increased component test will usually result in decreased milk yield. There are exceptions to these generalities. There are a few sires that will increase protein percent, decrease butterfat percent, but not decrease milk yield, thus netting increased pounds of protein and butterfat. Such sires are valuable to altering milk composition under MCP plans that value pounds of protein or solids-not-fat.

---

[13]Sutton, J.D., "Altering milk composition by feeding", *J. Dairy Sci.*, 1991

[14]Funk, Dennis, "Component pricing and Dairy Cattle Breeding", unpublished paper, Dairy Science Dept., Univ. of Wisconsin.

MCP sends an appropriate economic signal to producers to feed and breed for ***pounds*** of protein and ***pounds*** of butterfat. As producers respond with appropriate feeding and breeding strategies milk composition can be altered and additional dollars will be paid to producers.

EFFECT ON HANDLERS

Order-regulated Class II and Class III milk handlers will be affected by MCP in the opposite way from producers. In general, handlers costs will increase (decrease) to the extent that they acquire milk that has higher (lower) protein and other solids content than monthly M-W protein and other solids tests. This is appropriate since higher protein means higher yields of cheese, nonfat dry milk, and other manufactured dairy products.

However, the effect of MCP on handler costs will be moderated in two ways. First, handlers receive milk that is commingled from among many producers. This has an averaging effect on milk composition. The range in protein tests among handlers will be much smaller than the range among producers.

Second, pooled manufacturing plants already pay for protein in the form of protein premiums and deductions. Existing premiums fall short of the value of protein under MCP, and premiums and deductions are not symmetric. Nonetheless, the impact on plant costs will be much less than indicated by comparing order minimum prices with and without MCP.

With these caveats, cheddar cheese plant margins based on current order pricing and the proposed Midwestern MCP plan are compared in Table 5. These margins are based on product prices and resulting MCP component values for October 1994.

Several assumptions apply to the values shown in the table. Since the same assumptions apply to both conventional pricing and MCP, the *comparisons* are valid, even though the absolute levels are sensitive to the assumptions.

Cheese yields are based on a minimum casein-to-fat ratio of 64 percent. Excess butterfat is assumed to be skimmed prior to cheesemaking and recovered as sweet cream butter. Butterfat that is not recovered in cheese is used to produce whey cream butter. Both sweet cream and whey cream butter are priced at the CME butter price in determining gross revenue. In real life, standardization to ideal casein-to-fat ratios is usually through addition of condensed skim milk or nonfat dry milk rather than skimming cream. And sweet cream butter (Grade A or AA) usually trades at a premium to whey cream butter (Grade B). Plants are assumed to utilize nonfat whey solids to produce whey protein concentrate. In real life, whey is used to produce a number of different marketable products, and some nonfat whey solids are not utilized at all.

The first three panels of Table 5 show yields of cheese, butter, and whey protein concentrate for various combinations of protein and fat in producer milk. The extreme values of fat and protein would not be observed in cheese plants after producer milk is commingled.

Hence, actual product yield experience would not vary as much as shown in the table. The fourth panel shows gross returns given the indicated yields and October 1994 product prices.

The fifth and sixth panels show the cost of milk to cheese plants under conventional and MCP, respectively. Conventional pricing accounts for only order-determined milk value; it does not include protein premiums that are offered by cheese plants independent of order minimum pricing rules. Thus, milk cost is invariant with protein content. Orders price only volume and butterfat. In contrast, milk cost increases by $1.75 per hundredweight across the range of protein values under MCP.

The last two panels of Table 5 show the absolute net margins to cheese plants (gross returns minus milk cost) for milk of varying butterfat and protein composition. For conventional pricing, the range in net margins is from $0.53 to $4.16 per hundredweight, or $3.63 per hundredweight. There is a spread of from $2.10 to $3.29 across the range of protein values and from $0.34 to $1.53 across the range of butterfat values.

With the proposed Midwestern MCP plan, the absolute spread in net margins is only $1.78 per hundredweight, from $1.43 to $3.21. The spread across protein values ranges from $0.35 to $1.53 and the spread across butterfat values ranges from $0.25 to $1.43.

Table 5 demonstrates clearly that MCP improves the matching of milk cost and milk value to cheese manufacturers. With current pricing, cheese plants experience very low margins when they acquire milk that is low in protein. That is because the plants make less cheese, but are obligated by order pricing rules to pay the same price for milk regardless of protein content. Similarly, cheese plants experience high margins with high protein milk, again, because orders require payment for butterfat and skim milk, not for protein. Of course, protein premium payments would reduce margins for the high-protein milk from those shown in the table.

MCP does not eliminate the variation in net margins with varying butterfat and protein, but it substantially narrows the spread in margins. For the lowest protein test in the table (2.75 percent), MCP yields net margins that are $0.65-$0.75 per hundredweight higher than conventional pricing. At the high protein test (3.75 percent), the MCP net margins are $1.01 to $1.08 per hundredweight lower than for conventional pricing.

Note from Table 5 that, while less variable than margins with conventional pricing, MCP net margins steadily increase with increasing protein. MCP more closely matches milk cost with the value of that milk in cheesemaking, but MCP does not discourage plants from procuring high-protein milk.

MCP applies to handler payment obligations for Class III and Class II milk. Milk that is utilized for Class I products will continue to be priced on the basis of its butterfat and skim milk value. As noted earlier, the rationale for excluding Class I milk from MCP is that fluid processors cannot capture any additional market value from high-protein milk.

MCP will be used to price Class III-a milk. Milk used to produce nonfat dry milk will be subject to the same minimum component prices as milk used to make other Class III products. However, the pool obligation of Class III-a handlers will be reduced by the difference between the Class III and Class III-a price for the volume of milk used in Class III-a.

SUMMARY

Multiple component pricing in Midwestern federal order milk markets is long overdue. The region is the major cheese producing area of the U.S. Cheese yields are heavily influenced by protein in milk. It is essential that dairy producers receive appropriate economic signals to encourage expanded production of protein.

MCP promotes equity among producers by relating milk prices more closely to the relative values of milk components. Current federal order pricing benefits producers whose herds produce low levels of nonfat solids at the expense of producers with high-solids herds. This cross-subsidization is moderated somewhat through voluntary MCP programs that pay protein premiums. But protein premiums do not adequately compensate producers for protein relative to its marketplace value.

Similarly, MCP more equitably treats dairy manufacturing plants. Current pricing rules result in large variations in plant margins, depending on the composition of milk. MCP dampens these variations by pricing milk more in line with its value in producing manufactured products.

In the short term, MCP will have little or no effect on total producer revenue, but it will alter the distribution of the revenue pie. In the long run, MCP should encourage the adoption of feeding practices and genetic selection that will increase protein and, thus, producer revenue. MCP should also lead to greater consistency among payment plans, making it easier to compare what is being offered by competing plants.

In short, the recommended MCP decision is a very positive step toward rationalizing farm milk pricing in the Midwest.