August 1992 No. 350

ALTERNATIVES TO THE M-W PRICE

By

Edward V. Jesse[1]
University of Wisconsin-Madison

[1]Professor, Department of Agricultural Economics, University of Wisconsin-Madison. This paper was prepared for inclusion in the proceedings of the 1990 Southwest Milk Marketing Conference, held in Baton Rouge, Louisiana, in August 1990. The proceedings of this conference were not published as planned.

Alternatives to the M-W Price

Introduction

The Minnesota-Wisconsin Price Series (M-W Price) is the estimated average price paid for Grade B milk by plants in Minnesota and Wisconsin. The M-W price has been used to determine minimum class prices under federal milk marketing orders since the 1960s. It is intended to reflect a market-driven competitive pay price for Grade B milk used to make butter, powder and cheese in Minnesota and Wisconsin, where about 55 percent of the nation's Grade B milk is produced.

For all federal orders that define three use classes for milk, the M-W price for the current month is the minimum price Grade A plants can pay for milk used to produce Class III products, primarily butter, powder and cheese. Use of the M-W price to establish Class III prices equalizes raw milk costs of Grade A and Grade B manufacturers.

The M-W price is also used as the base for all federal order minimum Class I prices (for Grade A milk used to make fluid or beverage milk products). Class I prices in all orders are set equal to the M-W price from two months earlier plus a Class I differential that varies according to the market's distance from Eau Claire, Wisconsin. Use of a common price base in the form of the M-W price integrates federal order Class I prices nationally. As the M-W price changes, all Class I prices change by the same amount. This maintains inter-order price alignment.

Most dairy industry observers agree that the M-W price has served well as a federal order price mover, despite some deficiencies. The M-W price is an accurate measure of what plants pay for Grade B Milk. The National Agricultural Statistics Service (NASS), which is responsible for reporting the M-W price, has no vested economic interest in its value. The M-W price is a good indicator of plant competition that might not be reflected in product prices. The method of collecting and reporting the M-W price allows a good blend of survey data and human judgement.

However, declining Grade B milk production and fewer manufacturing plants purchasing Grade B milk have placed the validity and, more important, the longevity of the M-W price in question. Over time, prices paid for Grade A milk used for manufacturing purposes in Minnesota and Wisconsin have deviated further and further from the M-W price. A recent report by the U.S. General Accounting Office urged that a replacement for the M-W price be instituted rapidly. The new farm bill requires replacement by October 1991. Right now, the question is not *if* or *when* the M-W price should be replaced; it is *with what*.

This paper addresses the question of what should replace the M-W price, describing some possible alternatives along with their desirable and undesirable characteristics.

Characteristics of a Good Replacement

The M-W price serves as the basic formula price under all federal milk marketing orders. Its use dates to the early 1960s, when it was first used in the Chicago order. By the end of the 1960s, most orders had adopted the M-W in favor of various competitive pay prices, product formula prices, and economic formulas.

While the M-W price series may currently be a reliable basis for establishing milk prices, significant declines in Grade B milk production and in the number of Grade B purchasing plants are reducing its reliability as a fair indicator of the value of milk used in manufacturing. Further, because the replacement of the M-W price will probably be a difficult and lengthy process, the GAO recommended that USDA initiate the process of developing and testing alternatives to the M-W price immediately.

We believe the M-W price is still a reliable indicator of the value of Grade B milk. But we question its validity as an indication of the value of Grade A milk used for manufactured milk products. Further, we believe there is a genuine urgency in developing an alternative to the M-W price. A replacement will likely be necessary within the next year or two.

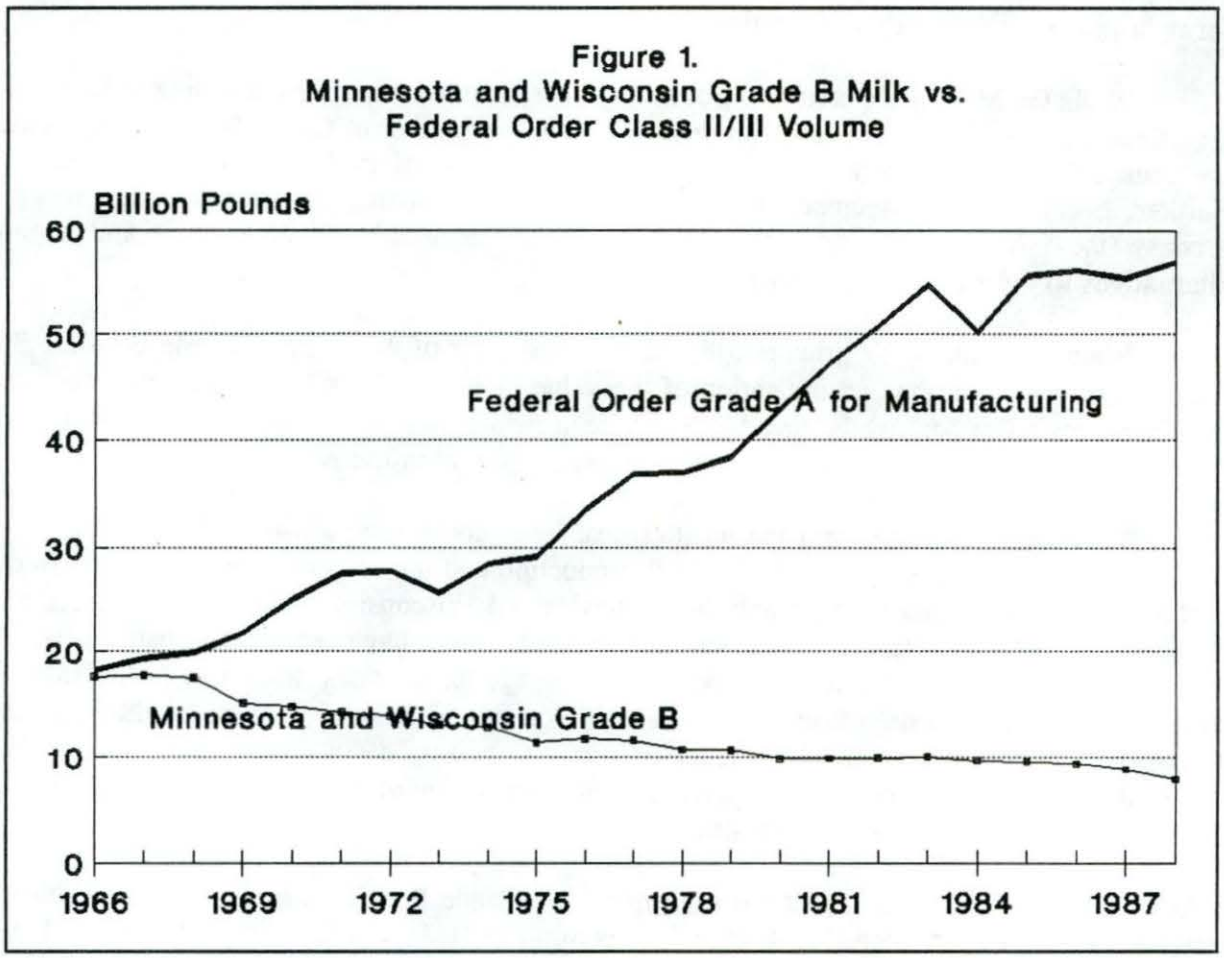
The GAO concluded that the most critical issue concerning the reliability of the M-W price series is the declining level of Grade B production and the corresponding reduction in the number of Grade B purchasing plants in Minnesota and Wisconsin. Both the percentage and total pounds of Minnesota and Wisconsin milk that is Grade B have decreased substantially. In 1965, the total Grade B pounds and respective percentage of the states' total milk production for Minnesota and Wisconsin were; Minnesota 9 billion pounds, 84 percent of production, and Wisconsin 10 billion pounds, 57 percent of production. By 1988 Grade B production had declined to just 3 billion pounds, 28 percent of production for Minnesota and 5 billion pounds, 20 percent of production for Wisconsin.

The number of plants that currently purchase Grade B milk in these two states is only one-fourth the number when the M-W price was implemented. In the early 1960s, about 1,325 plants purchased Grade B milk in Minnesota and Wisconsin. By 1989, that number had declined to about 315 plants.

It is our opinion that there is insufficient competition for Grade B milk to reflect the value of Grade A milk used for manufactured dairy products. Relative to the early 1960s, a much greater share of manufactured dairy products are now made from Grade A milk than from Grade B milk (see figure 1). Competition for Grade A milk used for manufactured dairy products is considerably more vigorous than for Grade B milk.

Other factors that could result in the current M-W price not accurately reflecting the price of milk used in manufacturing were noted by the GAO. One of these is hauling subsidies. The M-W is intended to represent the price paid before deductions for hauling. Plants in Wisconsin and, to a lesser extent, Minnesota, pay some or all of the cost of hauling milk from the farm to the plant. This subsidy is not included in the M-W price reported by USDA. As a result, the M-W price is less than the f.o.b. plant cost of milk to Grade B plants. Our estimate of the amount by which the M-W is understated because hauling subsides are not included is about 25 cents per hundredweight.

Figure 1.
Minnesota and Wisconsin Grade B Milk vs.
Federal Order Class II/III Volume



A second factor influencing the accuracy of the M-W price relative to actual Grade B milk cost pertains to the prevalence of multiple component pricing. Minnesota and Wisconsin Grade B plants are rapidly changing their method of pricing both Grade B and Grade A milk to include milk components other than butterfat. In Wisconsin, most plants pay premiums for protein higher than a specified base level. In Minnesota, the priced nonfat milk component is solids-not-fat (SNF). These premiums are included in the pay prices reported by M-W survey plants.

The M-W price is reported both "at test" (price paid for milk at the average butterfat test for the month) and adjusted to 3.5 percent butterfat. The adjusted M-W price is used in federal order pricing. The effect of protein and SNF premiums is to distort the adjusted M-W price when actual butterfat tests are well above 3.5 percent. Milk with a butterfat percentage greater than 3.5 percent has protein and solids-not-fat content greater than 3.5 percent milk. But in adjusting to 3.5 percent butterfat, only the value of butterfat in excess of 3.5 percent is subtracted; the M-W is not adjusted for any extra protein or solids-not-fat value.

In the fall of 1989, butterfat tests for Grade B milk in Wisconsin were in the 3.8 to 3.9 percent range. With this high of test and the level of protein premiums being paid in the state, we estimate that about 15-25 cents per hundredweight of protein premiums were included in the adjusted M-W price. In other words, the 3.5 percent butterfat M-W price was overstated by 15 to 25 cents.

A third factor affecting the accuracy of the current M-W is the type of plants that are included in the survey. In order to accurately reflect the value of milk used in manufacturing, the sample of plants used to calculate the M-W price should be representative of all Minnesota and Wisconsin Grade B purchasing plants. As reporting Grade B plants have ceased operation, some have not been replaced in the sample at all, and others have been replaced by plants making different products. Consequently, reporting plants surveyed may have become less representative of Grade B purchasing plants.

Desirable Characteristics Of A Price Series

To evaluate possible replacements for the M-W price series, the GAO established five desirable characteristics for a measure of the value of Grade A milk used for manufacturing:

(1) Generate a price that reflects national prices of manufactured dairy products. The price paid for milk used to manufacture dairy products should reflect, to the maximum extent possible, the national market prices of butter, nonfat dry milk and cheese. Since the prices of manufactured products are determined in a national market, there should be a single national price for milk used in manufacturing.

(2) Generate a price that reflects national supply-demand conditions for milk used for manufacturing. Grade A milk supplies used for fluid purposes have a higher value than those used for manufacturing. As the need for fluid milk changes, the amount of grade A milk available for manufacturing uses must shift to meet this change. It is important that national supply and demand conditions for milk, as a whole, be reflected in the price of milk used in manufacturing.

(3) Generate a price that is not significantly affected by local conditions. Pricing practices that are unique to a particular locality or region should not influence the pricing of milk at the national level.

(4) Provide a valid mechanism for setting milk prices over the long term. The mechanism chosen to set the values for milk used in manufacturing should have long-term duration because the industry needs a consistent and reliable pricing system for making future plans.

(5) Be automatic and self adjusting. The milk industry, like all of agriculture, is dynamic and volatile. Price adjustments are best accomplished by mechanisms that respond automatically when conditions change.

Alternatives To The M-W Price Series

Based on these criteria, the GAO suggested five alternatives to the M-W price series. An explanation and discussion of these alternatives follows.

Regulated Grade A Manufacturing Price:

This alternative would replace Grade B plants in the M-W sample with federal order-regulated Grade A plants that use milk primarily for manufacturing purposes. Candidates for including in the new sample could be any plant that used ten percent or less of its Grade A milk for Class I (beverage) purposes during any month of the year. These reporting plants would be among those currently regulated under the Upper Midwest and Chicago Regional federal milk marketing orders (Orders #68 and #30). Grade A plants in the sample would report producer pay prices for Grade A milk of average composition including all premiums and hauling subsidies. Prices would be adjusted to represent 3.5 percent milkfat and a uniform protein content, say 3.1 percent. Further adjustments would account for any added value of fluid milk sales over and above manufacturing value. The average price for all reporting plants would yield the Regulated Grade A Manufacturing Price to be used as a replacement for the current M-W price as the base price in all federal milk orders.

Existing federal order provisions require regulated Grade A plants to pay producers the minimum Class III price. Hence, the proposed regulated Grade A manufacturing price would be dependent upon itself. Overcoming this obstacle would require amending federal orders to exempt reporting Grade A plants from paying the minimum federal order blend price. However, they would continue to share in the order's pooling arrangement.

To understand how the Grade A manufacturing producer pay price by these selected regulated plants would be determined, a brief explanation of federal order pooling and pricing is in order. An average order producer blend price is determined from the Class I, II and III

utilization averaged over all regulated plants within the order and the minimum order class prices. This is commonly called "market-wide" pooling. All regulated plants are required to pay producers at least the minimum blend price. Plants that have a Class I utilization higher than the market average have an actual milk value higher than the minimum order blend price. Thus, they are required to pay into a "producer settlement fund", the difference between this higher value and the minimum blend price. In contrast, plants with Class I utilizations below the market average have a milk value less than the minimum order blend price. These plants draw out of the producer settlement fund the difference between this lower value and the minimum blend price.

A regulated Grade A plant that used all its producer milk volume for Class III products would draw from the producer settlement fund the full difference between the order blend price and the Class III price. Since the M-W price is to represent the value of milk used for manufacturing, the reported pay price of sample Grade A plants would be adjusted by subtracting the full difference between the estimated order blend price and Class III price, i.e., the maximum pool draw.

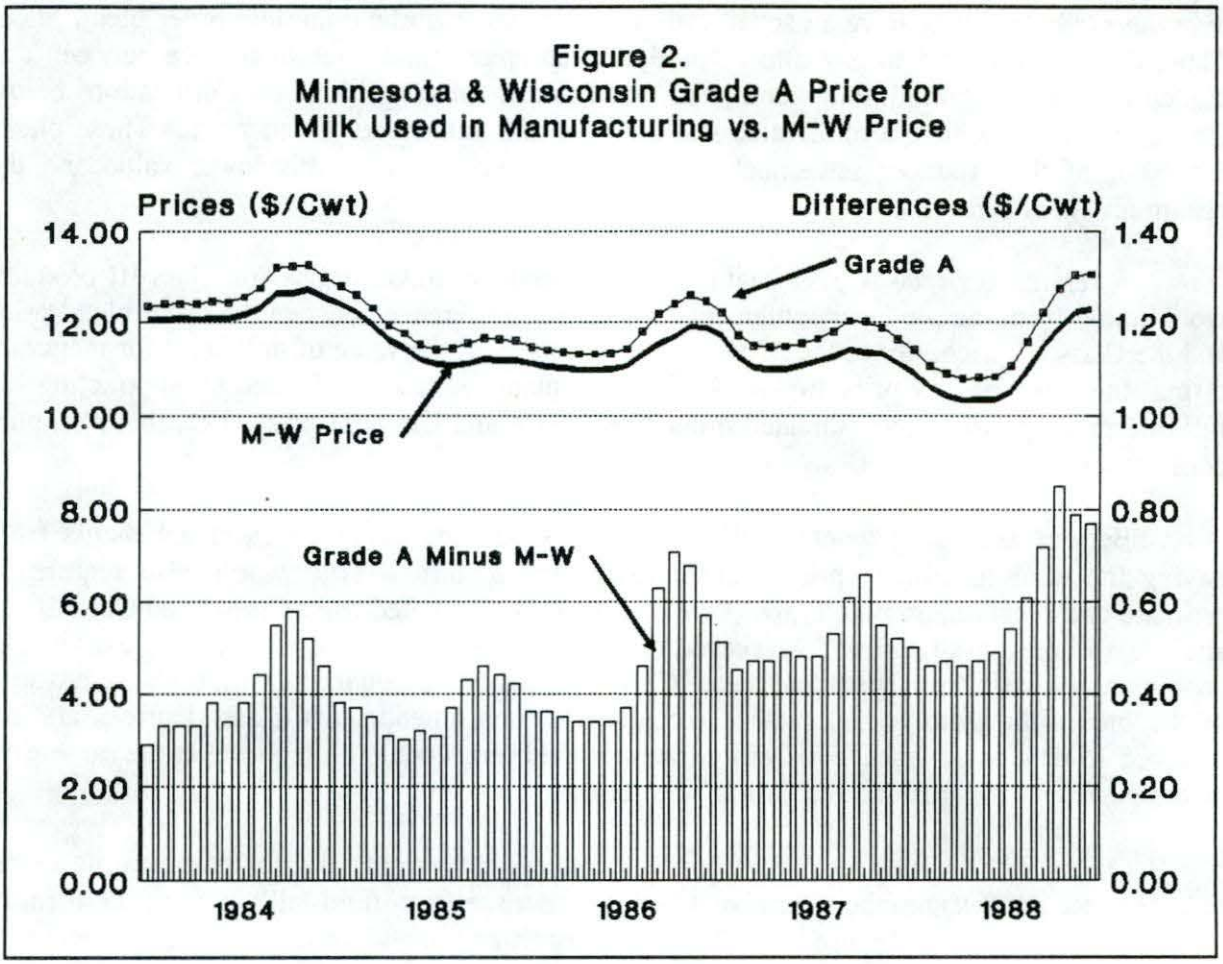
Besides amending federal milk marketing orders to exempt the selected plants from paying the minimum blend price, calculation of the modified series would also require an estimate of the maximum pool draw. Pool draws can be estimated from Class I and Class II use and Class I and Class II prices. Market administrators are able to accurately estimate class uses on a monthly basis from historical data. Class I prices are announced two months in advance of the month they apply, and (with a recently-proposed amendment) Class II prices are announced 15 days in advance. Therefore, the modified series could be reported at the same time as the current M-W (around the fifth of the following month).

On top of revenues received from the producer settlement fund for participating in the federal order pool, some plants receive additional revenue from fluid milk sales in the form of over-order premiums. In order to "sanitize" reporting plants' pay prices in the sense of adjusting for any revenues associated with fluid milk sales, over-order premiums net of costs associated with providing fluid milk would also be deducted.

Class I prices are the M-W from two months earlier plus a Class I differential that varies among orders. The Class I differential is relatively small in the Chicago and Upper Midwest orders, leading to the possibility of negative pool draws (i.e., blend prices less than Class III prices). That situation occurred in the fall of 1989, when the M-W price increased rapidly.

In recent years, Grade A prices have differed from Grade B prices in the upper midwest by substantially more than pool-related revenues received by Grade A plants. This was verified in a recent study by the Market Administrator's Office of the Upper Midwest Milk Marketing

Order.[2] Differences between Grade A prices (adjusted for pool draws) and the corresponding month M-W prices are shown in figure 2.



Since the regulated Grade A manufacturing price would likely be higher than the existing M-W price series, this would elevate the structure of federal order milk prices nationwide. To avoid this, Class I differentials should be reduced by an amount necessary to assure that the net price to producers would be no higher than it would be using the current M-W price series.

The calculation of a Grade A manufacturing price series would be somewhat complex. A specific example is shown in the appendix.

---

[2]See Victor J. Halverson, "Prices Paid for Grade A Milk by Selected Manufacturing Plants in Minnesota and Wisconsin," Staff Paper 89-01, October 1989.

Deregulated Grade A Manufacturing Price

This alternative would depool or deregulate those Grade A manufacturing plants in the Upper Midwest and Chicago Regional Orders whose milk is not needed to fulfill the Class I needs of the market. Because of economic incentives associated with pooling milk, (the pool draw) the quantity of Grade A milk pooled in these two orders far exceeds the amount of Grade A milk required to meet the Class I needs of the market.

Unlike the situation under the regulated Grade A manufacturing price alternative, these depooled plants would not be eligible to share in order receipts from Class I sales. In other words, they would not receive a pool draw. Thus, Grade A prices paid by these plants would not be directly affected by federal milk marketing orders.

These depooled Grade A plants would report producer pay prices for Grade A milk of average composition including all premiums and hauling subsidies. Prices would be adjusted to a uniform butterfat and protein content. The average price for all reporting plants would yield the Deregulated Grade A Manufacturing Price to be used directly as the minimum Class III price in all federal milk orders. Because of greater plant competition for Grade A milk in comparison to Grade B milk, the resulting price would likely be higher than the existing M-W price series. As with the regulated Grade A manufacturing milk price alternative, appropriate Class I differential adjustment may be called for.

The deregulated Grade A manufacturing price alternative is considerably "cleaner" than the regulated Grade A manufacturing price alternative. Reported prices could be used directly rather than having to be sanitized through the pool draw process. Moreover, depooling would raise the Class I utilizations and respective blend prices in the Upper Midwest and Chicago Regional orders, pleasing those producers who continued to be affiliated with regulated plants.

However, producers shipping to depooled plants would oppose this alternative because they would not share in the higher value Class I sales. Since depooled plants would no longer garner pool draws, they would not be able to consistently pay their producers as much as regulated plants Thus, the regulated Grade A manufacturing price alternative would be preferred by producers who would be forced to ship to depooled plants under the Deregulated Grade A Manufacturing Price alternative.

A variation of this alternative would involve compensation to producers affiliated with depooled plants from a pool of funds generated by all producers shipping to regulated plants. The loss in revenue to these producers because of depooling would be estimated. This loss would be shared equally on a per hundredweight basis over all federal order milk and paid to producers shipping to depooled plants.

Product Formulas

Prior to universal adoption of the M-W price series, product formulas were used extensively to establish minimum class prices under federal orders. With a product formula, the value of milk used for manufacturing purposes is derived from product yields per hundred pounds of milk, market prices of relevant products and plant manufacturing costs and profit margins (make allowances). Thus, a product formula derives milk values rather than reports actual plant pay prices. Putting it another way, product formulas derive prices for milk used for manufacturing on the basis of what plants can afford to pay.

The previous two alternatives are competitive pay prices; that is, market prices that plants have to pay in order to get a milk supply. Product formula prices and competitive market prices are likely to differ, and at times by a substantial amount. For example, processing margins for cheese usually widen in the fall of the year, when increases in the M-W lag increases in cheese prices. In the spring, the opposite phenomenon occurs.

Monthly deviations between a product formula price based on cheddar cheese and the M-W price for the period 1987-89 are shown in figure 3. Note the seasonal pattern of differences. Seasonal variation in imputed processing margins appears to be increasing over time, and has been especially large in the last two years.[3]

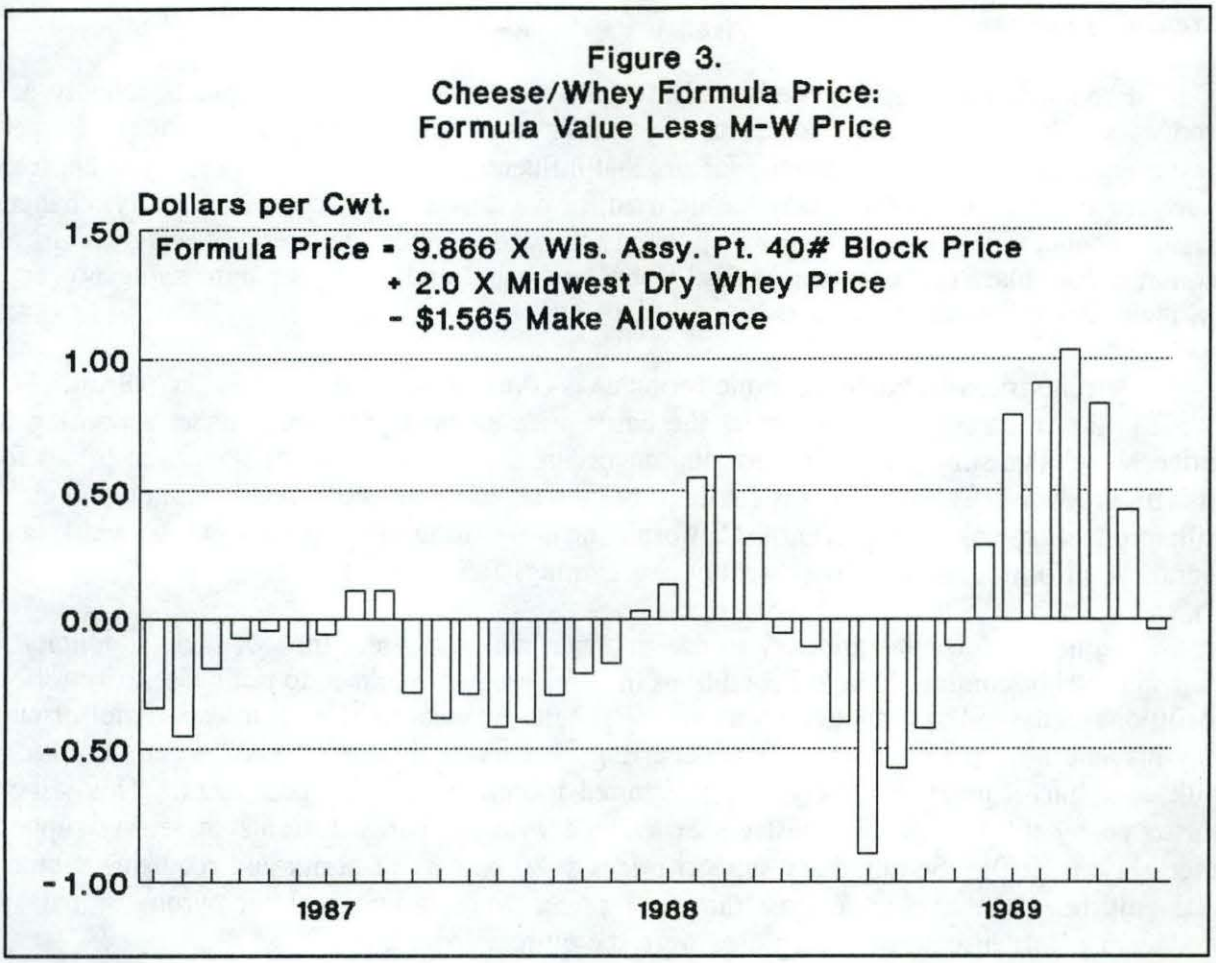
Product formulas would require the use of prices published in government reports or collected from plants or central markets, normal product yields (for example, pounds of cheese per 100 pounds of milk) and by-product yields and values. Finally, an appropriate make allowance is required.

Existing methods of reporting product prices are not adequate for calculating a reliable product formula. Central markets, such as the National Cheese Exchange and the Chicago Mercantile Exchange (for butter) are thin markets in the sense of representing only a tiny fraction of actual sales. Reported wholesale prices do not reflect premiums, discounts, lot size and moisture.

Extensive and frequent studies of plant costs would be required to establish an appropriate make allowance. Costs vary widely among plants. Periodically updating of the make allowance would be necessary to account for changing costs, technology and efficiencies. The selection of appropriate products to be included in the product formula and the appropriate weights is also a challenge. Would a cheese, butter and nonfat dry milk weighted formula be the best alternative, for example?

---

[3]The specific formula used in figure 3 weighted monthly Wisconsin Assembly Point prices for block cheddar and Central States dry whey prices by appropriate product yields per hundredweight of milk at 3.5 percent butterfat. A make allowance was arbitrarily set to yield an average monthly deviation between the formula price and the M-W price of zero.



To demonstrate calculation of product price formulas, a simplified cheese/whey product formula is illustrated below:

	Market price for cheese	$ 1.40	per Lb.
Times	pounds cheese per 100 lbs. milk	x 10.00	lbs.
Equals	Cheese value per 100 lbs. of milk	$14.00	per cwt.
Plus	value of whey per 100 lbs. of milk	$ .35	per cwt.
Equals	total value per 100 lbs. of milk	$14.35	per cwt.
Minus	Plant costs and profits per 100 lbs. of milk (make allowance)	$ 1.40	per cwt.
Equals	Grade A manufacturing milk value	$12.95	per cwt.

Economic formulas

Economic formulas also derive milk values rather than report what plants actually pay producers. But unlike product formulas they are not as closely tied to product prices. Rather, they attempt to incorporate economic factors that influence both demand and supply to approximate "reasonable" prices for Grade A milk used for manufacturing purposes. Usually, changes in such economic indicators as production costs and consumer incomes are weighted in an economic formula. For example, if feed prices are rising and consumer purchasing power is up, then milk prices should also rise.

Setting prices through economic formulas is common in the dairy industry. From 1949 to 1981, the price support level under the dairy price support program was set according to parity, which is a simple economic formula involving the ratio of farm input costs to prices for all farm products. California Class I milk prices are set using an economic formula that weighs milk production cost (43 percent), California manufacturing milk prices (42 percent), and average California manufacturing weekly real earnings (15 percent).

Economic formulas are easy to use in a mechanical sense. Indeed, their simplicity is their major shortcoming. Market conditions in dairy product markets do not necessarily reflect conditions in the milk production sector or the general economy. Use of an economic formula may insulate milk prices from what is occurring in markets for butter, cheese and nonfat dry milk, and runs a major risk of yielding distorted incentives to dairy producers. This is best illustrated by the U.S dairy industry's experience with the parity formula in setting support prices in the 1970s. Setting dairy support prices at 80 percent of parity and requiring semiannual adjustments at the same time that feed prices were falling sent the wrong signals to producers. Burdensome milk surpluses were the ultimate result.

Administratively Determined Price

An administratively determined price is one established through a process such as a committee, hearing, or panel rather than through a formula or via a reported market-determined plant pay price. The GAO specifically considered using the support price as an administratively-determined value for Grade A milk used for manufacturing. This price would not change automatically with market conditions.

Without frequent administrative changes, this alternative may reflect neither competitive market conditions nor product markets. If the support price remained at its current low level, actual plant pay prices would be well above order-specified minimum values.

Recommended Alternative

The GAO did not recommend a specific alternative to the M-W price series. However, their analysis of the five alternatives indicated that the regulated Grade A manufacturing price and product formulas best incorporate most of the characteristics necessary for a generating an appropriate value for Grade A milk used for manufacturing purposes.

Use of the support price as an indicator of Grade A manufacturing milk value was summarily rejected on grounds that it would bear no relationship to what it was intended to measure. Economic formulas were deemed inadequate because they often yield values that do not reflect milk supply and demand conditions. The Deregulated Grade A Manufactured Milk Price option met the specified criteria as well as the Regulated Grade A option, but was judged inferior because it would treat producers differently according to whether they could continue to ship milk to a regulated handler.

We agree with GAO's conclusion that the two most logical alternatives to the M-W price series are a competitive market price and a price derived from product formula. However, we believe that of these two options, the competitively-determined regulated Grade A manufacturing price can best reflect the value of Grade A milk used for manufacturing and should be adopted as a replacement for the current M-W Price Series.

Our major concern with using a product formula to derive a price for Grade A milk used for manufacturing purposes is grounded in the fact that formulas generate milk values that plants can theoretically afford to pay. In Wisconsin, competition for milk used for cheese is intense, often forcing plants to trim their margins in order to obtain supplies. This competition would not be reflected in a product formula. If a product formula were used to set minimum prices, Wisconsin plants would often pay more than the minimum price. In regions where manufacturing is a minor factor or an adjunct to the fluid milk, plants would pay no more than the minimum (formula) price. This would place Wisconsin manufacturing at a disadvantage in their raw product procurement costs.

We are also concerned that, without frequent modifications, a product price formula would not consistently reflect raw milk value. A product formula inherently assumes that all plants are the same with respect to product yields, sales prices for primary products and byproducts, and manufacturing costs. To us, it makes more sense to let the market tell what milk is worth rather than impute a residual value to milk through a product formula.

Finally, we believe that there is a real urgency in implementing an alternative to the M-W price. The National Agricultural Statistics Service (NASS) justifiably prides itself on its objective, reliable reporting. As fewer plants accept Grade B milk because of its shrinking volume, it is only a matter of time -- perhaps one or two years -- before NASS ceases publishing the current M-W price series.

To facilitate the replacement of the current M-W Series, the Agricultural Marketing Service of USDA should immediately identify pooled Grade A plants that can be included in a new sample. Adjusted pay prices (including adjustments for pool draws, hauling subsidies, and protein values deviating from those associated with 3.5 percent butterfat milk) for these potential new reporting plants should be routinely collected and compared with the current M-W over a 12-month period. The results of this comparison should be widely disseminated within the dairy industry to permit appropriate corrections in the modified series to be made.

TECHNICAL APPENDIX

Procedure for Calculating the Regulated Grade A Manufacturing Price

Define the following variables:

A = Average pay price for reporting Grade A plants adjusted for hauling subsidies and butterfat and protein deviations from uniform bases

D = Pool draw for 100% manufacturing use (difference between blend price and Class III price)

AMW = Grade A Manufacturing Milk Price = A - D

C1P = Class I Price

C1U = Class I Utilization

C2P = Class II Price

C2U = Class II Utilization

C3P = Class III Price = AMW

C3U = Class III Utilization

B = Blend Price = C1P*C1U + C2P*C2U + C3P*C3U

The pool draw, D, can be written as:

(1) $D = (C1P*C1U + C2P*C2U + C3P*C3U) - C3P$

$= C1P*C1U + C2P*C2U -(1-C3U)*C3P$

$= C1P*C1U + C2P*C2U -(1-C3U)*AMW$

All variables in equation (1) except AMW are known by the end of the current month or they can be accurately estimated by order market administrators. Note that D may be positive or negative.

Expressing AMW as (A - D) and substituting (1) for D yields:

$$(2) \quad AMW = A - (C1P*C1U + C2P*C2U - (1-C3U)*AMW)$$

$$= \frac{A - (C1P*C1U + C2P*C2U)}{C3U}$$

Solution of equation (2) allows announcement of the Grade A manufacturing price (AMW) at the time the estimate of the average adjusted pay price of reporting Grade A plants (A) is available. In reality, the pool draw (D) varies among plants according to distance from the market center. This complicates calculation of AMW, but the approach is the same.

The table below illustrates values of AMW for a range of values for reported Grade A pay prices given the following utilization values and Class I and II prices (conforming to recent Chicago Regional order values):

C1P	=	$15.00	C1U	=	20 Percent
C2P	=	$13.80	C2U	=	8 Percent
			C3U	=	72 Percent

A	*AMW*	*Pool Draw*
	---Dollars per Cwt.---	
16.00	16.52	-0.52
15.50	15.83	-0.33
15.00	15.13	-0.13
14.50	14.44	0.06
14.00	13.74	0.26
13.50	13.05	0.45
13.00	12.36	0.64
12.50	11.66	0.84
12.00	10.97	1.03
11.50	10.27	1.23
11.00	9.58	1.42