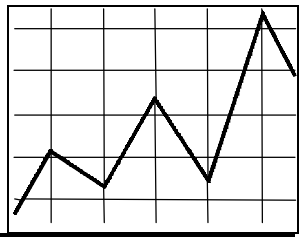
MARKETING AND POLICY BRIEFING PAPER



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Paper No. 58
September 1997

The Basic Formula Price: Has the Use of NASS Cheese Prices Changed Its Value?

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Introduction

The Minnesota-Wisconsin (M-W) price series was implemented in 1961 as a base price for Class III milk under the Federal Order system and as a mover of other classes of milk. The M-W price is an estimated weighted average price paid for Grade B milk by Minnesota and Wisconsin manufacturers of butter, powder and cheese.[2] The validity of the use of the M-W as a representative value for milk sold for manufacturing purposes came into question in the early 1990's as there has been a significant decline in the amount of Grade B milk sold in these two states. About 90 percent of Minnesota milk is now Grade A compared to 95 percent of Wisconsin milk. In response to these concerns, the U.S. Department of Agriculture held a public hearing in June 1992 to consider proposals to replace the M-W price series. After evaluating a number of proposal, the USDA issued a recommended decision on August 5,1994 to replace the M-W with the Basic Formula Price (BFP).[3] This final recommendation received favorable producer approval.

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2 For a more thorough discussion of how the M-W is calculated, refer to Cropp and Jesse, *The Minnesota-Wisconsin Price Series: Its Validity and Alternatives*, **Marketing and Policy Briefing Paper**, No. 18, Sept. 1987 and Cropp and Jesse, *The General Accounting Office (GAO) Report on the M-W Price Series: What Does it Mean*, **Marketing and Policy Briefing Paper**, No. 30, Jan. 1990

3 For more detail concerning this issue, refer to Cropp and Jesse, *USDA's Recommended Decision on Replacing the M-W Price*, **Marketing and Policy Briefing Paper**, No. 48, Sept. 1994.

The BFP was implemented in June, 1995. Since the price of cheese was a primary determinant of the M-W and now the BFP, the sharp decline in cheese prices on the National Cheese Exchange (NCE) in October 1996 lead to severe criticism of the NCE and its influence on the BFP. On April 29, 1997 the NCE ceased operation and pricing activities transferred to the Chicago Mercantile Exchange (CME). With the demise of the NCE, the USDA decided to use National Agricultural Statistical Service (NASS) cheese plant survey data in future BFP calculations rather than CME cheese prices. It has been charged that the use of the NASS data instead of the CME prices has resulted in lower BFP values. The purpose of this paper is to address this question.

What is the purpose of the M-W and the BFP?

The role of the BFP within the Federal Order system is essentially the same as the role played by the previous M-W price. The BFP is intended to be representative of the value of Grade A milk used in manufacturing under Federal milk orders. It includes all premiums paid to producers but excludes plant hauling subsidies. The BFP is the minimum price for milk used in Class III, that is cheese.

How is the BFP calculated?

The M-W has historically been estimated using a two step procedure. In the first step, a **base month M-W** price is obtained from a survey of approximately 170 plants in Minnesota and Wisconsin as to what they **actually** paid the previous month for Grade B milk. For example, the base month price for the August BFP was July. The base month M-W price is the average price for all milk of manufacturing grade delivered f.o.b. plant or receiving station before hauling costs and producer assessments. It includes quantity, quality component and other premiums paid to producers, but excludes hauling subsidies. The base month price relates only to manufacturing grade milk purchased from farmers and does not include Grade A milk diverted to manufacturing uses.[4]

NASS is required to report the M-W, and now the BFP, by the fifth of the following month to which it applies. For example, the August 1997 BFP was announced on September 5.The reporting of the M-W/BFP on or before the 5th of the following month is necessary so that milk handlers regulated under the federal orders know and can pay their producers for milk on schedule. Therefore, time does not allow NASS to survey and obtain from Minnesota and Wisconsin manufacturing plants actual producer pay prices for Grade B milk for the entire month to which the BFP applies. Therefore, NASS used a second step to calculate the M-W for the current month. In the second step, NASS surveyed a smaller set of plants and obtained actual producer pay price data for the first half of the month and estimated pay prices for the second half of the month to which the M-W applies. This information was then used to calculate the **change from the base month's Grade B price.**

Effective June 1, 1995, the BFP replaced the M-W price. The only change in the calculation of the BFP price series from that of the M-W price series occurs in step two. The step one survey of Minnesota and Wisconsin butter, powder and cheese plants to obtain information as to what these plants paid producers for Grade B milk for the previous month, the base month M-W, still applies. But the second step, the change from the base month price, now involves calculating the change in milk value by using cheese, and butter and milk powder product price formulas.

At the time of the adoption of the BFP as a replacement for the M-W price, the price of 40# blocks of

[4] **Dairy Market News**, June 19-23, Vol.62(25), 1995.

cheddar obtained each Friday from the National Cheese Exchange (NCE) were used in the cheese product price formula to calculate the value of milk used to make cheese. On April 29, 1997, the NCE was dissolved and replaced with a cash cheese market at the Chicago Mercantile Exchange (CME). The first trading day at the CME was May 2, 1997. Under provisions of the Federal Milk Orders, when a pricing factor used to compute a class price, such as the BFP, is no longer available, the Secretary of Agriculture has the authority to determine a substitute pricing factor. To this end, NASS began collecting weekly cheddar cheese transaction prices from a national sample of cheddar cheese manufacturing plants.[5] This survey collects price information on sales of natural, unaged, Cheddar cheese at the first (wholesale) point of sale. Data are recorded for sales transactions completed during the survey week. A transaction is considered complete when cheese is shipped out or title transfers. The plants surveyed typically account for 80-85 percent of bulk natural cheddar production in the U.S. Plants in this survey provide price and quantity sold data for 40# blocks, 640# blocks and for 500# barrels.

With the termination of the NCE, the Secretary of Agriculture determined that the 40# block prices obtained from the NASS cheese plant survey is equivalent to the previous NCE price for purposes of Federal Order pricing. As a result, the NASS price series was used for the first time in the calculation of the May BFP. This price series covers all transactions during a week, concluding on Friday, and published on Friday of the following week. A weighted monthly average cheese price series is calculated using weekly average price and sales volume data for those weeks that have been *published by the scheduled release* of the BFP and *published since* the previous BFP release. Table 1 shows an example of a weekly report from the NASS cheese plant survey. Using the data in Table 1, Table 2 shows how monthly average cheese prices are calculated from the NASS cheese price survey.

[5] For more information refer to **Dairy Market News**, June 9-13 1997, Vol. 64(24).

Table 1. Example of NASS Weekly Cheese Plant Survey Report

Cheddar Cheese Prices by Style and Region

Style and Region	Week Ending Jul 25, 1997	Jul 18, 1997 1/	Jul 11, 1997	Jul 4, 1997
40 Lb. Blocks:				
Avg. Price 2/			Dol./Lb.	
MN/WI	1.2636	1.2078	1.1906	1.1868
West 3/	1.1950	1.1617	1.1479	1.1445
US 4/	1.2150	1.1787	1.1603	1.1549
Sales Volume 5/			Pounds	
MN/WI	1,095,379	1,697,923	1,090,694	1,066,271
West 3/	3,269,397	3,923,510	3,400,241	3,606,842
US 4/	4,498,249	5,857,381	4,697,274	4,869,764
640 Lb. Blocks:				
Avg. Price 2/			Dol./Lb.	
US	1.2390	1.1863	1.1701	1.1644
Sales Volume 5/			Pounds	
US	1,055,345	863,666	1,098,164	1,121,786
500 Lb. Barrels:				
Avg. Price 2/			Dol./Lb.	
MN/WI	1.2177	1.2158	1.2131	1.2017
Oth	1.1952	1.1920	1.1900	1.1886
US	1.2046	1.2006	1.1996	1.1941
Adj. Price to 39 % Moisture				
MN/WI	1.1384	1.1370	1.1295	1.1263
Oth	1.1088	1.1058	1.1036	1.0980
US	1.1211	1.1170	1.1144	1.1098
Sales Volume 5/			Pounds	
MN/WI	3,707,010	3,465,431	3,318,522	3,417,633
Oth	5,161,707	6,121,424	4,637,298	4,717,162
US	8,868,717	9,586,855	7,955,820	8,134,795
Moisture Content			Percent	
MN/WI	34.75	34.77	34.48	34.92
Oth	34.25	34.25	34.22	33.96
US	34.46	34.44	34.33	34.36

1/ Revised.
2/ Prices weighted by volumes reported.
3/ CA, ID, OR, and WA.
4/ "Other Regions" included in U.S. total.
5/ Sales as reported by cooperating manufacturers.

Table 2. Example of Calculation of July 1997 Monthly Average NASS Cheese Price

Week Ending	NASS Weekly Price ($/lb)	Sales Volume (lbs)	Sales Value ($)
July 4	1.1549	4,869,764	5,624,090
July 11	1.1603	4,697,274	5,450,247
July 18	1.1787	5,857,381	6,904,095
July 25	1.2150	4,498,249	5,465,373
Total		19,922,668	23,443,805
Monthly Average Price		23,443,803/19,922668 = $1.1767	

The above table shows that the July, 1997 average monthly NASS cheese price was $1.1767. A similar calculation was conducted for August, 1997 with the resulting average price of $1.3024. The following table (Table 3) provides an example, using the month of August, of how the BFP is calculated. Except for cheese price, the commodity prices used in the update product price formula are monthly averages published each month in the *Dairy Market News*. The product yield factors for cheese, butter, nonfat dry milk (NFDM), and dry buttermilk are constants established by regulation.

The product prices used are for updating the base month price include: Grade AA butter and Grade A butter, both CME cash prices; 40# block NASS cheese plant survey average price; nonfat dry milk (NFDM) (low/medium heat, Western states); and dry buttermilk (Western states).[6] The yield factors per 100 pounds of raw milk are those used under the dairy support program adjusted to 3.5 milk. The pounds of products per 100 pounds of milk are: cheese 9.87 pounds, fat in whey .238 pounds, butter 4.27 pounds, nonfat dry milk 8.07 pounds and buttermilk .42 pounds. The formula for the BFP calculations assume that the gross value of milk used to manufacture cheese equals (9.87 * NASS cheese price) + (0.238 * Grade A butter price). The gross value of milk used to manufacture butter/NFDM equals (4.27 * AA Butter price) + (8.07 * nonfat dry milk price) + (0.42 * dry buttermilk price). As shown in Table 3, the *changes* in the gross values of milk for Cheddar cheese production, and for butter/nonfat dry milk production from the *previous* to the *current* month. These changes in value of milk, used for cheese and for butter/powder are weighted by the proportion of milk equivalent used in the production of American cheese, and butter and nonfat dry milk in the states of Minnesota and Wisconsin. Since much of the butter is made from excess cream the nonfat dry milk production is used for the milk equivalent for the butter/powder production. The BFP is then set equal to the base month M-W price at 3.5% fat plus the calculated weighted change in gross milk value. For August, 1997 this was the $10.88 July base month price + $1.19 calculated weighted change in milk value = $12.07 August BFP.

[6] The following discussion is taken largely from **Dairy Market News**, June 5-9, Vol. 62(23), 1995.

Table 3. Example of the Calculation of the BFP Using NASS Cheese Price

	July 1997	*August 1997*
AA CME Butter Price	$1.0995	$1.0932
A CME Butter Price	$1.0184	$1.0132
NASS Cheese Price (40 lb. block)	$1.1767	$1.3024
NFDM , Western States, Low/Medium Heat	$1.0520	$1.0493
Dry Buttermilk, Western States	$1.0414	$1.0414
July Values		
Cheese	(***9.87*** x $1.1767) + (***0.238*** x $1.0184) = $11.8564	
Butter/NFDM	(***4.27*** x $1.0995) + (***8.07*** x $1.0520) + (***0.42*** x $1.0414) = $13.6219	
August Values		
Cheese	(***9.87*** x $1.3024) + (***0.238*** x $1.0132) = $13.0958	
Butter/NFDM	(***4.27*** x $1.0932) + (***8.07*** x $1.0493) + (***0.42*** x $1.0414) = $13.5732	
Change in Values	*Cheese* $13.0958 - $11.8564=$1.2394	*NFDM* $13.572 -$13.6219 = $-0.0499
Production	*Milk Equivalents (CWT)*	*July Product Shares*
Cheese: 129,555,000/***9.87***	13,126,140	96%
NFDM: 4,380,000/***8.07***	542,751	4%
Total	13,668,891	100%
Update Values		
Cheese	(96.0/100) x $1.2394 = $1.1898	
Butter/NFDM	(4.0/100) x $-.0499 = $-0.0020	
Total Change in Value	$1.1898-$0.0020=$1.1878 rounded to $1.19	
July Base Month Price	$10.88	
BFP-August	$10.88+$1.19 = $12.07	

Note: The numbers in bold are constants determined by regulation.

Given the method by which the NASS cheese price survey is conducted there is the possibility that a week's average NASS price will not be included in the current month to which the BFP applies, but rather in the following month. This is due to the fact that as noted earlier, the weighted monthly average cheese price series is calculated using weekly average price and sales volume data for those weeks that have been ***published by the scheduled release*** **of the BFP and** ***published since*** **the previous BFP release**. To illustrate this point, Table 4 provides a schedule of BFP release dates and the weeks of average NASS survey prices used in the associated BFP calculations. In addition, we provide the number of CME trading days in each month. Examining the May BFP, there are four weeks of NASS survey data used to update the April base month price compared to 5 CME cheese trading days in that month. Given that the NASS survey of cheese prices for the week of May 30th was not published until June 6 and the BFP was released on June 5, the May 30th price data was used in the June BFP calculation. During periods of dramatic upswings or downturns in cheese prices, this can result in substantial differences in BFP values when based on the NASS survey versus the CME cash market.

Table 4. Schedule Release Dates For the BFP, the NASS Cheese Prices Used and Number of CME Trading Days, May-Dec. 1997

BFP Month	Release Date	NASS Cheese Prices Averages for Weeks Ending and Used in the BFP	Number of CME Trading Days for the Month
May	June 5	May 2, 9, 16, 23	5
June	July 5	May 30, June 6, 13, 20, 27	4
July	August 5	July 4, 11, 18, 25	5
August	September 5	August 1, 8, 15, 22, 29	4
September	October 5	September 5, 12, 19, 26	4
October	November 5	October 3, 10, 17, 24	5
November	December 5	October 31, November 7, 14, 21, 28	4*
December	January 5	December 5, 12, 19, 26	4*

*The last trading day in the month falls on a holiday so CME trading will occur on Wed. of these weeks.

Figure 1 provides a comparison of weekly average U.S. NASS survey-based cheese prices and CME average prices obtained on the Thursday of each week. The weekly average U.S. NASS cheese prices are less than the CME average cheese prices. A major reasons why the NASS prices are lower than the CME prices may be the relative importance of lower Western cheese prices included in the calculation of average U.S. NASS cheese prices.

But in spite of these price differences, it is **not the cheese price levels** themselves that influences the monthly BFP values. Rather, it is the **change** in the cheese prices over consecutive months that impacts the **change from the base month** in the BFP calculation (Table 3). The CME and NASS cheese prices would provide the same change in the calculated milk value for the month, which is added/subtracted, to the base month price in the BFP calculation, if the monthly average NASS and CME cheese prices changed the same absolute amount, example 5 cents per pound. The 5 cents x 9.87 = $.4935 per hundredweight change in milk value used for cheese and this would be the same even though the average monthly NASS and CME are at different price levels. But, in reality, because of possible price lags with the NASS cheese price data

versus the CME cheese prices, monthly changes in the average NASS cheese data do differ from monthly average CME cheese prices. And therefore, the calculated BFP does differ by using NASS prices rather than CME prices. But it cannot be concluded that the BFP will always be lower with NASS prices rather then CME prices. This may depend on whether cheese prices are going up or down.

Monthly average cheese price values are presented in Table 5. Both the weekly and monthly averages show that since May, we have been in a period of steadily increasing cheese prices. The implication of this is that with the differences in weeks used to calculate the NASS based versus CME based averages, some increases in BFP prices may be incorporated or delayed until the next month. In contrast, if we were in a period of declining prices then the decrease in the BFP may be delayed or incorporated into the next month. Given the use of the NASS series was first initiated for the May 1997 BFP, we are yet to witness the impact on the BFP by using NASS prices rather than CME prices when cheese prices are declining. But its is logical to assume that because of the lag in NASS prices, the BFP may actually be higher than if CME prices had been used.

Table 5. Monthly Average U.S. NASS and CME Cheese Prices: May-August 1997

Month	NASS	CME	Difference
May	$1.1664	$1.1588	$0.0076
June	$1.1583	$1.1666	-$0.0083
July	$1.1767	$1.2244	-$0.0477
August	$1.3024	$1.3705	-$0.0681

Table 6 provides a comparison of how the announced BFP would differ if the CME monthly average rather than the NASS averages had been used. The NASS based cheese component changes were consistently lower than the CME based estimates, since cheese prices were increasing rather than decreasing. The NASS monthly average prices lagged CME monthly average prices. In July, for example, CME prices increased on July 30th, but cash transaction cheese prices collected by the NASS survey for the week of July 28-August 1 was not included in the July monthly average U.S. NASS price. But NASS prices also did increase that week, but was not captured in the July BFP (Nass U.S.average week ending July 25 =$1.2158/Lb. And the week ending August 1 $1.2320/Lb). But as long as cheese prices hold or increase further, which they did, the higher NASS transaction cheese prices for the week of July 18 was captured in the August BFP.

Does the use of NASS survey transaction cheese prices rather than using CME cheese prices impact the level of the BFP?

The answer is clearly yes. NASS cheese prices during May through August were lower than CME cheese prices. Cheese prices are used in a product price formula to adjust upwards or downwards the base month price due to a change in milk value because cheese prices have changed from the previous month to the current month. It is this change in cheese prices rather than the level of cheese prices that impact this change in milk value. But, the experience thus far with the BFP has been during a period of rising cheese prices. There is some lag in the NASS reported monthly average transaction cheese prices as compared to the monthly average CME cheese prices. As a result, the BFP prices for June, July and August were lower than if the CME prices had been used. But a caution to drawing any conclusions. Due to a lag in NASS prices it seems only logical that when cheese prices fall, this lag may work in reverse and the BFP calculated with NASS prices may actually be higher than if CME prices were used. Then perhaps, over

the course of the year, the BFP will average about the same with NASS or CME prices. Time will tell. If in the future the BFP is replaced with some product price formula using cheese prices, than lower U.S. average NASS prices would definitely result in a lower base price than would using CME prices, assuming the Western cheese prices will continue to decrease average U.S. NASS cheese prices.

Table 6. Comparison of Change in Cheese Value Component of BFP Formula Using the NASS Cheese Price Survey Results and CME Monthly Prices

Comparison of Change in June BFP due to Cheese Value Changes: NASS versus CME	
May Cheese Value Using NASS Average: 9.87*$1.1664=$11.5124	Change in June BFP Due to Change in Cheese Value Based on NASS Average: ($11.4324-$11.5124)*.96 = -$0.0768
June Cheese Value Using NASS Average: 9.87*$1.1583=$11.4324	
May Cheese Value Using CME Average: 9.87*$1.1558=$11.4374	Change in June BFP Due to Change in Cheese Value Based on CME Average: ($11.5143-$11.4374)*.96 = $0.0738
June Cheese Value Using CME Average: 9.87*$1.1666=$11.5143	
Difference in June BFP Between NASS Based Versus CME Based: $0.1506 **lower**	
Comparison of Change in July BFP due to Cheese Value Changes: NASS versus CME	
June Cheese Value Using NASS Average: 9.87*$1.1583=$11.4324	Change in July BFP Due to Change in Cheese Value Based on NASS Average: ($11.6140-$11.4324)*.97 = $0.1762
July Cheese Value Using NASS Average: 9.87*$1.1767=$11.6140	
June Cheese Value Using CME Average: 9.87*$1.1666=$11.5143	Change in July BFP Due to Change in Cheese Value Based on CME Average: ($12.0848-$11.5143)*.97 = $0.5534
July Cheese Value Using CME Average: 9.87*$1.2244=$12.0848	
Difference in July BFP Between NASS Based Versus CME Based: $0.3772 **lower**	
Comparison of Change in August BFP due to Cheese Value Changes: NASS versus CME	
July Cheese Value Using NASS Average: 9.87*$1.1767=$11.6140	Change in August BFP Due to Change in Cheese Value Based on NASS Average: ($12.8547-$11.6140)*.96 = $1.1911
August Cheese Value Using NASS Average: 9.87*$1.3024=$12.8547	
July Cheese Value Using CME Average: 9.87*$1.2244=$12.0848	Change in August BFP Due to Change in Cheese Value Based on CME Average: ($13.5268-$12.0848)*.96 = $1.3843
August Cheese Value Using CME Average: 9.87*$1.3705=$13.5268	
Difference August BFP Between NASS Based Versus CME Based: $0.1932 **lower**	