PART THREE

ECONOMICS OF PRICING

CHAPTER 7

INTRODUCTION TO US MILK PRICING

In this chapter, we delve into the economics of US milk pricing using the concepts of end-product and multiple component pricing as adopted in federal milk marketing orders. The complexity of milk pricing in the US grew significantly in recent years due to the advent of federal order reform and modern milk testing methods. This allowed processors to pay dairy farmers not just for the volume of milk they delivered, but also on the quality and volume of components in the milk. Milk processors today are able to pay more for high component and high-quality milk since there is a direct relationship between these factors and product yields.

BACKGROUND

The cornerstone for milk pricing in the US from 1961-1995 was the old Minnesota-Wisconsin price series, called the "M-W." This monthly price was based on competitive market conditions in the unregulated markets for Grade B milk in Minnesota and Wisconsin, where about half the nation's Grade B milk supply existed.[1] The M-W represented a competitive pay price for surplus milk in the US and was used as a mover in federal orders to price Class III milk used to produce cheese, as well as Class I and Class II prices. At the time, the Upper Midwest was effectively the reserve milk supply for the US and reflected a single basing point for US milk pricing. The M-W survey reported milk both "at test," which reflected the price at the average level of butterfat in the milk, and adjusted to 3.5% butterfat. Thus, an individual farmer's milk price in the US was based on the announced M-W price at 3.5% butterfat, with adjustments for actual butterfat levels in the milk.

At the time the M-W was adopted in 1961, Grade B milk represented 68% of the milk in Minnesota and Wisconsin and was purchased from about 1,200 milk processing plants. However, by 1993, it only represented 11% of the milk in these two states and was purchased from just 260 milk plants.[2] The rapid decline in the supply of unregulated Grade

[1] See Bailey, *Marketing and Pricing of Milk*, pg. 120-21.

[2] Cropp and Jesse, "USDA's Recommended Decision," 1994.

B milk created a problem for the USDA since the M-W became statistically unreliable as a mover for regulated milk pricing in the US. Also, the series was based on just volume (one hundred pounds of milk) and the butterfat test. It did not reflect any pricing adjustments for protein which was important for the cheese industry. Thus, the M-W was eventually replaced with a new price series when federal milk marketing orders underwent major reforms in the late 1990s (called "Federal Order Reform"). In addition, it was recognized that the Upper Midwest was no longer the single reserve supply for milk in the US. Milk production was growing rapidly in Idaho and in the Southwest. Thus, a new system was needed to reflect national pricing with multiple basing points.

FEDERAL ORDER REFORM

Milk pricing in the US was clearly in need for major reforms in the 1990's. Milk prices became much more volatile. The global markets were expanding. Milk processors were asking for pricing methods based on the actual components in milk, and the old bellwether of milk pricing, the M-W, was no longer statistically relevant. On June 1, 1995, the M-W was replaced with the "Basic Formula Price," or BFP. The BFP used survey information updated by a product price formula. It took the base month price from the M-W survey (prior month) and updated it with a product price formula (change in the current month over the prior month). The USDA recognized that the BFP was only a short run solution given the decline in the supply of Grade B milk.

The Federal Agriculture Improvement and Reform Act of 1996 (the 1996 Farm Bill) required the Secretary of Agriculture to reform federal milk marketing orders. The Secretary carried out this task by relying on industry, academia, and government experts to participate in a hearing process. The result was a final rule issued on March 31, 1999 that was eventually adopted by dairy farmers in a national referendum and effective October 1, 1999.[3] The final rule, as amended, consolidated the number of federal orders, replaced the BFP with a multiple component pricing system, created a new Class IV price, and adopted an updated county-based fluid milk pricing map.[4] The new system reflected one price for

[3] Cox and Cropp, "Federal Order Reform: The Final Rule," April 1999.

[4] Bailey and Tozer, "An Evaluation of Federal Order Reform," *Journal of Dairy Science*.

Class III and IV milk across the entire US. However, the new fluid milk pricing map reflected the basing points in the Upper Midwest as well as Idaho and the Southwest as sources of excess milk. Thus, a truly national pricing plan was developed and adopted with industry participation.

End-Product Pricing

Federal Order Reform required a permanent replacement for the BFP. The concept that was ultimately adopted created a multiple component pricing system that derived farm level component values from surveyed wholesale prices for manufactured dairy products. In effect, the new system reverse engineered the value of milk components. Dairy farmers would now be paid the market value for their milk components, not an administrated price based on the farm cost of production. The new federal system mirrored the California state order that derived farm level component prices from Chicago Mercantile Exchange (CME) prices for block cheese and butter, as well as a state survey price for nonfat dry milk called the California weighted average price, or "CWAP". The benefit of deriving component prices from wholesale reported prices is that the latter is readily available and widely accepted. Both pricing systems used the concept of "end-product pricing" to derive the farm level price of milk components from market prices for finished dairy commodities. The more formal definition for end-product pricing is as follows:

$$\textit{Component Price} = (\textit{WholesalePrice} - \textit{MakeAllowance}) \times \textit{Yield Factor} \quad (7.1)$$

where the "make allowance" is the average US manufacturing cost to convert milk components into one pound of a finished dairy commodity, and the "yield factor" reflects the milk components needed to produce a finished dairy commodity. The make allowance includes all variable and fixed manufacturing costs, including depreciation and a predefined return on investment (or profit). The yield factor reflects not only the components that end up in the finished goods, but an allowance for waste or shrink in order to reflect the true volume of milk components needed from farm to plant.

Multiple Component Pricing

A cornerstone of Federal Order Reform was the concept of paying

dairy farmers based on the market value and quality of the milk components they delivered. Conceptually that meant paying farmers in the same milk shed different prices for their milk based on component content and milk quality. Prior to multiple component pricing, federal orders paid farmers the same price for similar quality milk regardless of how the milk was used (Class I, II, or Class III). Dairy farmers either produced Grade A or lower quality Grade B milk. Pooling guaranteed all producers would share in the same pool value. However, after 50 years of pricing milk this way, the USDA modernized the pricing system by paying dairy farmers the pool value of the milk, adjusting the base price (the Class III value) by paying on the basis of milk components: butterfat, protein, and "other solids." Dairy farmers with higher component tests would now get paid a higher milk price per 100 pounds.

Dairy farmers that participate in federal orders all face the same prices for milk components. The old "M-W" with a butterfat adjustment was replaced with component prices for butterfat, protein, and "other solids." So, in that way, the concept of a shared market price remains. Whether you produce milk in the Pacific Northwest, or in the Northeast, all producers face the same prices each month for the basic milk components.[5] These component prices are then used to compute federal order prices and the pool value (uniform pay price). Dairy farmers today have an economic incentive to produce higher test milk, or milk with higher levels of components. In fact, US dairy farmers responded by changing the genetics of their herds and feed rations. Dairy producers in federal orders with multiple component pricing now produce milk with higher levels of components than in 2005 (see figures 7.1 and 7.2). Our hypothesis is that changing economic incentives under Federal Order Reform drove these changes.

CME vs. Mandatory Survey

The starting point for end-product pricing formulas in the US for milk components are the wholesale prices of cheese, butter, nonfat dry milk, and dry whey. Federal milk marketing orders require a weekly government survey of these basic dairy commodity prices. Congress passed the Mandatory Price Reporting Act of 2010 on September 27,

[5] Not all federal orders pay on the basis of multiple components. Orders that have a high fluid and low Class III utilization (e.g. Florida and Southeast orders) pay dairy farmers on the basis of fat and skim milk.