FUTURES CONTRACTS FOR MILK: HOW WILL THEY WORK?

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Summary

The two new milk futures contracts offer dairy farmers and other buyers and sellers of milk and dairy products additional opportunities to manage price risk in an increasingly volatile milk price environment. The availability of these risk management tools is especially important given the market-oriented direction of federal dairy policy.

The CSCE and CME contracts differ somewhat in their specifications. Potential hedgers will need to evaluate which offers the best opportunity to lock in prices. Hedgers also should look at the cheese and nonfat dry milk contracts in determining the most appropriate risk management strategy. Strategies may involve using more than one futures market.

Key in any hedging decision is the basis, especially the predictability of the relationship between cash and futures prices. Hedgers should compare the alternative contracts in terms of which yields the most predictable basis given the type of hedge and the specific market conditions affecting their business.

(Key Words: Milk Futures, Hedging.)

Introduction

In June 1993, the Coffee, Sugar and Cocoa Exchange (CSCE) introduced futures and options contracts for cheddar cheese and nonfat dry milk. For more on the cheddar cheese contract, see *Futures and Options Trading in Cheese: Basic Principles for Hedgers,* Bulletin No. A3593, University of Wisconsin-Extension, Cooperative Extension, October 1993. (This bulletin also provides a detailed discussion of hedging and basis calculation.) These new contracts provided the opportunity for dairy industry participants -- dairy farmers, manufacturers, distributors, and others -- to manage price risk in an era of increasingly volatile dairy markets.

Expanded, risk management opportunities now exist via futures and options contracts for Grade A milk. On October 10, 1995, the Commodity Futures Trading Commission approved Grade A milk futures and options contracts for both the CSCE and the Chicago Mercantile Exchange (CME). The CSCE began trading these contracts on December 12, 1995. The CME announced a starting date of January 11, 1996.

This paper discusses these new milk futures contracts, focusing on their potential uses for hedging.

What Is the Purpose of Futures Contracts?

Futures contracts are marketing tools for managing price risk. Using futures to manage price risks is not new. Futures contracts for grains have been traded for about 130 years. Today, more than 100 different commodities are traded on U.S. futures markets.

The federal dairy price support program provided a relatively high floor (safety net) under manufacturing milk prices directly and under Grade A milk prices indirectly. That program requires USDA's Commodity Credit Corporation to purchase unlimited quantities of surplus butter, cheddar cheese, and nonfat dry

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milk at specified prices that enable manufacturers of these products to pay the support price. Thus, the program provided price protection for milk and dairy products. For many years, there was little price risk and, therefore, no interest in dairy futures as a risk management tool.

But all that has changed. The federal price support level for milk was cut from $13.10 per hundredweight in 1981 to $10.10 per hundredweight in 1990, where it remains today. (The support price was raised to $10.35 per hundredweight on January 1, 1996, under provisions of the 1990 Food, Agriculture, Conservation and Trade Act. New dairy legislation is being debated that will likely change the support price.) At this low level of price support, market forces -- not the federal support program -- determine cheddar cheese and nonfat dry milk prices most of the time. And for the past 2 years, even butter prices have usually been above support. Indeed, manufacturing milk prices (as measured by the M-W price and the more recent Basic Formula Price) have not been at support since 1988.

A market-driven system has created uncertain and volatile dairy product prices and milk prices. Dairy producers, milk processors and marketers, and buyers of fluid milk and dairy products now are exposed to major price risks. As a result, there is increased interest in dairy futures and options contracts as tools to manage this price risk.

The risk of price change is reduced through the *hedging* on the futures market. Hedging is taking opposite transactions in the cash and futures markets. By taking opposite transactions, losses (gains) on the cash market can be offset by gains (losses) on the futures market. With these offsetting losses and gains, hedging enables the users of futures markets for price protection to realize close to their price objectives.

Why Grade A Milk Futures and Options Contracts?

Cheddar cheese and nonfat dry milk futures and options have been used since their inception in June, 1993 as risk management tools by dairy farmers, milk processors and marketers, and buyers of cheese and milk powder. But the interest has been limited, and trade volume has been disappointing.

Cheddar cheese and nonfat dry milk futures and options may be used by both buyers and sellers to protect themselves against changes in the prices of these manufactured dairy products. But these same contracts can be used to reduce the risk of a change in farm-level milk prices. This is because the *base price* and *mover* of Grade A milk prices under all federal milk marketing orders is the Basic Formula Price (BFP). (The Basic Formula Price has been used since May 1995 as the federal order Class III price and Class II and Class I price mover. From 1961 until May 1995, the M-W price served that role. Both price series are based on pay prices by [unregulated] Grade B plants in Minnesota and Wisconsin.)

The BFP is the grade B price paid to producers by butter, milk powder, and cheese plants located in Minnesota and Wisconsin adjusted by a product price formula for the same three products. Because about 85 percent of the grade B milk in Wisconsin and 65 percent in Minnesota are used to make cheese, cheese is the major determinant of the BFP. About 90 percent of the change in the BFP may be explained by changes in cheddar cheese prices. With such a strong relationship, dairy producers and buyers of farm-level milk can use cheese futures and options contracts to reduce the risks from changing milk prices. Dairy cooperatives have successfully used cheese futures contracts to offer cash forward price contracts to their producer members. (Alto Dairy Cooperative has been offering their producers cash forward contracts hedged through the CSCE cheddar cheese futures since August, 1994. Since then, Swiss Valley Farms and Dairylea Cooperative have made cash forward contracts available to producers, and others may do so.)

About 80 percent of all grade A milk is priced under federal milk marketing orders. But prices for grade A milk not priced under a federal order and prices for Grade B milk have similarly strong relationships to cheese prices. In California, for example, a state order is used

to price grade A milk. But prices for cheese, nonfat dry milk, and butter are used in a formula to calculate the minimum pay prices to the state's dairy producers.

Protecting milk prices via cheddar cheese futures contracts is a "*cross hedge*" (cheese prices against milk prices) and not a "*direct hedge*" (milk prices against milk prices). Although the price relationship between cheddar cheese futures and milk is high, the price relationship between milk futures contracts and milk prices should be even higher. This is because other factors besides cheese prices influence milk prices.

Further, dairy producers and fluid milk bottlers may have more interest in a direct hedge. Dairy producers normally don't manufacture cheese. Therefore, dairy producers may relate better to milk prices than cheese prices. And, because futures contracts are deliverable, dairy producers are in a position to deliver milk but not cheese. The same is true with fluid milk bottlers. Bottlers are interested in purchasing grade A milk for bottling. Bottlers do not sell or purchase cheese.

Dairy cooperatives and other dairy companies who wish to offer cash forward price contracts to dairy producers may find the grade A milk futures preferable to cheese futures. Even if the milk purchased by the cooperative is used to make cheese, the grade A milk futures provides for a direct hedge, so producer milk prices are protected with grade A milk futures. Cheese prices would not need to be converted to milk prices, which is necessary when using cheese futures to offer cash forward contracts to producers.

The Basis

Success in reducing price risks through hedging hinges on the *predictability of the relationship between the cash price and the futures price.* In this case, we are talking about the relationship between the cash market price and the futures price for Grade A milk. The relationship between the cash price and the futures price is referred to as the *basis.*

Successful hedges are possible only if the basis relationship is known and predictable. That's because the net outcome of a hedge is equal to the change in the basis. The likelihood of the basis being different at the time the hedge is placed and when it is removed or offset is referred to as *basis risk.* If the basis is exactly the same at placement and offset, then the net outcome will be equal to what was anticipated when the hedge was set. If the basis changes, the net outcome will be either better or worse, depending on the direction in which it changed from what was anticipated earlier when the hedge was set.

The level of basis is immaterial, i.e., it makes no difference whether the cash price for milk is, for example, $1.00 per hundredweight higher or $1.00 per hundredweight lower than the milk futures price. What does matter is that this relationship is predictable and stable. If it is, then losses (gains) on the cash market will be offset closely by gains (losses) on the futures market.

The good news is that the basis is normally more predictable than cash prices. Therefore the risk exposure from a change in the basis is less than the risk of changing cash prices.

Contract Specifications of Milk Futures

The contract specifications for grade A milk futures contracts for the NY CSCE and the CME are given in Table 1. Some significant differences exist between the two contracts.

The biggest distinction between the CSCE and the CME grade A milk contracts is the delivery point. The CSCE contract requires delivery ***from*** an approved plant or facility in the Madison, Wisconsin district of the Chicago Regional federal milk marketing order. The buyer is responsible for picking up the shipment and assuming all transportation costs from that point. The CME requires delivery ***to*** a CME-approved facility within the borders of Wisconsin and Minnesota or located in that portion of surrounding states included in the Chicago Regional or Upper Midwest Federal Milk Marketing orders. The seller assumes all transportation costs to the buyer's facility,

Table 1. Contract Specifications: Milk Futures Contracts, CSCE & CME

Contract Specification	CSCE	CME
Commodity	FOB delivery of Grade A milk with 3.5 percent butterfat content from an approved plant	FOB delivery of Grade A milk with 3.5 percent butterfat content to an approved plant
Trading unit	One tanker load	One tanker load
Delivery unit	One tanker load; allowable variation 48,000 to 50,000 pounds	One tanker load; allowable variation 3%
Trading hours	9:15 AM to 2:00 PM NY time	8:00 AM to 1:00 PM
Delivery months	All 12 months of the year	Feb., Apr.,Jun., Jul., Sept., Nov.
Price quotation	Dollars and cents per hundredweight	Same
Minimum fluctuation	$.01 per cwt., equivalent to $5.00 per contract	$.025 per cwt., equivalent to $12.50 per contract
Daily price limits	From previous day's settlement price, $.50 per cwt. with variable limits effective under certain conditions. No price limits on 2 nearby months, with no limits on 3rd. nearby month from first day of a delivery month until the last trading day of the delivery month	From previous day's settlement price. No trading at a price more than $1.50 per cwt.
Standards	Grade A raw milk with 3.5% butterfat content	Same
Delivery points	From Interstate Milk Shippers (IMS) certified plants, receiving stations, or transfer stations located in the Madison, WI district of Chicago federal order	To CME-approved facilities within borders of Wisconsin and Minnesota or that portion of surrounding states included in the Chicago or Upper Midwest federal orders
Delivery	Pickup by the buyer from the seller's plant	Seller to buyer's facility
Last trading day	Six Exchange business days prior to the last Exchange business day of the delivery month	Seven Exchange business days prior to the last Exchange business day of the delivery month
Notice of delivery	First Exchange business day following last trading day	Same
First and last delivery day	First Exchange day following notice day up to the last Exchange business day of the delivery month	Buyer and seller shall select a day so that delivery can be made by the last calendar day of the delivery month. If no agreement is conveyed to the Clearing House, the Exchange will chose a delivery date from calendar days beginning 4 days after notice of no agreement and ending on the last calendar day of the delivery month

except that the buyer will be assessed a standard freight rate per mile for each additional mile the milk is hauled over and above the distance between the seller's facility and either Eau Claire or Fond du Lac, Wisconsin. The excess hauling cost will paid to the seller.

Both the CSCE and the CME specify that grade A milk deliveries be from or to, respectively, a facility regulated under a federal milk marketing order. Federal milk marketing orders use classified pricing and set minimum pay prices for milk according to use class. Class III-A is skim milk used for nonfat dry milk. The minimum price is established via a nonfat dry milk product price formula. Class III is grade A milk used to make cheese. The minimum price for class III is the current month's Basic Formula Price (BFP). Class II is grade A milk used for soft manufactured dairy products (yogurt, cottage cheese, ice cream, etc.) and is based on the BFP 2 months previous plus $.30 per hundredweight. Class I is grade A milk used for beverage purposes and also is priced using the BFP 2 months previous plus a class I differential that varies with distance from Eau Claire, Wisconsin.

Deliveries of milk under both contracts will be subject to federal order pricing rules. The federal order class specification for both contracts is Class III. Class III-a, Class II, and Class I price differentials will apply to the delivery settlement price. In other words, those taking delivery will be responsible for any additional costs associated with higher uses (Classes I and II) or any reduced cost if the milk is used for Class III-A and the federal order Class III-A price is less than the Class III price.

What Will the New Milk Futures Contracts Price?

Because the new milk futures contracts price Class III milk and the minimum Class III price in all federal orders is the Basic Formula Price (BFP), it would seem logical to assume that the contracts will "price" the BFP; that is, that futures prices will represent the expected value of the BFP for the delivery month.

However, the actual value of Grade A milk used for Class III purposes seldom matches the BFP. In Wisconsin and other Midwestern states, intensive competition for milk elevates Grade A milk prices well above minimum blend prices, implying plant costs for Grade A milk used for manufacturing higher than the BFP.

Under the CSCE milk contract, with delivery points in the vicinity of Madison, eligible plants likely would not be willing to supply milk for delivery at the BFP if they were obligated to pay producers more. The cost to acquire milk for delivery would be at least the Grade A cost to the plant for Class III milk.

The CME contract price could be affected in a different way. The CME contract specifies plants regulated under the Chicago and Upper Midwest orders as destinations for delivery. Contract sellers bear all or most of the cost of delivery to the destination. The milk can originate from eligible Grade A milk plants anywhere in the U.S. This raises the possibility that the CME milk contract will price "distressed" milk; i.e., milk volume that temporarily exceeds plant capacity in some region. Distressed milk moving to Wisconsin for manufacturing typically sells at a discount to the BFP. (Distressed Grade A milk from regulated plants is subject to federal order minimum pricing rules. But dairy cooperatives, which are exempt from paying minimum producer blend prices, account for most interorder shipments of milk in excess of local manufacturing capacity) Suppliers are willing to incur large hauling costs in order to find a home for the milk. The possibility that the CME contract will price distressed milk poses a potential problem for hedgers, because the basis may be more difficult to predict.

From what we know so far, the futures contract is definitely not pricing the BFP. Early on, the CSCE contract apparently was pricing the Grade A price for milk used for manufacturing, about $.70 to $.90 per hundredweight about the BFP, with about a $.30 discount for the CME. But as we approached June 1996, contract prices of $17 to $18 per hundredweight for delivery months of July,

August and September clearly were not the BFP. But instead, the futures price was reflective of the spot shipments of Grade A milk from Wisconsin to deficit fluid markets in the South; a BFP of about $14 plus a plant "give-up" charge of $3 to $4.

In the hedging examples below, we assume that the CSCE and CME milk contracts price the BFP. If that is not the case, then hedgers will need to account for deviations in establishing basis.

Hedging with the Milk Futures Contracts - Some Examples

Dairy Farmer Hedge

A simplified dairy farmer hedge is illustrated below, in which a dairy farmer sells 2 April milk contracts to hedge expected April Grade A milk production of 100,000 pounds. Given specific on-farm conditions with respect to milk composition, size of herd, milk quality, etc.; buyer conditions with respect to the buyer's premium structure (plant volume, quality, protein, etc.); and milk utilization by class in the federal order market, the farmer has determined that a $13.00 BFP correlates to a Grade A milk price of $14.00. That price looks favorable compared to production costs, so the farmer attempts to lock the price in through a short hedge. In case I, with a constant basis, the lower cash market price from a lower BFP is offset by futures market gains. In cases II and III, offsets are not exact, because the basis at the time the hedge was lifted was different from what was expected at the time the hedge was placed. Net gains are experienced with a strengthened basis, and losses are incurred when the basis weakens.

The farm-level Grade A price associated with a particular BFP was merely specified in this example (Table 2). In reality, considerable analysis would be necessary to derive the basis, and there would be several sources of basis risk. The minimum federal order blend price varies with utilization by class as well as with the BFP; hence the blend price relative to the BFP is not constant. A plant's base pay price relative to the federal order blend price varies with product mix, extent of competition, and premium structure. Farmers' butterfat and protein tests, somatic cell count and other quality variables, herd size, and a host of other factors cause actual pay prices to deviate from base pay prices.

Cash Forward Contracts

Milk plants may use dairy futures as a means to offer cash forward contracts to dairy farmers. This is illustrated in Table 3. Let's assume that in January a cheese plant offers dairy farmers a cash forward contract for April milk at $14.00 per hundredweight. This price is protected by selling in January an April Grade A milk futures at $13.00. The cheese plant estimates its basis at $1.00. This includes a $.75 pool draw from the federal order and a $.25 premium. So the $1.00 basis added to the $13 futures price enables the plant to offer the $14 cash forward price contract.

In April, the dairy farmer delivers milk to the cheese plant. The April milk price has declined to $13.00, but the cheese plant is obligated to pay the cash forward price of $14.00. The cheese plant buys an April Grade A futures at $12.00 and incurs a $1.00 gain from the futures market. The basis was unchanged at $1.00. Adding the $1.00 gain to the market price enables the cheese plant to pay the cash forward contract price of $14.00. If the reverse had occurred and the April milk prices had increased, the cheese plant would still pay the $14.00 cash forward price. The cheese plant would not be able to pay more, because it would incur a loss on the futures market. The cheese plant offers a cash forward contract to dairy farmers and hedges its obligation in Grade A milk futures.

Table 2. Example of a Dairy Farmer Hedge

Date	Cash Market	Futures Market	Basis
Jan. '96	Dairy farmers expects to sell 100,000 pounds of Grade A milk in April. Price expectation based on April futures price is $14.00	SELL 2 Apr. milk contracts @ $13.00	$1.00
Case I: Futures price decline/No basis change			
Apr. '96	Sell 100,000 pounds of milk @ $13.00.	BUY 2 Apr. milk contracts @ $12.00.	$1.00
Gain/(Loss)	($1.00)	$1.00	
Net Gain	$0.00		
Case II: Futures price decline/Basis weakens			
Apr. '96	Sell 100,000 pounds of milk @ $13.00.	BUY 2 Apr. milk contracts @ $12.50	$.50
Gain/(Loss)	($1.00)	$.50	
Net Gain	($0.50)		
Case III: Futures price increase/Basis strengthens			
Apr. '96	Sell 100,000 pounds of milk @ $15.00.	BUY 2 Apr. milk contracts @ $13.50	$1.50
Gain/(Loss)	$1.00	($.50)	
Net Gain	$.50		

Table 3. Example of a Cash Forward Contract

Date	Cash Market	Futures Market	Basis
Jan.'96	Plant offers price contract to Grade A patrons. Will pay $14.00 base price (3.5% butterfat) for April milk. Contract price is derived as follows: $13.00 BFP + .75 Pool Draw + .25 Premiums $14.00	Plant sells April Grade A milk contracts @ $13.00	$1.00
April'96	April milk is $13.00, but plant pays contract price of $14.00	Plant buys April Grade A milk contracts @ $12.00	$1.00
Gain/(loss)	($1.00)	$1.00	