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Hedging Milk with BFP Futures and Options

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The 1996 farm bill changed the dairy industry forever. The security provided by the support program is gone and the Federal Order reforms mandated in the legislation may radically change the order system and dairy price levels. Since 1990, when price support levels were lowered substantially, prices have become more volatile.

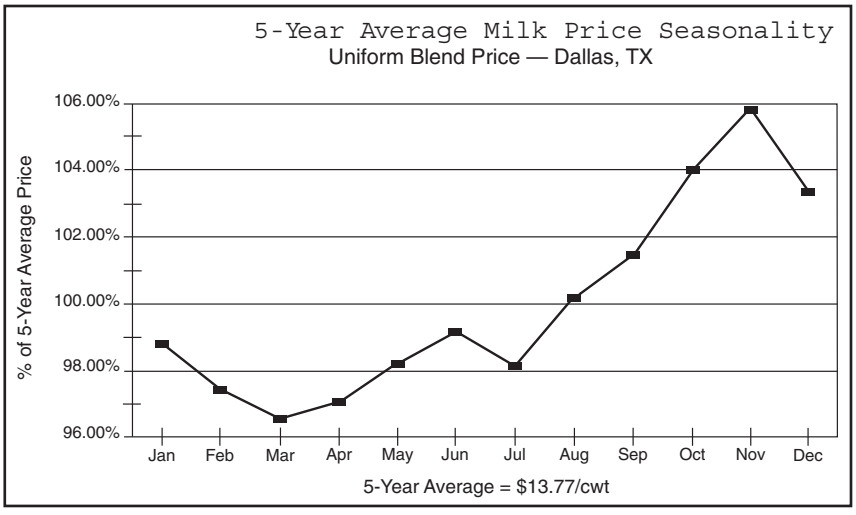
Milk prices fluctuate throughout the year because of seasonal demands, weather and supply fluctuations. Over longer time periods a variety of economic factors drive milk price changes. Milk prices usually are lowest in late spring and early summer and highest in late fall. This pattern follows the spring flush and the increased demand for milk and dairy products during the school year and end of year holiday season (Fig.1).

BFP (Basic Formula Price) milk futures and options can be used to hedge, or lock in, milk prices in order to manage milk price fluctuations. For more general information pertaining to hedging with futures and options, please refer to the following publications in this series: *Selling Hedge with Futures* (RM2-14.0), *Buying Hedge with Futures* (RM2-15.0), *Knowing and Managing Grain Basis* (RM2- 3.0), *Introduction to Options* (RM2-2.0), and *Hedging with a Put Option* (RM2-12.0).

Futures Contracts

A futures contract is a contract traded on a futures exchange for the delivery of a specified commodity at a future point in time. The contract specifies acceptable delivery methods and locations, and clearly defines the standards of the commodity such as weight, quantity, quality and form.

Figure 1.



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Depending on the exchange used, BFP futures contracts are available for delivery of 50,000, 100,000 or 200,000 pounds of milk. Milk futures contracts are traded on the Coffee, Sugar and Cocoa Exchange, and on the Chicago Mercantile Exchange. If a BFP contract is held open until maturity, it is settled by the cash difference between the contract price and the actual index of basic formula price for milk at the time the contract expires.

A hedger is someone taking a position in the futures market that is equal and opposite to the position he either has or expects to take in the cash market. This position protects against adverse price movements. That is in contrast to a speculator, who is not hedging the price of his own production but is hoping to profit on price movement alone. The hedger could be a dairy producer desiring to protect the price of milk or the price of corn used to feed dairy cows, or the hedger could be a cattle feeder desiring to protect a cattle price. A short futures position means that a person sells a futures contract. A long position means that a person buys a futures contract. For example, a dairyman hedging his milk would take a short position by selling the BFP contract. A dairyman desiring to hedge feed costs would take a long position by buying a corn futures contract.

The milk producer considering hedging must decide: 1) Do I lock in my milk selling price? If so, for what month? 2) Do I lock in prices of feed ingredients? If so, what commodity prices do I lock in and for what month do I lock in these prices? and 3) If I decide to lock in these prices, at what levels do I lock them in?

During the planning process, the producer must examine feed needs, expected feed prices, expected milk prices, expected expenses, and debt load, as well as desired returns to management, owner labor, and investment. In addition, the producer must anticipate cash flow needs to cover ongoing expenses and debt payments.

Basis

Basis is the difference between the local cash price and the futures price at the time the milk is sold or the feed grain purchased. Basis accounts for transportation costs, quality differences, and local market conditions. Table 1 reveals the historical basis for the Federal Order 126 Uniform Blend milk price at Dallas compared to the BFP. Since the BFP is cash settled, the basis is the local Uniform Blend price minus the BFP. Grain basis tables for several locales can be obtained from the Agricultural Extension Service in both Texas and Kansas.

A producer will need to calculate the basis for milk FOB his or her pay zone. Three important aspects about calculating the basis must be kept in mind:

1. Several years of historical price data should be used to calculate the basis;
2. Basis data used should correspond to the time the hedge is lifted or completed; and
3. Basis can be seasonal and cyclical.

In other words, it may tend to increase or decrease over the production or marketing year or show large changes across years. The BFP basis, as the difference between the Uniform

Table 1. Federal order 126 basis at Dallas, 1992-1997.

	1992	1993	1994	1995	1996	1997	Average '92-'97
January	$2.27	$2.25	$1.60	$1.68	$1.59	$1.56	$1.83
Feburary	2.28	2.03	1.39	1.13	1.56	0.96	1.56
March	1.95	1.45	0.87	1.04	1.05	1.17	1.26
April	1.44	0.60	0.69	1.54	0.97	2.17	1.23
May	1.07	0.75	2.08	1.85	0.66	2.62	1.51
June	1.31	1.91	2.42	1.29	1.11	2.15	1.70
July	1.51	2.42	1.19	1.36	1.29	1.87	1.61
August	1.87	2.26	1.42	1.67	1.18	0.96	1.56
September	2.32	1.37	1.43	1.18	1.28	0.39	1.33
October	2.22	1.01	1.18	1.01	2.66	1.38	1.58
November	2.01	1.35	1.74	1.20	4.76	1.74	2.13
December	2.06	1.36	2.02	1.27	3.55	1.51	1.96

Blend price and the BFP, captures changes in the class utilization of milk in the Federal Order. Recently, the Texas market has averaged about 50 percent Class I utilization annually. The Class I differential at Dallas is $3.16 per hundredweight, which supports the positive historical basis.

Cash Settlement

The term "cash settlement" means that at expiration of the contract, the difference between the futures contract price and the actual price on the expiration date can be settled by a cash transaction rather than actual delivery of the product. The BFP contract is settled by cash so that milk does not have to be delivered to settle the contract terms.

Margin Call

When a producer opens an account and begins trading, he or she is required to put a certain percentage of the value of the contract into a margin account to guarantee financial security on the part of the contract holder. If the futures market moves against the producer, additional margin money will be required. If a profit accrues (the futures market moves in favor of the producer), money may be withdrawn from the margin account. When the futures position is liquidated, the margin account is used to settle the account. For example, a dairyman who is short a BFP futures contract will receive a margin call if the BFP contract price increases, because the dairyman would have to buy the contract back to offset the position, resulting in a loss on the futures transaction.

A Hedging Example

To illustrate a hedge on an upcoming milk sale, assume it is July 1 and the producer is planning for December milk production. Feed and hay prices for the production year are locked in with forward contracts. The manager wants to ensure that milk revenues will cover expected cash costs during December.

The producer just returned from a co-op outlook meeting where the December BFP was predicted to be $11.04 (Table 2). Because the producer's December basis averages +$1.96, he realizes he faces a possible $13.00 milk check for December milk if that prediction comes true. Next, the producer finds that the BFP December futures contract closed for the day at $12.54.

The producer needs a $13.89 per hundredweight milk price (Table 2) to cover cash costs in December. Using either futures or options, the producer decides he can hedge 1,400,000 pounds of his expected December production of 1,490,000 pounds. BFP contracts and options are offered in 100,000-pound and 200,000-pound units. A 50,000-pound mini-option is also offered. Leaving 90,000 pounds unhedged allows for possible production variation.

An at-the-money put option will cost $.35 per hundredweight. However, the option will allow him to escape margin calls and have the potential to gain back some premium if he chooses to sell the option rather than let it expire. Using options, the producer can lock in a milk price of $14.11 for the hedged portion of his milk by purchasing puts with a strike price of $12.50. The producer realizes that hedging with futures contracts has the potential to net more money if the milk price falls.

Table 2 contains two examples of hedging with BFP futures contracts. The bottom portions of both the futures hedge and option hedge sections of Table 2 illustrate the returns above cash costs with and without the associated hedges. Example 1 illustrates a short hedge when prices fall, while Example 2 illustrates a short hedge when prices rise. In Example 1, the producer sells a January BFP futures contract in July at $12.54. When the producer lifts the hedge in January, the futures price has fallen to $11.04, resulting in a gain of $1.50 which increases the net price received to $14.50 (1.50 + 1.96 basis + 11.04 cash BFP).

In Example 2, the producer sells the same BFP futures contract for $12.54. When the hedge is lifted in January, the futures price has risen to $13.00 resulting in a loss of $0.46. But the BFP cash price has also risen, settling at $13.00. When adjusting the BFP cash price for the loss in the futures market, the resulting net price is $14.50, the same as when prices declined in Example 1.

The hedging with BFP options examples in Table 2 are the same as the hedging with BFP futures examples. Example 3 illustrates the case of decreasing prices, while Example 4 illustrates rising prices. In Example 3, the producers buys an at-the-money put option ($12.50 strike price) for $0.35. When the hedge is lifted, the futures price has fallen to $11.04. He executes the option, sells futures at the $12.50 strike price, and buys back at $11.04. After subtracting the cost of the put premium ($.35) from the $1.46 gain in the futures position, the net gain on the hedge is $1.11. When added to the BFP cash price, the net price received is $14.11. Rather than executing the option, he could have sold the option back and achieved roughly the same results. At expiration, a put option's value is composed entirely of its intrinsic value, which is

the strike price less the futures price. In this case, the intrinsic value at expiration is $1.46.

In Example 4, prices have risen to $13.00 when the hedge is lifted. Since the futures price is above the put option strike price ($12.50), the put option expires without value. Therefore, the producer simply lets the option expire and his loss is equal to the cost of the option ($.35). The loss results in a net price of $14.61 ($13.00 cash BFP - $.35 option loss + $1.96 basis).

The producer could have chosen any strike price above or below the $12.50 strike. For put options the cost (premium) increases as the strike price increases, and the cost is less for lower strike price options. The opposite is true for call options (the option to purchase a commodity at the specified strike price). The key to hedging with options is to know your basis, production costs, price objective, and how much risk you can bear.

Table 2. Hedging with the BFP futures and options contracts.

Assumptions	**Per cwt.**
Producer's total cash costs	$13.89
Projected December BFP	$11.04
Average December basis	$1.96
Projected uniform blend cash price	$13.00
December BFP contract on July 1	$12.54
December put option strike price on July 1	$12.50
Cost of December put option on July 1	$0.35

Hedging with the BFP futures contract

	Example 1	**Example 2**
BFP futures contract sold (July 1)	$12.54	$12.54
Cash settled BFP futures price (January 5)	$11.04	$13.00
Net on hedge	$1.50	-$.46
December BFP cash	$11.04	$13.00
	$12.54	$12.54
Basis	+$1.96	+$1.96
Net price received*	$14.50/cwt.	$14.50
Returns over cash costs w/hedge* (14.50-13.89)	$0.61/cwt.	$0.61
Returns over cash costs without hedge	-$0.89/cwt.	$1.07

Hedging with BFP put option

	Example 3	**Example 4**
Strike price (July 1)	$12.50	$12.50
Premium (July 1)	$0.35	$0.35
Cash settled BFP futures price (January 5)	$11.04	$13.00
Net on hedge	$1.11	-$.35
December BFP cash	$11.04	$13.00
	$12.15	$12.65
Basis	+$1.96	+$1.96
Net price received*	$14.11/cwt.	$14.61
Returns over cash costs w/hedge*	$0.22/cwt.	$0.72
Returns over cash costs without hedge	-$0.89/cwt.	$1.07

*Excludes commissions costs.

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