



Risk Management Tools for Dairy Farmers: Options on Dairy Futures

John D. Anderson and Gregg Ibendahl

In light of recent changes in the government's dairy policy, many dairy producers are beginning to see the need for better price risk management. Futures contracts provide producers with a potentially powerful risk management tool; however, hedging with futures contracts may not be attractive to some producers, for a number of reasons.

First, smaller producers may lack sufficient monthly production to cover even a single Basic Formula Price (BFP) Milk contract for 2,000 cwt of milk. Farmers who produce less than this amount in a month's time may not be comfortable with holding what is essentially a speculative position on the difference between the size of their production and the 2,000 cwt contract.

Second, holding a futures market position requires the trader (i.e., the person taking a position in the futures market) to maintain a margin account. This account represents a trader's equity in an open futures market position. When futures prices move against a trader's open position, money is taken from the margin account to cover the losses. The trader is then required to deposit more money into the account in order to maintain equity. The notification a trader receives when a deposit to the margin account is required is known as a *margin call*. The possibility of having to cover margin calls is another reason some producers may be deterred from using futures contract hedging in their risk management programs. Finally, hedging with futures contracts limits a producer's opportunity to benefit from price increases that occur after a hedge has been placed. To illustrate, suppose that in March, a dairy farmer sells a September BFP Milk contract at \$16/cwt and that the current cash price for milk is \$17.50/cwt. If the price of milk then rises so that in September the BFP Milk contract is trading for \$18/cwt and the cash price of milk is \$19.50/cwt, the producer will still realize a total milk price of only \$17.50/cwt. The \$2/cwt gain in the cash market will be exactly offset by a \$2/cwt loss in the futures market. In fact, as long as the difference between cash and futures prices (i.e., the *basis*) is stable, gains in one market will always be offset by losses in the other market. Thus, when prices are declining, producers who hedge with the futures market realize higher prices than do producers who simply sell on the cash market. Unfortunately, when prices are rising, the opposite will be true—hedging with futures contracts will result in lower prices than could be realized by selling exclusively on the cash market. Of course, hedgers should always keep in mind that the purpose of hedging is not necessarily to increase the level of returns, but rather to reduce the variability of returns.

Options on futures contracts allow traders to avoid these perceived negative aspects of futures market trading. Options

can be traded without posting margin money. Options allow hedgers to establish a price floor without giving up the opportunity to benefit from favorable cash price changes. Finally, for milk producers, options on the BFP Milk contract can be purchased in contract sizes of 500 cwt (mini-BFP Milk options) or 1,000 cwt (mid-size BFP Milk options).

Options Terminology

An *option* conveys to its holder the right, but not the obligation, to buy or sell the underlying futures contract at a specified price on or before a specified expiration date. As this definition implies, there are two types of options:

- *Put* options convey the right to *sell* an underlying futures contract.

- *Call* options convey the right to *buy* the underlying futures contract. The "specified price" referred to above is known as the *strike price*. It is the price at which the holder of an option has the right to buy or sell the underlying futures contract.

An option may be said to be "in the money," "at the money," or "out of the money" based on the relationship of the strike price to the current price of the underlying futures contract. For example, if the October BFP Milk futures contract is trading at \$15/cwt, a put option with a strike price of \$15.75/cwt would be *in the money*. In other words, exercising the option (i.e., exercising the right to sell a BFP Milk futures contract at the strike price of \$15.75) would result in positive returns for the option holder. A put option with a strike price of \$14.75/cwt would be *out of the money*, and one with a strike price of \$15/cwt (equal to the current BFP Milk futures price) would be *at the money*. Note that with BFP Milk futures trading at \$15/cwt, a call option with a strike price of \$15.75/cwt would be out of the money and one with a strike price of \$14.75 would be in the money.

The price that must be paid to purchase an option is called the *premium*. The premium is affected by a number of factors. One factor is the volatility of the price of the underlying futures contract. In general, the more volatile the futures price, the higher the premium will be. An option's premium also reflects the option's intrinsic value and its time value. An option has *intrinsic value* if it is in the money. Obviously if an option can be immediately exercised for a profit, it will be worth more than one that cannot. Thus, the premium on in-the-money options will be higher than the premium on out-of-the-money options. Options have *time value* because the longer the time until a futures contract's maturity, the greater the uncertainty associated with the price of that contract. Thus, options on more distant contract months will generally have higher premiums.

Managing Risk with Options

As noted above, for producers who are interested in hedging a commodity that they sell, purchasing a put option establishes a price floor. This concept is illustrated in Figure 1. If prices are falling, a put option will keep the price the option holder actually receives from falling below some minimum level. That minimum level is equal to:

Option Strike Price – Option Premium Paid +/- Basis

If prices are rising, the price that the option holder receives will rise as well; however, the option holder's price will be below the actual price by the amount of the premium.

The option holder has three possible courses of action:

First, an option may be *exercised* (a term that has been mentioned already). When an option is exercised, the option holder is simply using the right the option conveys to take a futures market position at the option's strike price. An example will help to illustrate:

Suppose that in January, a dairy farmer purchased a put option on June BFP Milk futures with a strike price of \$14.25/cwt for a premium of \$0.30/cwt. Suppose that when the June BFP Milk contract expires, the contract is trading for \$13.50. The dairy farmer will exercise the put option, selling a BFP Milk futures contract at the strike price of \$14.25 and immediately purchasing a BFP Milk contract back at the current price of \$13.50. This transaction will net the farmer \$0.45/cwt (i.e., a gain of \$0.75/cwt on the futures market transaction minus the \$0.30/cwt premium paid for the option).

American-style options may be exercised at any time during the life of the underlying futures contract. European-style

options may be exercised only at the expiration of the underlying futures contract.

Regular BFP Milk options are American style, while mid-size and mini-BFPs are European style. BFP options are automatically exercised at contract expiration. That is, if an option has intrinsic value when the BFP contract expires (i.e., if it is in the money), the exchange will automatically carry out the transactions described in the previous paragraph, and the option holder will receive a credit for the resulting gain.

What if the option does not have any intrinsic value at contract expiration (i.e., what if the option is out of the money)? That leads to a second course of action for an option holder: to do nothing, which is known as *letting the option expire*. Since there is no value to capture by exercising the option, there is nothing for the option holder to do.

A third course of action for an option holder is to sell the option at some point before contract expiration. Suppose that our dairy farmer from the previous example, who purchased a put option on the June BFP Milk contract with a strike price of \$14.25 for a \$0.30/cwt premium, realizes that in March the premium on those options has risen to \$0.40/cwt. The farmer could sell that option and pocket the \$0.10/cwt profit. However, by doing this, the farmer has lifted the hedge on milk price, leaving no protection from falling milk prices. In effect, the farmer has begun speculating rather than hedging.

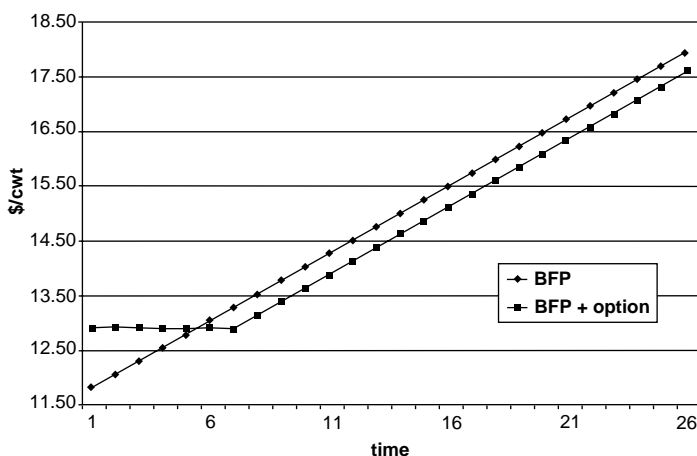
Clearly, the decision to purchase a put option is complicated by the fact that for each contract month, options are traded at several different strike prices, each with a different premium. No simple rules exist to help decide which option to purchase. Of course, it is extremely helpful if producers know their per-unit cost of production. That way, a producer can know how much profit (or loss) will be realized at each strike price.

In addition, producers' ability to withstand losses will influence their risk management decisions. For example, a producer with a great deal of debt will be less able to tolerate periods of low prices than a producer who has substantial equity. The producer with the great debt should be more willing to pay a higher premium for options offering a higher strike price.

Summary

Futures and options on the basic formula price are financial instruments that may be used by dairy farmers as a way of managing milk price risk. Options on the BFP Milk contract may be particularly attractive to dairy farmers for several reasons: the smaller size of the option, no risk of margin calls, and unlimited potential to benefit from milk price increases. The examples and definitions presented in this article are intended to help producers understand basic futures market concepts and terminology. This understanding should be helpful to dairy farmers contemplating the use of options in their own risk management programs.

Figure 1. Realized basic formula price with and without BFP Milk options.



Note: Option strike price = \$13/cwt; option premium = \$0.40/cwt.