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Put Options as Price Insurance for Dairy Farmers

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Dairy producers who want to manage price risk can purchase put options, which provide holders the right, but not the obligation, to sell at a predetermined price. Put options allow producers to lock in a floor price without limiting any upside price gains and can best be thought of as price insurance. Keep in mind that the main benefit of options is not to increase overall gross income, but to reduce variability of income.

This publication explains how dairy producers can use put options in their operations. More complete information about options can be found in the Cooperative Extension publication *Risk Management Tools for Dairy Farmers: Options on Dairy Futures,* AEC-86.

To effectively use put options, dairy producers need to know their cost of production, their basis, the strike price, the premium, and their trading costs.

Definitions

Cost of production

Dairy producers need to thoroughly understand their cost of production. Only then can they know if a put option is locking in a profit for their milk. Cost of production includes all expenses involved in producing milk. At a minimum, dairy producers want to cover their variable costs (direct cash costs plus the value of homegrown feed). Fixed costs, such as depreciation and interest on equity and value for unpaid labor, should also be considered.

These costs of production should be calculated on a per hundredweight (cwt) of milk produced. For a description of these costs and how they are calculated, refer to *The Kentucky Farm Business Program 1997 Annual Summary*, Agricultural Economics Extension Series, No. 98-03.

Basis

Basis, or mailbox differential, is the difference between a producer's mailbox price and the USDA's Basic Formula Price (BFP). The basis varies by region of the country and, to a lesser degree, the individual farm. The following table, adapted from information provided by the Chicago Mercantile Exchange[1], lists the monthly basis for the area of Louisville and Lexington, Ky., and Evansville, Ind. The months in the table are when the BFP is announced. Keep in mind that cash prices lag behind the BFP by two months.

Remember, there is some variability in the basis, but not as much as the variability in cash prices. Dairy farmers should calculate their own monthly basis to obtain a more accurate number. Producers unfamiliar with their own monthly basis might be better off using the averages shown in Table 1.

Table 1. Monthly basis for the Louisville, Lexington, and Evansville area.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	AVE
1.03	0.61	0.46	0.80	1.08	0.99	1.20	0.84	0.54	1.33	2.40	1.75	1.09

Strike Price

The strike price, or exercise price, is the price at which you may sell the underlying BFP milk futures contract. Strike prices are set at $0.25 intervals.

Premium

The price you pay for a put option. The market determines the premium.

Trading Costs

These are the fees, commissions, etc., necessary to purchase the option. Trading costs vary, depending on the broker.

Examples

The following demonstrates how put options can be used by a dairy farmer (adapted from chapter 11, Plourd[2]).

Ken Tucker owns a 125-head dairy herd that averages about 225,000 pounds of milk per month. His cost of production is $12.25/cwt, and the basis is typically $1.25/cwt. Trading costs to purchase a put option are about $0.05/cwt.

In October, February BFP futures are at $12.10/cwt. An out-of-the-money put option (an option taken when the underlying futures price is higher than the strike price) for February of $11.50/cwt can be purchased for $0.25. With this information, Ken Tucker knows in advance that he can have a profitable February (reflected in his April milk check) and thus purchases a put option for 200,000 pounds of milk. This strategy is demonstrated in Table 2.

Table 2. February strategy.

	Put Option Strike Price	$11.50
+	Typical Basis	$1.25
–	Put Option Premium	($0.25)
–	Trading Costs	($0.05)
=	Net Protection Level	$12.45
–	Cost of Production	($12.25)
=	Net Profit	$0.20

[1] Chicago Mercantile Exchange. *Self-Study Guide to Forward Pricing with BFP Milk Put Options*. CME Chicago: 1998.

[2] Plourd, P. *From Price Taker to Price Maker: a guide to dairy risk management using futures and options*. Coffee, Sugar and Cocoa Exchange, Inc. New York: 1997.

Example 1

The February BFP is announced (March 5) at $10.80. With a $1.25 basis, Ken receives $12.05 for his April milk. Table 3 below shows the results when purchasing a put option.

As Table 3 indicates, the put option is valuable since the actual BFP ($10.80) is less than the put strike price ($11.50). After factoring in trading costs, Ken has a gain of $0.40 from the put option. When the loss from the cash market is considered, Ken earns the $0.20/cwt profit he originally calculated back in October.

Table 4 below shows the total profits from the entire month.

Keep in mind that these examples assume zero basis risk. In actuality, the basis is usually either higher or lower than what is assumed. This variability in the basis is the basis risk. However, basis risk is usually lower than price risk.

Example 2

Now, the February BFP is announced at $12.50. With a $1.25 basis, this makes the mailbox price $13.75. The option expires worthless. Table 5 shows these results.

Because the option expires worthless, Ken loses his $0.30 insurance "investment" ($0.25 put premium plus $0.05 trading costs). This cost reduces his total milk income by $600 ($0.30/cwt times 2,000 cwt). Table 6 shows the total profits from the entire month.

Table 3. Results from Example 1.

Cash Market		
	Actual Price	$12.05
+	Cost of Production	($12.25)
=	Profit/(Loss)	($0.20)
Futures/Options Market		
	Strike Price	$11.50
–	Actual BFP	$10.80
=	Gross Profit/(Loss)	$0.70
–	Option Premium	($0.25)
–	Trading Costs	($0.05)
=	Net Profit/(Loss)	$0.40
Final Result		
	Actual Cash Price	$12.05
+	Net F/O Profit/(Loss)	$0.40
=	Total Milk Price	$12.45

Table 4. Total profit from Example 1.

February Results	Price	Quantity (cwt)	Total
Actual Cash Market	$12.05	2,250	$27,112.50
Net Futures Gain/(Loss)	$0.40	2,000	$800.00
Total Milk Payments			$27,912.50
Cost of Production	($12.25)	2,250	($27,562.50)
Overall Profit/(Loss)			$350.00
Profit/(Loss) Margin			1.27%

Table 5. Results from Example 2.

Cash Market		
	Actual Price	$13.75
+	Cost of Production	($12.25)
=	Profit/(Loss)	$1.50
Futures/Options Market		
	Strike Price	$11.50
–	Actual BFP	$12.50
=	Gross Profit/(Loss)	$ -
–	Option Premium	($0.25)
–	Trading Costs	($0.05)
=	Net Profit/(Loss)	($0.30)
Final Result		
	Actual Cash Price	$13.75
+	Net F/O Profit/(Loss)	($0.30)
=	Total Milk Price	$13.45

Table 6. Total profit from Example 2.

February (Example Month)	Price	Quantity (cwt)	Total
Actual Cash Market	$13.75	2,250	$30,937.50
Net Futures Gain/(Loss)	($0.30)	2,000	($600.00)
Total Milk Payments			$30,337.50
Cost of Production	($12.25)	2,250	($27,562.50)
Overall Profit/(Loss)			$2,775.00
Profit/(Loss) Margin			10.07%

As this example shows, when the option expires worthless, Ken is usually better off than in Example 1. Because prices are higher, Ken earns more than the $0.20/cwt minimum profit he calculated back in October. Prices have not dropped low enough for the "insurance" to kick in.

In this second example, Ken would have been $600 better off by not purchasing the option. However, the $600 was the cost of purchasing price insurance. Ken had no way of knowing what the price would do. As Example 1 demonstrated, doing nothing would have been costly.

As these two examples show, purchasing put options allow dairy producers to establish a floor without sacrificing the gains from higher prices. There is some cost to the options, but options help farmers minimize risk.

More Information

More information about BFP futures and options can be found on the Chicago Mercantile Exchange Web site. The address is: <http://www.cme.com/market/prices/a-options.html>. This address gives 20-minute delayed prices for BFP options. To find information about futures, visit <http://www.cme.com/market/prices/commodities.html>. This address gives 10-minute delayed prices for BFP futures.