

AGRICULTURAL PRODUCTS

Introduction to Hedging with Dairy Futures and Options



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CHAPTER 1

INTRODUCTION

Dairy producers and manufacturers today face many challenges in operations and in marketing. Dairy prices fluctuate from month to month and make it difficult to ensure meeting break-even costs. Dairy futures and options, however, serve as useful tools for managing the risks inherent to the dairy industry. Options on Dairy futures, in particular, allow producers and manufacturers to limit their price risks, while allowing them to take advantage of positive price movement. Other market participants are willing to assume the dairy hedger's risk in return for potential profits. They provide much of the market liquidity that is required to have an efficient dairy market.

About Risk in the Dairy Industry

The U.S. dairy business is a multi-billion dollar business which can have extreme price volatility at times. Cows produce a perishable product (milk) two to three times per day, 365 days per year. Dairy manufacturers turn this raw commodity into finished goods for a multitude of uses which are consumed anywhere from within a few days, weeks or months, to several years for specialty aged cheeses. Along the marketing chain from the producer to the consumer, the milk and its components such as butterfat/cream will change hands many times and as such, each of the market participants have one thing in common – price risk.

Whether on the buying side, selling side or even when merchandising dairy products, there are many risk management alternatives that buyers and sellers alike can use to minimize or even eliminate their local market risk using Dairy futures and options. Also, because dairy has universal appeal, dairy risk management is important worldwide.

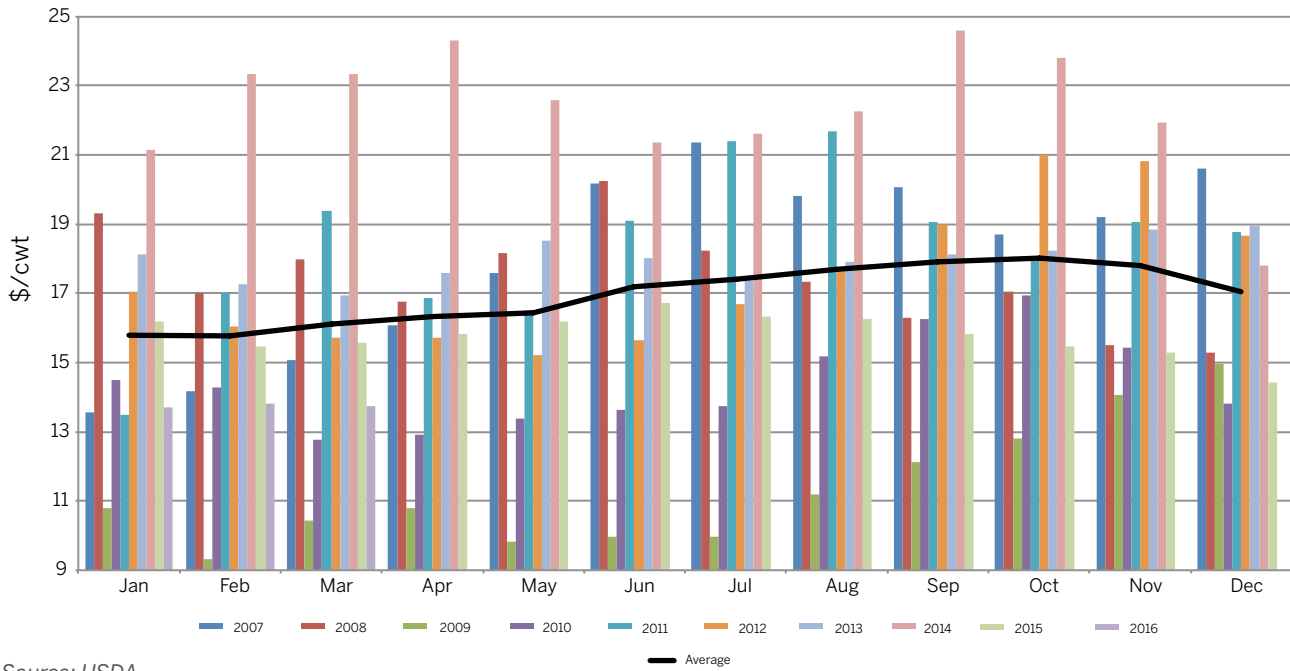
The dairy markets are unique in that they react very dramatically to small changes in supply and demand.

Extremely minor reductions in supply or increase in demand can send prices soaring within a few months, while the opposite may happen with slight increases in supply or decreases in demand. Against this type of market environment, activity in Dairy futures has increased significantly in recent years. Some of this market volatility is due to the U.S. government's steadily decreasing involvement in the dairy support program.

This hedging guide is designed to help you manage this increased market volatility. It will focus on and incorporate a variety of CME Group Dairy products in price risk management examples. CME Group offers a range of Dairy futures and options that address specific needs, and while it is not feasible to include all products in this publication, the strategies highlighted do apply to all of them.

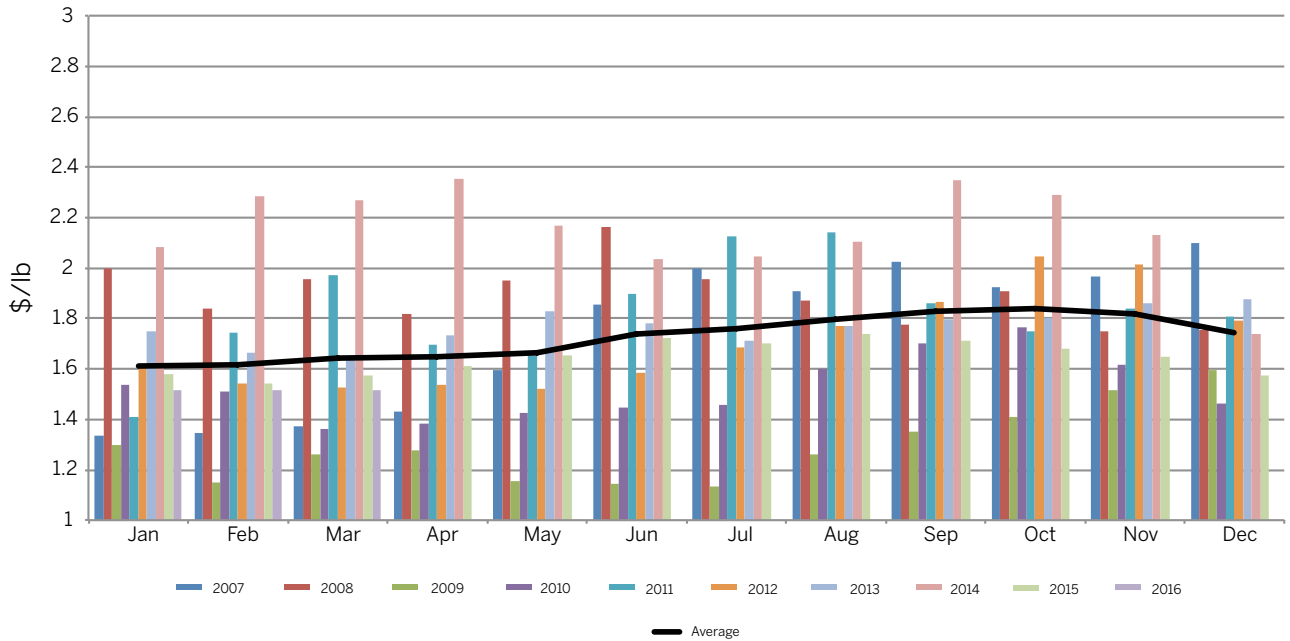
Also, keep in mind that dairy market participants are exposed to other types of market risk, including feed, energy, interest rates and possibly even foreign currency. A brief section on non-dairy risk will be included towards the end of this publication.

CLASS III MILK SETTLEMENT PRICES



Source: USDA

CHEESE SETTLEMENT PRICES



Source: USDA

CHAPTER 2

WHAT ARE DAIRY FUTURES AND OPTIONS?

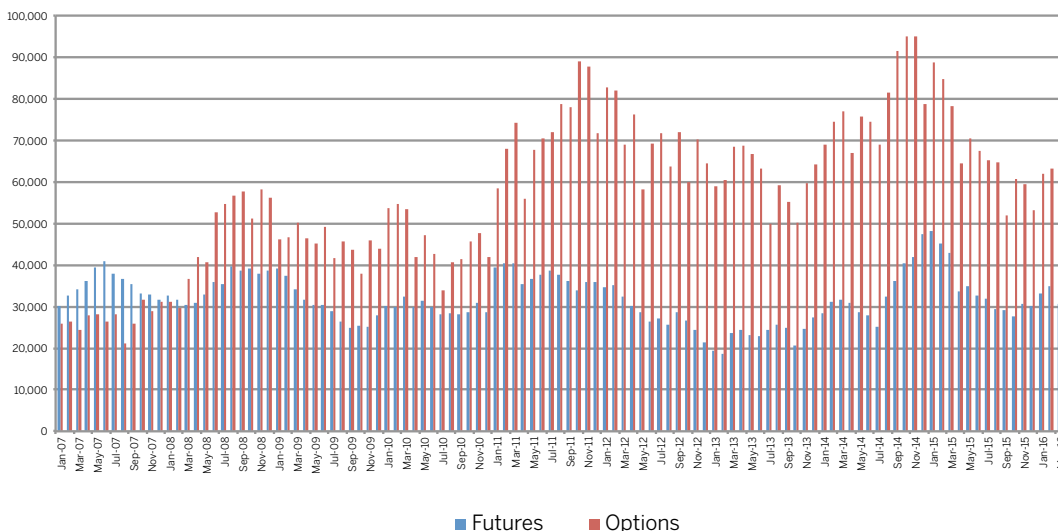
Dairy futures contracts are legally binding obligations to buy or sell a specific amount and specific quality (set grades and standards) of a dairy product— milk, butter, nonfat dry milk, cheese, etc.— at a specific time and place in the future. All Dairy futures contracts are binding obligations that the trader must fulfill before the contract expires. Traders fulfill their contract obligations in two ways: 1) by making or taking delivery of the physical dairy product, or 2) by offsetting the initial futures market position by entering an opposite trade at any time prior to the last day of trading. In the case of all dairy contracts which are cash-settled, any position that has not been offset is settled in cash based upon a specific price or index.

Although Dairy futures contracts can be offset at any time, most hedgers will offset their positions in the futures market when they either buy or sell the physical dairy product in the cash market. In other words, when the price risk of a physical purchase or sale is removed, they no longer need their futures position.

There are Dairy futures contracts for each month, offering both producers and processors a chance to lessen the pricing impact of the market volatility throughout the calendar year. Dairy producers concerned about declining prices in the future can initially sell Dairy futures to lock in current price levels, thereby eliminating the risk of falling prices over time. On the contrary, dairy product consumers, processors and manufacturers can lock in current price levels and protect against price increases by buying futures.

CME Group also provides options on futures contracts as additional risk management and trading alternatives. Whereas a futures contract provides protection against adverse prices and allows the hedger to lock in a price, options provide similar protection against adverse prices but also the opportunity to participate in advantageous price movement.

CLASS III MILK FUTURES AND OPTIONS OPEN INTEREST



Source: USDA

Dairy Product Futures and Options

CME Group offers a wide array of dairy products including futures, options and spot market products, providing a variety of risk management and trading opportunities. Following is a sampling of the key products.

Class III Milk: Class III Milk is also known by the industry as “cheese milk,” and the Class III Milk contract represents milk which is used primarily in cheddar cheese manufacturing. All of the fundamental factors which affect milk and cheese production and demand in the physical market influence the price direction of Class III Milk futures and option contracts. The contract is listed out to 24 consecutive months. Hedgers and speculators watch factors affecting milk production and the cheese cash market for pricing indicators.

Class IV Milk: Class IV Milk is used to produce butter and nonfat dry milk. Class IV Milk futures and options were introduced in 2000 in response to commercial hedgers’ needs to hedge the price risk of liquid milk, dried milk and butter. All supply and demand factors affecting milk, non-fat dry milk and butter influence the price direction of the Class IV contract.

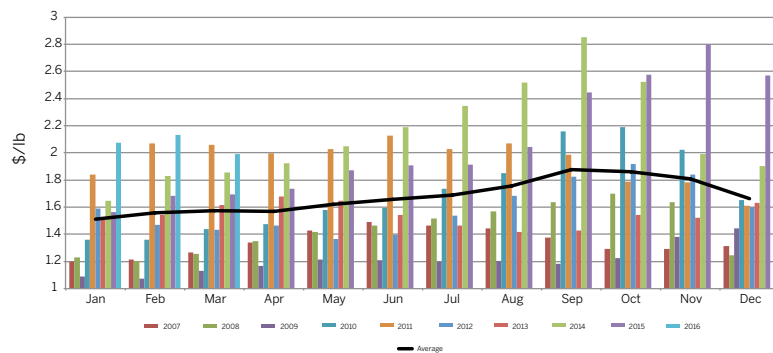
Nonfat Dry Milk: As a by-product of butter manufacturing, Nonfat Dry Milk is a storable product that can be used in various feed and food items or can be reconstituted into milk. Nonfat Dry Milk is traded

throughout the world, making the futures contract a potential global price reference, hedging tool and benchmark for cash contracts. The Nonfat Dry Milk futures contract is cash-settled based on the USDA monthly weighted average price in the United States for nonfat dry milk as first released.

Cash-Settled Butter: Butter futures and options reflect fundamental cash market information that impacts the supply, demand and cold storage stocks. As the supply and demand for the physical (cash) product changes, the need arises for the butter industry to store product or take product out of storage. This movement of physical products creates potential differences in price relationships between the nearby contract month and the more deferred contract months. The butter futures contract is an electronically-traded, cash-settled contract based on the USDA monthly weighted average price in the United States for butter as first-released.

Dry Whey: Dry Whey futures are cash-settled and traded exclusively on the CME Globex electronic trading platform. Whey is the liquid that separates from milk during the cheesemaking process. Dried whey, which is high in protein and low in fat, is used in foods such as crackers, breads, cereal and energy food products, as well as in animal feed. Contract settlement is based on the USDA monthly weighted average price in the United States for dry whey as first released. The contract provides opportunities for hedgers to manage their price risk as well as for traders who are looking for opportunities in outright price moves and or spread movement.

BUTTER SETTLEMENT PRICES



Source: USDA

Cheese: Cheese futures and options allow users to hedge forward exposure to cheese pricing across all parts of the milk crush (Class III Milk, Cheese and Whey) with a single contract. The price reflects the market expectations of the value of cheddar cheese at a forward date, providing processors and food companies with an effective tool for managing price and supply. Cheese futures and options are cash-settled and traded electronically on CME Globex.

CHAPTER 3

FINANCIAL INTEGRITY OF THE DAIRY FUTURES MARKETS

One of the key benefits of the futures market is the financial integrity of every contract that is traded and cleared at the exchange, a role fulfilled by CME Clearing. The obligation of a futures contract is ensured through the concept of margin or performance bond.

Every buyer and every seller of a futures contract must post and maintain a margin account to ensure their adherence to the terms of the futures contract. The Exchange establishes a minimum margin requirement per contract, called the “initial” margin, which usually ranges from 5–15% of the contract value. However, brokers may require their customers to post a margin that may be higher than the Exchange minimum. Margin is deposited into a “segregated” trading account with the customer’s FCM. In segregated accounts customers’ deposits are not commingled with their FCMS proprietary funds.

Although the absolute amount of margin is not a cost of trading futures, there is a cost associated with margin: interest. This can be the interest paid on the amount borrowed to fund the margin, or the opportunity cost of not having the earning power on the funds used as margin. It is not necessary to deposit cash as initial margin; there are different types of financial instruments that are acceptable to post as the initial margin requirement. As some forms of acceptable initial margin are interest bearing, the deposit of these forms of capital allow the customer to retain the earning power.

Once a position is initiated in a futures contract, the margin account will be adjusted twice daily, based on movements in the futures market. The margin account will receive a credit if the futures market moves in favor of the customer’s position, or will be debited if the futures market moves against the position. This daily adjustment process, called marked to market, is based on the futures contract’s settlement price for that day. Every open position for a particular futures contract will be marked

to market at the end of the trading day against the same daily settlement price for that contract.

A margin call is a request from the commodity broker for the customer to deposit additional funds into their margin account. This occurs when the balance in the margin account falls below a specified maintenance margin level. The amount of the additional margin to be deposited must be enough to return the margin account balance back to the initial margin level.

Market participants receive margin calls when the futures market moves against their position.

- With a long (buy) futures position, a margin call is received if the market moves low enough to cause the margin account balance to fall below the maintenance level.
- With a short (sell) futures position, a margin call is received if the futures market moves high enough to cause the margin account balance to fall below the maintenance level.

NOTE FOR HEDGERS

A hedger’s cash market position is always opposite to their futures market position. So if the futures market moves against a hedger’s futures position, possibly resulting in a margin call, their cash market position should simultaneously be improving. This will be clarified in the later chapters highlighting hedge examples.

The margin system is a key concept which ensures the financial integrity of each and every futures and option contract cleared by CME Clearing.

To access additional information on margins, including current requirements, acceptable types, and an example of how they work, visit cmegroup.com/clearing.

CHAPTER 4 DAIRY BASIS

“Basis” is the most important factor impacting the result of a hedge strategy using either futures or options. The concept of basis is vital because it helps a dairy producer or buyer determine:

1. If they should use futures (or options) to manage the price risk of their eventual cash market purchase or sale, and if so,
2. When to initiate, modify or close out their futures or options position, and then
3. Who they should eventually buy the cash (actual or physical) dairy product from or sell to in the cash market.

What is Dairy Basis?

Dairy basis is unique to every dairy producer. Every producer receives a “milk check” at the end of the month with details outlining how the components of the milk they shipped for the month compares to the standardized levels for which they are paid. These standard levels are (3.5% for butterfat, 3.1% for protein and 5.9% for other solids). If the milk shipped is higher than these standards producers receive a premium, and if the standards are lower they receive less.

Basis is the relationship between the producer’s monthly gross pay price (also known as their “mailbox price”) and the Class III Milk price. Since producers sell a blend of milk (Class I, II, III and IV) it becomes challenging to determine basis. In order to resolve this issue, producers will typically use their mailbox price minus the announced Class III price to determine a basis.

In a perfect world, there is no basis in Class III milk prices. Class III milk futures are cash-settled to the USDA’s announced Class III price each month and this price is universal, equating to a zero basis. As noted above, producers sell more than one class of milk,

therefore basis is normally not zero. The basis reflects the correlation of the producer’s mailbox price to the Class III price. The better the correlation between the two markets, the more effective the hedge strategy will be.

BASIS EQUATION:

$$\text{MAILBOX PRICE} - \text{CLASS III MILK PRICE} = \text{BASIS}$$

Keep in mind that although the basis equation is relatively simple and the amount of time required for the calculation is minimal, the importance and value of maintaining the basis information should never be under-estimated.

EXAMPLES OF DAIRY BASIS

LOCAL MAILBOX PRICE	CLASS III MILK PRICE	BASIS
16.90/ hundredweight (cwt)	17.00/cwt	-.10/cwt (or .10 under basis)
17.00/cwt	17.00/cwt	0 (even or zero basis)
17.20/cwt	17.00/ hundredweight (cwt)	+.20/cwt (or .20 over basis)

What Futures Market Price Should Be Used?

Since there are many different contract months for the same Dairy futures product, the one the hedger uses depends on whether they are calculating a current basis or a deferred basis.

For calculating a current basis, the hedger should use today’s cash market price minus the nearby futures contract price. The nearby futures contract is the month that is closest to the current time period, but not before.

Example 1: If today is September 5, then use the October Butter futures contract

Example 2: If today is December 10, then use the January Cheese futures contract

The current basis calculation is the more common of the two and will provide an excellent history of what the basis is expected to be at any given time of the year in the cash market. Although basis history is not an exact science, it is an invaluable tool in helping to manage cash market risk.

For calculating a deferred basis, the hedger uses a forward cash market quote minus the price of the futures contract month that is closest to, but not before, the specific time period when the hedger plans to buy or sell the physical dairy product.

Example: In January, if a hedger gets a cash forward market quote for mid-March physical delivery of whey, they would use the April Whey futures contract price in calculation of the deferred basis.

$$\begin{aligned} & \text{Cash Forward Price (for mid-March delivery)} \\ & - \text{April Futures} \\ & = \text{Deferred Basis} \end{aligned}$$

A deferred basis can be compared to what hedgers expect the basis to be at a specific time period in the future. This comparison will help determine if one should use a futures contract or a cash market alternative, such as a cash forward contract, for their risk management positions. If the cash contract that is being offered has a better basis than is expected at the time of physical delivery, then they may want to choose the cash contract. However, if the expected basis is better than what is being offered via the cash market contract, then they may decide to use a futures market contract for their risk management needs.

In other words, the decision to use a futures contract or cash forward contract for hedging will depend on how the basis is expected to change from the current time period, to the time period that the hedger expects to buy or sell the physical dairy product.

How Can Basis Change?

Cash market prices and the futures market price for the same or related dairy product should be correlated, meaning that the cash market and futures market prices should move up and down together. Although the two markets should move in tandem, they don't necessarily move by the same amount. Any difference in the change in one market's price relative to the other market's price is a change in basis.

Stronger Basis

If the cash market price increases relative to the futures market price, then the basis is said to have strengthened or gotten stronger—the key word is “relative.” It highlights that a basis can strengthen when prices are moving higher or when prices are moving lower.

Stronger Basis When Price Levels Increase

Basis can strengthen if the cash market price increases by an amount greater than the increase in the futures market price.

Example: If the cash market price for cheese increased by \$0.15 per hundred weight (cwt) and the cheese futures price increased by \$0.05 per cwt, then the basis strengthened by \$0.10 per cwt from the previous basis level.

Stronger Basis When Price Levels Decrease

Basis can also strengthen when the cash market price declines by an amount less than the decline in the futures market price.

Example: If the cash market price for cheese declined by \$0.01 per pound and the Cash-Settled Cheese futures price declined by \$0.015 cents per cwt, the basis strengthened by one half of a cent per pound.

Who Benefits From a Stronger Basis?

As we have learned so far, the cash market price is a local market factor and the futures market price is a global benchmark that affects everyone who buys or sells that dairy product, regardless of where they are located. In other words, the futures contract price is identical for all market participants at any given time, while the hedger's cash market price is pertinent only to those in their local area. Therefore, the hedger's basis is a reflection of their local cash market relative to the global benchmark futures market. As such, sellers (short hedgers) of physical dairy products will benefit if and when the basis strengthens. After all, sellers prefer selling in a “strong” cash market rather than a weak cash market. Therefore, if the basis strengthens over time, the seller will receive a relatively improved higher net selling price.

Weaker Basis

If the cash market price decreases relative to a futures market price, then the basis has weakened or gotten weaker. Again, the key word is “relative.” It highlights that a basis can weaken when prices are moving lower or higher.

STRENGTHENING BASIS

Note that when a local basis number becomes more positive or less negative over time, the basis has strengthened.

Stronger Basis Movement

Strengthen
More positive or
Less negative
Benefits the Short
(selling) Dairy Hedgers



- +0.15/CWT
- +0.10
- +0.05
- +0
- 0.05
- 0.10
- 0.15/CWT

Weaker Basis When Price Levels Decrease

Basis can weaken if the cash market price decreases by an amount greater than the decrease in the futures market price.

Example: If the cash market price for Non-fat Dry Milk decreased by \$0.50 per pound and the Non-fat Dry Milk futures market price decreased by \$0.30 per pound, then the basis weakened by 20 cents per pound from the previous basis level.

Weaker Basis When Price Levels Increase

Basis can also weaken when the cash market price increases by an amount less than the increase in the futures market price.

Example: If the cash market price for butter increased by 1 cent per pound and the Cash-Settled Butter futures contract price increased by 1.2 cents per pound, the basis weakened by \$0 .002 cents per pound.

Who Benefits From a Weaker Basis?

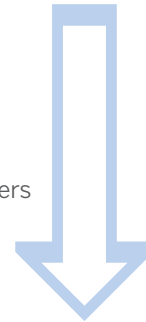
Think about the market participants who may prefer to buy in a weak cash market. Following this rationale, buyers of physical dairy products (buying hedgers) will

WEAKENING BASIS

Note that when a local basis number becomes less positive or more negative over time, the basis has weakened.

Weaker Basis Movement

Weaken
More negative or
Less positive
Benefits the Long
(buying) Dairy Hedgers



- +0.15/CWT
- +0.10
- +0.05
- +0
- 0.05
- 0.10
- 0.15/CWT

benefit if and when the basis weakens. That is, if the basis weakens over time, the buyer will pay a relatively lower net purchase price.

Getting Started With Basis

One of the first things the hedger needs to decide is how often to calculate his local basis; usually more data is better. As such, calculating the monthly basis is the most common. The hedger should use their mailbox price and the Class III announced price.

Although initiating a historical basis table and/or basis chart and moving forward may be easy, it may take a little more work to find or obtain milk checks from the past. However, hedgers may find this additional research effort very worthwhile when they begin their price risk management program. A hedger may start their research by contacting local brokers, dairy cooperatives, county extension offices, lenders, or market advisors. Also, university dairy marketing professors may have basis information for their area.

Tracking Basis

Basis can be tracked with pencil and paper, or on a computer spreadsheet. The following is a sample dairy basis worksheet.

CLASS III CASH SETTLEMENT BASIS WORKSHEET

(Example: 2012 Class III Milk for Illinois)

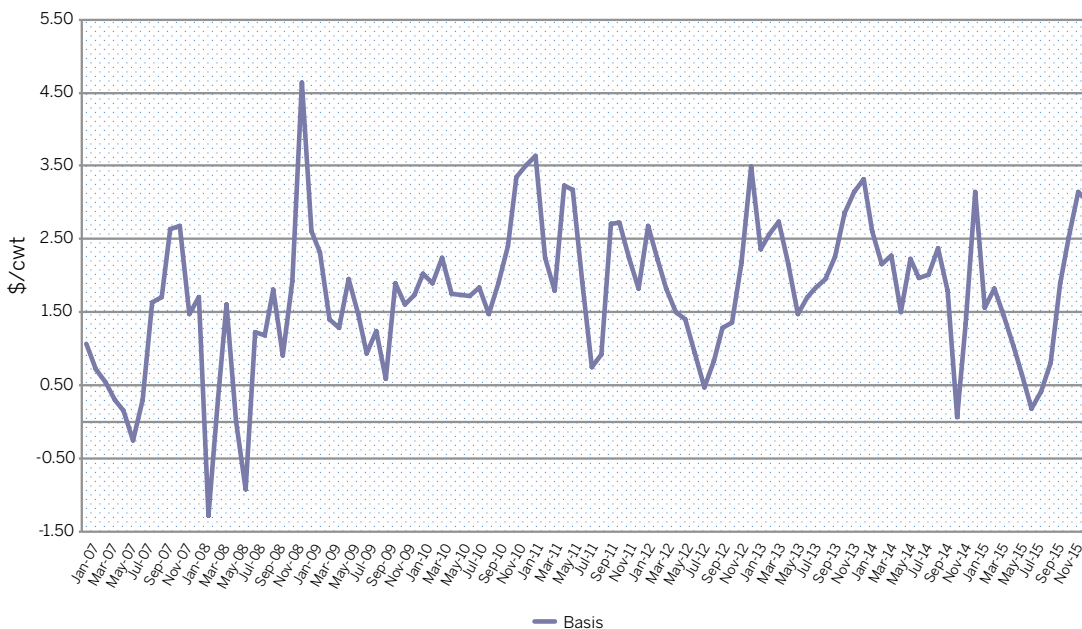
MONTH	MAILBOX PRICE	MINUS CLASS III MILK FUTURES PRICE*	EQUALS BASIS
January	19.73	17.05	2.68 (over)
February	18.27	16.06	2.21 (over)
March	17.55	15.72	1.83 (over)
April	17.23	15.72	1.51 (over)
May	16.63	15.23	1.4 (over)
June	16.57	15.63	0.94 (over)
July	17.15	16.68	0.47 (over)
August	18.57	17.73	0.84 (over)
September	20.29	19	1.29 (over)
October	22.38	21.02	1.36 (over)
November	23.02	20.83	2.19 (over)
December	22.15	18.66	3.49 (over)

*Based on USDA Settlement Price

Some hedgers may consider including an additional column for market commentary, especially if there was any unusual activity in dairy market.

The format or frequency of basis data collection is a choice. The most important thing is to just get started collecting it. Once the data is collected in tabular form, the hedger may want to create a basis chart, which will provide a visual effect of the basis changes in their local markets.

MONTHLY HISTORICAL MILK BASIS ILLINOIS



With several years of basis information, a chart can be created to highlight the strongest, weakest, average and range of basis for a particular month of the calendar year. As stated earlier, knowing what the forward quoted basis is compared to where the basis is expected to be during any calendar month of the year, will help make the decision of which risk management contract and strategy appears to work best.

Basis Summary

From the amount of information devoted to the topic of basis in this publication, it should be clear how important this concept is to price risk management. A good student of basis should have an easier task of becoming a good student of price risk management.

SEASONAL HISTORICAL CLASS III MILK BASIS 2007-2015 ILLINOIS



CHAPTER 5

HEDGING WITH DAIRY FUTURES

Hedgers use futures in a completely different way and with different objectives than speculators. Dairy hedgers use futures to manage the price risk related to buying or selling dairy products in their local markets. They use futures to lock in a known price for a dairy commodity, expecting that losses in either their cash market or futures market position are offset by gains in the other market position. There are three basic principles that must be fully understood to see the true objectives of hedging.

1. There needs to be a strong relationship (better known as correlation) between the Dairy futures price and the same or related underlying physical (cash) dairy product. This means that as futures prices move higher, the physical or specific cash market prices should move higher as well and conversely, if the cash market moves lower the futures market for the same or related product should also move lower. Note, although the prices should move in the same general direction, the price changes are not always by the exact same amount.
2. The initial futures market position is a temporary substitute for the eventual activity in the cash market. Therefore, a dairy cooperative which continuously needs to sell Class III milk will initially sell (be short) futures. Conversely, if a business is planning to buy dairy products at some later date, their initial futures hedge position will be to buy (go long) futures.
3. When hedging, the current position in the futures market is opposite to the current position in the cash market. At all times during the life of a hedge, the positions in the two markets must be opposite of each other. Note: the hedger may elect to hedge only a portion of their cash position, in other words, you don't have to be 100% hedged.

Based on the above three principles of hedging, a loss in one market should be offset by a gain in the other correlated market. It is important to realize that if the futures market position has a gain, there usually is a corresponding loss in the cash market and if there is a loss in the futures market position, then there should be a gain in the underlying cash market.

When a hedge is initiated, you don't know which market will have a gain and which market will have a loss. Regardless, the objective of establishing a buying or selling price in advance of the physical transaction will be accomplished regardless of the price movement.

In summary, the initial futures position, being a substitute for the eventual cash market position, provides protection should the risk of higher prices occur for the buyer or the risk of lower prices occur for the seller.

Hedge Results

HEDGING INCLUDES CASH + FUTURES

The result of a hedge should be the same regardless of which direction the price moves. In a properly executed hedge, one would experience a loss in one market and a gain in the other, i.e., a loss in the futures market would be offset by a gain in the cash market and vice versa. The exception may occur when there is a change in the correlation or in other words, when there is a change in basis.

A common misconception about hedging is that the hedge is only the futures market position. Remember that a hedge always consists of a futures market position and a cash market position. It is the combined result of these two market positions that determines the result of the hedge.

CHAPTER 6

SHORT FUTURES HEDGE

PRICE RISK MANAGEMENT FOR DAIRY SELLERS

The **short futures hedge** is one of the most basic price risk management strategies for an individual or firm who has intentions of selling cash (physical) dairy products at some point in the future. A potential seller of dairy products is primarily concerned about falling prices in their local markets. Other potential short hedgers would be anyone who is holding inventory and as such, is exposed to the risk of falling prices as it will negatively impact their inventory value.

Examples of Potential Short Hedgers

- Dairy producers
- Dairy cooperatives
- Dairy manufacturers (for their production)
- Food related businesses holding inventory (e.g., restaurants, food processors)

Concept and Mechanics of the Short Futures Hedge

The *concept* of a short futures hedge is to use a futures contract to manage the risk of falling prices in the hedger's local cash market at some point in the future. Price risk management can be used to protect either a short-term sale or long-term sale, as well as inventory value.

The mechanics of a short hedge consists of two necessary features:

1. The short hedge always consists of two market positions: one in the Dairy futures market and one in a local cash market. The initial short futures market position in the selling hedge is solely for the protection against falling cash dairy prices. As such, the short futures position acts as a temporary substitute for the eventual cash market sale of the actual dairy product.

As previously mentioned, at all times during the life of a hedge, the futures market position should be opposite the cash market position. For a short hedge, the initial cash market position is long the physical dairy product, which they are either producing or own (in the case of inventory). Therefore, the initial futures position of a selling hedge is short futures. These market positions of a short hedge are maintained until the time that the risk of falling prices no longer exists for that specific cash sale transaction. This occurs when the actual dairy production or inventory is sold or priced in the cash market. Immediately upon the sale or pricing of the actual dairy product or physical inventory, the futures position is no longer needed and should be offset by buying back the initial short futures position.

If a hedger does not maintain simultaneous opposite positions in the cash and futures market, it is no longer considered a hedge. It may even be considered to be a speculative transaction.

2. The cash market price and the futures market price are positively correlated, moving up and down together. Remember, that although the two markets move in the same direction, the amount of change in one market could be different than the other. As that occurs there would be a change in the basis over time. The short (selling) hedger is looking for opportunities for their local basis to strengthen at the time the hedge is closed out.

Short Hedge Results

When combining the two previously discussed features of a short hedge, if the risk of falling prices actually occurs, the lower selling price in the cash market should be offset by a gain in the futures market. If prices actually increase, the higher cash selling price will be offset by a loss in the futures market position. Regardless of the price direction, a loss in one market should be offset by a gain in the other.

Again, when initiating a short hedge, the hedger obviously does not know which market will have a gain and which one will have a loss. However, they should be secure in

knowing that they have a position in the futures market that should protect them against falling prices in their local market.

SHORT HEDGE EXAMPLE #1

Falling Prices with Basis Unchanged

DATE	MAILBOX CHECK	CLASS III MILK FUTURES MARKET	BASIS
Sep 1	Cash Forward 17.00/cwt (info. only)	Short December @ 17.10/cwt	-0.10
Nov 20	Sell Class III Milk @ 16.00/cwt	Buy December @ 16.10/cwt	-0.10
Futures	Lower selling price	1.00/cwt Gain	Unchanged

Dairy Producer sold Class III cash milk at the lower price of: \$16.00/cwt
 Dairy Producer offset his futures position for a gain of: + 1.00/cwt

Effective result of the short hedge: \$17.00/cwt

SHORT HEDGE EXAMPLE #2

Rising Prices with Basis Unchanged

DATE	MAILBOX CHECK	CLASS III MILK FUTURES MARKET	BASIS
Sep 1	Cash Forward 17.00/cwt (info. only)	Short December @ 17.10/cwt	-0.10
Nov 20	Sell Class III Milk @ 17.50/cwt	Buy December @ 17.60/cwt	-0.10
Futures	Higher selling price	0.50/cwt Loss	Unchanged

Dairy Producer sold Class III cash milk at the higher price of: \$17.50/cwt
 Dairy Producer offset his futures position for a loss of: - 0.50/cwt

Effective result of the short hedge: \$17.00/cwt

SHORT HEDGE EXAMPLE #3

Falling Prices with Stronger Basis

DATE	MAILBOX CHECK	CLASS III MILK FUTURES MARKET	BASIS
Sep 1	Cash Forward 17.00/cwt (info. only)	Short December @ 17.10/cwt	-0.10
Nov 20	Sell Class III Milk @ 15.90/cwt	Buy December @ 15.90/cwt	-0 (zero)
Results	Lower selling price	1.20/cwt Gain	0.10 Basis Gain

Dairy Producer sold Class III cash milk at the lower price of: \$15.90/cwt
 Dairy Producer offset his futures position for a gain of: + 1.20/cwt

Effective result of the short hedge: \$17.10/cwt

SHORT HEDGE EXAMPLE #4

Falling Prices with Weaker Basis

DATE	MAILBOX CHECK	CLASS III MILK FUTURES MARKET	BASIS
Sep 1	Cash Forward 17.00/cwt (info only)	Short December @ 17.10/cwt	- 0.10
Nov 20	Sell Class III Milk @15.60/cwt	Buy December@ 15.90/cwt	- 0.30
Results	Lower selling price	1.20/cwt Gain	0.10 Basis Gain

Dairy Producer sold Class III cash milk at the lower price of: \$15.60/cwt

Dairy Producer offset his futures position for a gain of: + 1.20/cwt

Effective result of the short hedge: \$16.80/cwt

Summary of Short Hedge Examples

- The effective results of #1 and #2 were identical because the basis remained unchanged, first in a falling market and then in a rising market. This highlights an important concept of hedging – the short hedge worked when the risk of falling prices occurred and also when the prices increased.
- The effective result of #3 was better than either of the first two examples because the basis improved (strengthened) by \$0.10/cwt And the lower cash selling price was protected by the initial short futures position. Note, if a dairy product seller is expecting the basis to improve over time, the short hedge should provide a better result than the initial cash forward price.
- The effective result of #4 was worse than the initial cash forward contract price because the actual basis was weaker than expected. However, the overall result of the hedge was \$1.20 better than had they not hedged.

Highlights of the Short Hedge

Regardless of the price change over time, a loss in either the cash or futures market is offset by a gain in the other market, resulting in the same net selling price. The one key factor which could affect this net outcome is a change in the basis at the time of the cash market sale. A short (selling) hedger's net result will improve if the basis strengthens, and the net result will be worse if the basis weakens at the time of the cash sale. In addition to the impact of a basis change, the short hedger needs to subtract the futures brokerage commission from the net result.

SHORT HEDGE

A short hedge is the use of two markets (cash and futures) to establish a selling price, and it is this NET selling price that will determine the profitability of the business. Although there may be different nuances to each type of dairy product, this key concept applies to any individual or firm who plans to sell milk, cheese, butter, whey or other dairy products.

CHAPTER 7

LONG FUTURES HEDGE

PRICE RISK MANAGEMENT FOR DAIRY PRODUCT BUYERS

The long futures hedge is one of the most basic price risk management strategies for an individual or firm who has intentions of buying cash (physical) dairy products at some point in the future. A potential buyer of dairy products is primarily concerned about rising prices in their local markets, which would have a negative impact on their profitability.

Examples of Potential Long Dairy Hedgers

- Dairy product manufacturers
- Restaurants
- Food processors

Concept and Mechanics of the Long Futures Hedge

The concept of a long futures hedge is to use a futures contract to manage the risk of rising prices in the hedger's local cash market at some point in the future. Price risk management can be used to protect either short-term or long-term purchases.

The mechanics of a long hedge consists of two necessary features:

1. The long hedge always consists of two market positions: one in the Dairy futures market and one in a local cash market. The initial long futures market position in a buying hedge is solely for protection against rising dairy product prices in their local cash market. At all times during the life of a long hedge, the futures market position has to be opposite the cash market position.

For a long hedge, the initial cash market position is short the physical dairy product, which means they do not currently own it but will need to buy it in the future. Therefore, the initial futures position is long futures.

The initial long futures position is a temporary substitute for the eventual purchase in the cash market.

The market positions of a long hedge are maintained until the time that the risk of rising prices no longer exists for that specific cash purchase. That occurs when the actual dairy product is bought or priced in the cash (physical) market. Immediately upon the purchase or pricing of the actual dairy product, the futures position is no longer needed and should be offset by selling back the initial long futures position.

2. The cash market price and the futures market price are positively correlated, moving up and down together. Again, remember that although the two markets move in the same direction, the amount of change in one market could be different than the other. As that occurs, there would be a change in the basis over time. The long (buying) hedger is looking for opportunities for their local basis to weaken by the time the hedge is closed out.

When combining the two previously discussed features of a long hedge, if the risk of rising prices actually occurs, the higher purchase price in the cash market should be offset by a gain in the futures market. If the price risk does not occur and prices actually fall, the loss on the futures market position is offset by a lower cash purchase price. Regardless of the price direction, a loss in one market should be offset by a gain in the other. When initiating a hedge, it is not known which market will have a gain and which market will have a loss. However, the long hedger should be secure in knowing that their position in the futures market should provide protection against rising prices in their local market.

LONG HEDGE EXAMPLE #1

Rising Prices with Basis Unchanged

DATE	CHEDDAR CHEESE CASH MARKET	CHEESE FUTURES MARKET	BASIS
May 1	Cash Forward 1.90/lb (info only)	Long November @ 1.75/lb	+ 0.15
Oct 25	Buy Cheddar Cheese @ 2.05/lb	Sell November @ 1.90/lb	+ 0.15
Futures	Higher buying price	0.15/lb Gain	Unchanged

Food processor bought cheddar cheese at the higher price of: \$2.05/lb

Food processor offset the futures position for a gain of: – 0.15/lb

Effective result of the long hedge: \$1.90/lb

LONG HEDGE EXAMPLE #2

Rising Prices with Basis Unchanged

DATE	CHEDDAR CHEESE CASH MARKET	CHEESE FUTURES MARKET	BASIS
May 1	Cash Forward 1.90/lb (info only)	Long November @ 1.75/lb	+ 0.15
Nov 20	Buy Class III Milk @ 1.75/lb	Sell December @ 1.60/lb	+ 0.15
Results	Lower buying price	0.15/lb Loss	Unchanged

Food processor bought cheddar cheese at the lower price of: \$1.75/lb

Food processor offset the futures position for a loss of: + 0.15/lb

Effective result of the long hedge: \$1.90/lb

LONG HEDGE EXAMPLE #3

Rising Prices with Weaker Basis

DATE	CHEDDAR CHEESE CASH MARKET	CHEESE FUTURES MARKET	BASIS
May 1	Cash Forward 1.90/lb (info only)	Long November @ 1.75/lb	+ 0.15
Oct 25	Buy Cheddar Cheese @ 2.25/lb	Sell November @ 2.30/lb	- 0.05
Results	Higher buying price	\$0.55/lb Gain	0.20 Basis Gain

Food processor bought cheddar cheese at the higher price of: \$2.25/lb

Food processor offset the futures position for a gain of: – 0.55/lb

Effective result of the long hedge: \$1.70/lb

LONG HEDGE EXAMPLE #4

Rising Prices with Stronger Basis

DATE	CHEDDAR CHEESE CASH MARKET	CHEESE FUTURES MARKET	BASIS
May 1	Cash Forward 1.90/lb (info only)	Long November @ 1.75/lb	+ 0.15
Oct 25	Buy Cheddar Cheese @ 2.55/lb	Sell November @ 2.30/lb	+ 0.25
Results	Higher buying price	\$0.55/lb Gain	0.10 Basis Loss

Food Processor bought Cheddar cheese at the higher price of: \$2.55/lb

Food Processor offset the futures position for a gain of: – 0.55/lb

Effective result of the long hedge:

\$2.00/lb

Summary of Long Hedge Examples

- The effective results of #1 and #2 were identical because the basis remained unchanged, first in a rising market and then in a falling market. This highlights an important concept of hedging – the long hedge worked when the risk occurred (higher prices) and also when the prices declined.
- The effective result of #3 was better than either of the first two examples because the basis improved (weakened) by \$0.20/lb And the higher cash buying price was protected by the initial long futures position. Note, if a dairy product buyer is expecting the basis to improve over time (weaken), then the long hedge should outperform the initial cash forward price.
- The effective result of #4 was worse than the initial cash forward contract price because the basis strengthened more than expected. However, the overall result of the hedge was still \$0.55/lb better than had they not hedged.

Highlights of the Long Hedge

Regardless of the price change over time, a loss in either the cash or futures market is offset by a gain in the other market, resulting in the same net buying price. The one key factor which could affect this net outcome is a change in the basis at the time of the cash market purchase. A long (buying) hedger's net result will improve if the basis weakens, and the net result will be worse if the basis strengthens at the time of the cash purchase. In addition to the impact of a change in the basis, the long hedger must add the futures brokerage commission to the net purchase price.

LONG HEDGE

A long hedge is the use of two markets to establish an effective purchase price, and it is this net purchase price that will determine the profitability of the business. Although there may be different nuances to each type of dairy product, this basic and key concept applies to any individual or firm who plans to buy dairy products that are correlated to the CME Group Dairy products.

CHAPTER 8

OVERVIEW OF THE DAIRY OPTIONS MARKET

The array of dairy risk management tools offered by CME Group includes options on Class III, Class IV and Non-fat Dry Milk, Cash-Settled Cheese, Cash-Settled Butter and Dry Whey. These option contracts can be utilized in a variety of ways to provide protection and opportunity. For example, a dairy product producer using options could obtain downside protection similar to a short futures position, but unlike a short futures hedge, they also retain the opportunity to benefit from higher prices. Conversely, a dairy product buyer could obtain upside price protection much like a long futures hedge, but unlike a long futures hedge, they may still have the opportunity to benefit from lower prices.

This is possible because of the foundation of an option contract: options convey rights and not obligations. The rights in an option are either to buy (call option) or to sell (put option) the underlying Dairy futures contract, but they are not obligated to do so. For every option that is traded, there is a buyer and a seller. The option buyer pays the premium (cost of the option) to receive the rights within the specific option. Since an option buyer has rights and no market obligations to perform, they do not have performance bond/margin requirements with their position.

On the other hand, the option seller who received the premium for selling those rights has a market obligation to fulfill them and as such, they will have performance bond/margin requirements.

In order to use Dairy options as effective risk management tools, it is imperative to understand the unique terminology, concepts and pricing of these instruments.

Option Terminology

An option is a legally binding contract that provides the buyer with the right, but not an obligation, to either buy or sell an underlying commodity at a specific price within a specific time period in exchange for a premium.

Calls versus Puts

There are two types of options: call options and put options.

Dairy call options contain the right to buy a specific Dairy futures contract at a specific price prior to a specific expiration date.

Dairy put options contain the right to sell a specific Dairy futures contract at a specific price prior to a specific expiration date.

It is important to note that calls and puts are two completely separate and distinct option contracts. They are not offsetting contract positions.

Call Option Positions

For every call option, there is a call buyer and a call seller; just as with futures, one could elect to initially go long (buy) or short (sell) a call option. A long call option is the opposite and offsetting position to a short call option of the same type.

The call option buyer pays a premium and receives the right to buy the underlying Dairy futures contract. Since the call option buyer has the *right* to take a long futures position and not an obligation, they do not have to post or maintain margin or a performance bond. They are only required to pay the call option premium up front. A call option buyer is also referred to as a “holder”, meaning they are holding the rights to buy the underlying Dairy futures contract. **It is important to note that if the call buyer does exercise the option and is assigned a long futures position, he then must post the initial margin required for that specific futures contract.**

The call option seller is also known as either a “writer” or “grantor,” as they grant the rights to buy and are then obligated to sell the underlying Dairy futures contract. The call option seller receives the premium in exchange for granting the rights to the buyer. They have an obligation

to sell the underlying Dairy futures contract to the call option buyer, if and when the call option buyer decides to “exercise” the call option, i.e., to use the rights conveyed in the option. The call option seller must post and maintain a performance bond or margin account to ensure that the rights will be fulfilled if and when the call buyer so chooses.

CALL OPTION EXERCISE NOTE:
 Only the call option buyer can exercise (use) the right to buy Dairy futures. The call option seller is obligated to fulfill that right any time the buyer chooses to exercise it. The call option is an American style option, meaning that it can be exercised by the call option buyer at any time from when the option is bought until it expires.

A call option is offset by taking the opposite position in an identical call option. In other words, if a call is initially bought and later an identical call is sold, the option positions are offset and the initial option buyer is out of the market. Likewise, if a call is initially sold and later an identical call is purchased, the two option positions are offset and the initial option seller is out of the market.

Put Option Positions

For every put option, there is a put buyer and a put seller. A long (buy) put option position is the opposite and offsetting position to a short (sell) put option.

The put option buyer pays a premium and receives the right to sell the underlying Dairy futures contract. Since the put option buyer has the right to take a short futures position and not an obligation, they do not have to post or maintain performance bond or margin. They are only required to pay the full amount of the put option premium up front. A put option buyer is also referred to as a “holder”, meaning they are holding the rights to sell the underlying Dairy futures contract. **Again, note that if the put buyer does exercise the option and is assigned a short futures position, he then must post the initial margin required for that specific futures contract.**

The put option seller is also known as the “writer” or “grantor,” as they grant the rights to sell and are obligated to sell the underlying Dairy futures contract. The put option seller receives the option premium in exchange for granting the rights to the buyer. The put option seller has an obligation to buy the underlying Dairy futures contract if and when the put option buyer decides to “exercise” the put option, i.e., use the rights conveyed in the option. To ensure

that the rights will be fulfilled, the put option seller must post and maintain a performance bond or margin account.

A put option is offset by trading the opposite position in an identical put option. In other words, if a put option is initially bought, and later an identical put is sold, the option positions are offset and the initial put option buyer is out of the market. Likewise, if a put option is initially sold and later an identical put option is bought, the two option positions are offset and the initial put option seller is out of the market.

PUT OPTION EXERCISE NOTE:
 Only the put option buyer can exercise (use) the right to sell Dairy futures. The put option seller is obligated to fulfill that right any time the buyer chooses to exercise it. The put option is an American style option, meaning that it can be exercised by the put option buyer at any time from when the option is bought until it expires.

SUMMARY OF OPTION POSITIONS

OPTION POSITION	PUT OPTION EX. 17.00 CLASS III MILK PUT	CALL OPTION EX. 1.72 CASH-SETTLED CHEESE CALL
Long (buy) Option Position (Pays option premium)	Right to sell Class III Milk futures at 17.00	Right to buy Cash-Settled Cheese futures at 1.72
Short (sell) Option Position (Receives option premium)	Obligation to buy Class III Milk futures at 17.00	Obligation to sell Cash-settled Cheese futures at 1.72

IMPORTANT NOTE FOR SELLING OPTIONS
 Due to the amount of risk associated with selling either call options or put options, many option sellers will look to minimize this risk by taking another position in a related futures, option or cash market contract. Depending on the trader’s objectives, the option seller could be either a hedger with specific risk management objectives, or a speculator with specific opinions on market movement.

Strike Price

The option strike price is the price at which the underlying futures position will be assumed if the option is exercised, i.e., the price of the long futures position in the case of a call, or a short futures position in the case of a put. Strike prices are also referred to as exercise prices.

Option traders will choose from an initial array of option strike prices in intervals established by the Exchange for each dairy product. As the underlying Dairy futures market moves in either direction, the Exchange will make additional strike prices available for trading. Note that each strike price represents a different option contract. Once an option is either bought or sold, the chosen strike price is a specific fixed part of that option contract.

Underlying Contract

A Dairy option's underlying contract is the respective Dairy futures contract of a specific contract month. For example, the underlying contract to a December Dry Whey option (call or put) is a December Dry Whey futures contract. The underlying contract to a September Cash-Settled Butter option (call or put) is a September Cash-Settled Butter futures contract.

Standard options contract months are listed to correspond to the same months as the underlying futures. Standard Dairy options become available for trading at least one day following the first day of trading of the underlying Dairy futures. As such, some Dairy options will be available months or even years in advance of their expiration.

SHORT-TERM OPTION ALTERNATIVES

CME Group offers some agricultural options with shorter life cycles that are not currently available for the Dairy products. However, these short term options may be useful to the dairy producers who need to purchase feed. They are used by hedgers who want short-term protection at a relatively lower cost and for short-term opportunities. Grain and Oilseed **serial** options are listed for the months which are not a part of the standard futures contract cycle, and usually have a lifespan of up to 90 days until to expiration. **Weekly** Grain and Oilseed options are listed to expire every Friday that is not an expiration of a standard or serial option. Hedgers may use Weekly options to manage "event driven" risk, e.g., to obtain price protection or take a position in the market prior to a major government report. Additionally, CME Group offers **Short-Dated New Crop (SDNC)** options on Corn, Soybeans and Wheat (Chicago Soft Red Winter and KC Hard Red Winter).

The primary advantage to serial, Weekly and SDNC options is that they usually trade at a lower premium due to their shorter duration, which means the cost of short term risk management is relatively less. This will become clearer in the discussion on option premium.

Option Expiration

Call and put option rights have an expiration date, after which the option can no longer be exercised by the option buyer and the value of those expired options is zero.

DAIRY OPTION EXPIRATION INFORMATION

Dairy options trading terminates on the business day immediately preceding the day the USDA announces the dairy prices (Class III Milk, Class IV Milk, Non-fat Dry Milk, Butter, Cheese and Dry Whey) for that month. On the last trading day, trading ceases at 12:10 p.m. (Chicago time).

Option Pricing

Premium is one of the most important concepts in Dairy option trading. The premium is the price or cost of the option paid by the option buyer and received by the option seller. Premiums are also referred to as the current value of the rights in an option.

Although the initial option premium is fixed as a cost to the option buyer, the price or value of the option will fluctuate throughout the option's life. In other words, when an option is bought, the initial premium paid is the maximum cost of that option strategy to the buyer. If an option is initially sold, the initial premium collected is the maximum gain on that strategy to the seller.

Premium is the only term of an option contract that is negotiated in the marketplace, on CME Globex. Option premiums are not set by the Exchange.

Although the option premium is quoted as a single price, it can be broken down into two components: Intrinsic Value and Time Value:

$$\text{Option Premium} = \text{Intrinsic Value} + \text{Time Value}$$

So what are the major factors that could impact and change the premium throughout the life of an option? Let's review the market factors that affect these two key components.

Intrinsic Value

Intrinsic value is the value of an option if it is exercised immediately. Intrinsic value is determined by the relationship between the Dairy option strike price and the current underlying Dairy futures price.

A call option has intrinsic value if the strike price is lower than the underlying futures price. In other words, it gives the holder the right to buy (or go long) futures at a price that is below the current futures price. The intrinsic value is the difference between the strike price and the underlying futures price.

For example, if an April Cash-Settled Butter call option has a strike price of 149.00 (i.e., the right to buy April Cash-Settled Butter futures at \$1.49/lb) and the underlying April Cash-Settled Butter futures contract is currently trading at 1.50, the call option's intrinsic value is \$0.01/lb.

A put option will have intrinsic value if the put strike price is higher than the underlying futures price. In other words, it gives the holder the right to sell (or go short) the underlying Dairy futures at a price that is above the current underlying futures price.

For example, if a May Cash-Settled Cheese put option has a strike price of 170, i.e., contains the right to sell May Cash-Settled Cheese futures at 1.70/lb) and the underlying May Cash-Settled Cheese futures contract is currently trading at 1.65, the intrinsic value of that put option is \$0.05/lb.

Option Classifications

A Dairy option may be classified in one of three ways at any point in its life, based on the relationship between the strike price (a fixed element of the Dairy option) and the current underlying Dairy futures contract price (a variable element).

In-the-Money Dairy options are options that have intrinsic value. A call option is in-the-money when the strike price is below the current Dairy futures price, and a put option is in-the-money when the strike price is above the current underlying Dairy futures price.

At-the-Money Dairy options are options whose strike price is identical or close to the underlying Dairy futures price. At-the-money Dairy options have no intrinsic value—this applies to both calls and puts.

Out-of the-Money options also have no immediate intrinsic value. A Dairy call option is out-of-the-money when the strike price is above the current underlying Dairy futures, and a Dairy put option is out-of the-money when the strike price is below the current Dairy underlying futures.

Note that option classifications apply to the current time period. In other words, as the underlying futures price changes, the option classification may change as well, i.e., move from out-of the money to at- or in-the-money, and vice versa.

Time Value

The option's time value is simply the option premium minus the intrinsic value:

$$\text{Time Value} = \text{Option Premium} - \text{Intrinsic Value}$$

Mathematically, calculating intrinsic or time value is relatively simple. However, determining what affects an option's time value is a little more complex. Time value is impacted by time remaining to expiration, volatility, and interest rates. Time to expiration and volatility are the two most dominating factors.

Time, or the number of days to expiration, is the obvious factor that impacts time value. Everything else remaining equal, the greater the amount of time left in the life of an option, the greater the time value portion of the premium. "Time decay" is the decline in time value as there are fewer days remaining until option expiration. Time value decay occurs at an increasing rate as expiration approaches. This works against option buyers and in favor of option sellers.

TIME VALUE AND OPTION PREMIUM

Generally speaking, the premiums associated with standard, serial and Weekly options are heavily affected by the option's time value. Standard options usually have the longest lifespan, followed by serial options and then Weekly options. As such, serial and Weekly options are usually lower cost alternatives to managing short term agricultural price risk. Their shorter lifespans mean lower time value, resulting in lower premiums. Keep in mind that these shorter-term options are currently not available for dairy products, however, they may be available on other agricultural products (i.e., feed related), that impact the dairy producer.

Volatility is the other major factor that impacts an option's time value. All else remaining equal, the greater the volatility of the underlying dairy market, the greater the option time value.

Time value depreciates at an increasing rate throughout the life of an option, and equals zero at option expiration. If the option has any value at expiration, it is all intrinsic value.

Option Premium Movement

Dairy call option and put option premiums react differently when the underlying Dairy futures contract price changes.

Call option premiums have a direct relationship with changes in the underlying futures contract price. As such, Dairy call premiums should increase as the underlying Dairy futures contract price increases and should decrease as the underlying futures contract price decreases. In other words, the rights to buy at the call option strike price should become more valuable as the underlying futures contract price moves higher, and decline in value as the underlying futures contract price moves lower.

Conversely, put option premiums have an inverse relationship with changes in the underlying futures contract price. As such, Dairy put premiums should increase as the underlying Dairy futures price decreases and decline as the underlying futures price increases. In other words, the rights to sell at the put option strike price should become more valuable as the underlying futures contract price moves lower, and decline in value as the underlying futures contract price moves higher.

A more advanced study of option pricing would include the “Greeks.” Option pricing models, such as Black-Scholes, have been developed to calculate theoretical option premiums, and “Greeks” are byproducts of those models, measuring the sensitivity of option prices to various additional factors.

For the purposes of the dairy hedger, the main Greek factor to take into consideration is the option’s “**Delta,**” which is the change in a dairy option premium for a given change in the underlying Dairy futures price. It is often referred to as the “hedge ratio”, as it indicates how many options are needed at any point in time to offset the risk of a price change in the underlying cash commodity or futures.

Other Greek factors are:

Vega: option premium sensitivity to a change in volatility

Theta: the sensitivity of option premium to time decay

Gamma: the sensitivity of a change in option premium due to a change in Delta

Although a thorough working knowledge of the Greeks is not necessary to use Dairy options as an effective price risk management tool, it may be helpful to be aware of some market factors that other option traders take into consideration.

OPTION PREMIUM MOVEMENT

	CALL OPTION	PUT OPTION
Futures price declines	Call premium declines	Put premium increases
Futures price increases	Call premium increases	Put premium decreases

PREMIUM

Remember that premium is the most important option element that impacts the use, choice and profitability of trading options for dairy price risk management. Option buyers pay the premium and option sellers receive the premium.

Dairy Option Quotations

Dairy futures and option contracts are quoted in either pounds or 100 pound units called hundredweights (cwt). For example, Class III Milk trades in 200,000 pound futures and option contracts, which is equivalent to 2,000 hundredweight. As such, option pricing can be referenced in either cents per pound, or dollars per hundred pounds.

Example of Dairy futures and option pricing:

Class III Milk futures at 17.94 is \$0.1794/lb or \$17.94/cwt

Cash-Settled Cheese option strike price of \$172.5/cwt or \$1.72/lb

Where Can I Find Option Premiums?

Premiums for Dairy options can be acquired from a variety of sources including:

- CME Group website at cmegroup.com
- Commodity brokers
- Quote vendors
- Newspapers

CHAPTER 9

OPTION STRATEGIES FOR DAIRY PRODUCT BUYERS

A buyer of physical dairy products will be impacted negatively should market prices rally. The earlier chapters of this publication covered the use of a futures contract to hedge or lock in a purchase price, thereby eliminating the risk of higher prices. However, the long futures strategy does not allow the buyer to benefit from more favorable prices should the market decline.

Some Dairy option risk management strategies offer price protection similar to the long futures hedge but unlike the futures hedge, buyers will also be able to benefit from lower dairy market prices. A key benefit of including Dairy options is the flexibility they offer to price risk management plans. By using options, futures, and cash market alternatives either alone or in combination, the long dairy hedger can eliminate, minimize or adjust their price risk exposure to a level they are comfortable with.

There are two primary option strategies for the long (buying) dairy hedger that highlight the benefits and flexibility of using Dairy option products: the Long Call option strategy and the Long Call/Short Put Combination strategy.

Long Call: Establishing a “Maximum” Purchase Price

The long call strategy provides both protection against upside market risk and the opportunity to buy at a lower price if the markets decline. Hence, the long call option strategy will establish a maximum purchase price without limiting the downside potential.

The buying hedger can choose from a multitude of option strike prices, which provide different levels of risk management at varying costs (premiums). In other words, each different strike price represents a different call option and therefore will establish a different maximum purchase price.

Why don't all dairy buying hedgers use options rather than futures? It comes down to one key element of the option markets: the premium.

Long Call Maximum Purchase Price Equation

The premium of the long call needs to be factored into the results of the Dairy option strategy. Also, because the call option is being used to protect a cash market purchase, the equation must also include the basis in addition to the futures commission.

Expected Maximum Purchase Price =

Call Strike Price + Call Premium + Expected Basis + Brokerage Commission

CALL STRIKE PRICES AND OPTION PREMIUM

Remember that choosing a different strike price will result in a different option cost and therefore a different strategy result. The following example shows how different strike prices can impact the net purchase price, using an expected basis of + \$0.05 (over) the futures. Commission is not included in this example.

JULY CLASS III MILK FUTURES @ \$17.75

17.00 (CALL STRIKE) + 1.12 (PREMIUM) + 0.05 (EXPECTED BASIS) = \$18.17/CWT

17.25 (CALL STRIKE) + .96 (PREMIUM) + 0.05 (EXPECTED BASIS) = \$18.26/CWT

17.50 (CALL STRIKE) + .82 (PREMIUM) + 0.05 (EXPECTED BASIS) = \$18.37/CWT

17.75 (CALL STRIKE) + .70 (PREMIUM) + 0.05 (EXPECTED BASIS) = \$18.50/CWT

The lower the call strike price, the higher the premium and the lower the maximum purchase price. However, if market prices decline, the higher strike price option which costs the least will yield the best net price for the buying hedger.

Long Call Strategy: Advantages

- Risk is limited to the cost of the premium paid for the option
- Protection against higher purchasing price levels
- Opportunity to buy at lower prices remains
- Weaker basis at the time of the dairy purchase will lower the effective buying price
- No margin requirements
- Variety of strike prices offering different levels of protection
- Hedger retains the flexibility to choose the cash market supplier of dairy products

Long Call Strategy: Disadvantages

- Must pay the full amount of the call option premium when the position is initiated
- Stronger basis at the time of the dairy purchase will increase the effective purchase price
- Brokerage commission must be paid

Long Call Strategy Example

A cheese manufacturer decides to hedge against higher Class III milk prices by purchasing Class III Milk call options for an anticipated purchase in early March

Initial Market Conditions:

- March Class III Milk futures are currently at \$17.00/cwt
- March 1700 Class III Milk Call option is trading at a premium of \$0.65/cwt
- Expected local cash basis in early March is +0.05/cwt over the March futures

The following are three different scenarios that could occur when the cash Class III milk is purchased:

MARCH CLASS III MILK FUTURES	BASIS	MAILBOX CHECK	1700 CALL OPTION VALUE AT EXPIRATION	CALL OPTION – GAIN OR + LOSS	PURCHASE PRICE CASH PRICE +/- CALL OPTION GAIN/LOSS
16.00/cwt	+0.05	16.05	0	+ 0.65 Loss	16.70
17.00/cwt	+0.05	17.05	0	+ 0.65 Loss	17.70
18.00/cwt	+0.05	18.05	1.00	- 0.35 Gain	17.70

Example Notes:

- As the risk of higher futures prices occurs, the cash purchase price will also be higher but the gain on the long Dairy call option will offset the increase in the dairy cash market. Therefore, the net purchase in a rising market is capped at a maximum level.
- If the market moves lower, the cash milk purchase price will be lower and the loss on the long Dairy call option is capped at the premium paid. Therefore, the long dairy hedger has the opportunity to improve their effective cash purchase price. Note that in this situation the buying hedger using a long call option will actually “lose” money on the option, while benefitting from a better (lower) net purchase price. It is important to remember that the effective net purchase price is going to determine the profitability of the dairy operation, and not whether there was a gain or loss on the option position.
- Another factor that could impact the results of the long call option strategy is if the basis is different than expected at the time of the cash market purchase. If it is weaker (+0.02) the net purchase price will be lower and if it is stronger (+ 0.10), the net purchase price will be higher.
- The long call option strategy also allows the buying hedger to choose the cash market supplier, which is usually the cash market participant offering the best cash price, or in other words, the best(weakest)basis.

Long Call/Short Put Combination – Establishing a Purchase Price Range

There could be a variety of reasons why a dairy buyer would want to establish a purchase price range by simultaneously buying a Dairy call option and selling a Dairy put option. The most obvious reason is that this strategy provides yet another alternative to manage the risk of higher prices in the local dairy cash market. Another reason is that the premium collected by selling the Dairy put option effectively lowers the cost of the upside protection provided by purchasing a Dairy call option.

However, selling the put option not only lowers the maximum purchase price set by the call, it also establishes a minimum (or floor) purchase price. In other words, the opportunity for a lower purchase price is limited with the sale of the put option. As such, buying hedgers will usually choose to sell an out-of-the money put option.

The difference between the call strike price and the put strike price will determine the purchase price range. There are many different Dairy call and put option strike prices that a buying hedger can choose from, allowing them to effectively determine the parameters of their buying price range.

Long Call/Short Put Combination: Purchase Price Range

Price Range Calculations

Unlike the long futures or long call option strategies that require a single calculation, the Long Call/Short Put Combination strategy requires two calculations: one determines the maximum (ceiling) purchase price of the range and the other determines the minimum (floor) price. The call premium paid and the put premium collected are factored into the results of the strategy. Also, because the call and put options are being used to protect a cash market purchase, the calculation must also include the basis in addition to the brokerage commission.

Long Call/Short Put Combination – Expected Maximum Purchase Price:

Call Strike Price + Call Premium – Put Premium + Expected Basis + Brokerage Commission

Long Call/Short Put Combination – Expected Minimum Purchase Price:

Put Strike Price + Call Premium – Put Premium + Expected Basis + Brokerage Commission

LONG CALL/SHORT PUT STRIKES

Options with different strike prices will also have different premiums, which will result in different purchase price ranges. Although the objective of selling a put in combination with the call option is to lower the cost of the upside market risk, the short put also establishes a minimum purchase price. In other words, the long hedger's downside opportunity is limited.

Long Call/Short Put Combination Strategy – Advantages

- Put premium received reduces cost of price protection
- Retain some opportunity for lower purchase prices
- Weaker basis at the time of the dairy purchase will lower the effective buying price
- No margin on the call option
- Variety of strike prices offers different purchase price ranges
- Hedger retains the flexibility to choose the cash market supplier of dairy and/or dairy products

Long Call/Short Put Combination Strategy – Disadvantages

- Must pay the full amount of the call option when the position is initiated
- Establishes a minimum purchase price
- Margin required on the short put option
- Short put option may be exercised earlier than expected
- Stronger basis at the time of the dairy purchase will increase the effective purchase price
- Brokerage commission must be paid for the call and put option

Long Call/Short Put Combination Strategy – Example

A cheese manufacturer decides to hedge against higher Class III milk prices by purchasing Class III Milk call options and selling CME Class III Milk put options.

Initial Market Conditions:

- March Class III Milk futures are currently at \$17.00/cwt
- March 1700 Class III Milk Call option is trading at a premium of \$0.65/cwt
- March 1650 Class III Put option is trading at a premium of \$0.25/cwt
- Expected local cash basis in early March + 0.05/cwt over the March futures

The following are three different scenarios that could occur when the cash milk is purchased:

MARCH CLASS III MILK FUTURES	BASIS	MAILBOX CHECK	1700 CALL OPTION VALUE AND 1600 PUT OPTION VALUE AT EXPIRATION	RESULTS FOR LONG CALL SHORT PUT & NET RESULT	PURCHASE PRICE = CASH PRICE +/- NET OPTION GAIN/LOSS
16.00/cwt	+.05	16.05	0 call/0 put	+ .65 Call loss – .25 put gain Result: +0.40 net loss	16.45/cwt
17.00/cwt	+.05	17.05	0 call/0 put	+ .65 Call loss – .25 put gain Result: +0.40 net loss	17.45/cwt
18.00/cwt	+.05	18.05	1.00 call/0 put	- .35 call gain -.25 put gain Result: -0.60 net gain	17.45/cwt

Example Notes:

- As the risk of higher Dairy futures market prices occurs, the cash milk purchase price will also be higher, but the gain on the long Dairy call option and the short Dairy put option will offset the increase in the cash market. Therefore, the net purchase price in a rising market is capped at a maximum level. This is a lower maximum price level than that of the previously discussed Long Call strategy; the amount of premium collected for selling the put is the difference in the lower maximum price.
- If the market moves lower, the cash purchase price will be lower. However, the hedger will experience a maximum loss of the premium paid on the long call component of the strategy, and increasing losses on the short put option component. Therefore, unlike the Long Call strategy, the opportunity for a lower net purchase price in a falling market is limited because of the short option position.
- The effective price range is determined by the difference in the call and put option strike prices. In the above example, the price range of (1.00/cwt) was determined by the difference in the call strike price (1700) and the put strike price (1600). Depending on the risk level a long hedger is willing to assume, the purchase price range established by this strategy could vary by choosing different strike prices.
- Another factor that could impact the results of the Long Call/Short Put Combination strategy is if the basis is different than expected at the time of the cash market purchase. If it is weaker (+ 0.03/cwt) the net purchase price will be lower and if it is stronger (+ 0.08/cwt), the net purchase price will be higher. Also, the scenarios assumed there is no time value left at the expiration of the strategy. If there is time value remaining, it will impact the effective purchase price.
- The Long Call/Short Put Combination strategy also allows the buying hedger to choose the cash market supplier, which is usually the one offering the best cash price, or in other words, the best (weakest) basis.

Long Hedger Highlights

This booklet has illustrated three different ways that a dairy product buyer can use futures or options to manage the risk of higher market prices.

- The *Long Futures strategy* establishes a “purchase price level” regardless of whether the market risk occurs (higher prices) or does not occur (lower prices).
- The *Long Call strategy* establishes a “maximum purchase price level” which provides protection if the market risk occurs, but also the opportunity for a lower price if the market declines.
- The *Long Call/Short Put Combination strategy* establishes a purchase price “range”, which is determined by the difference in the call and put strike prices.

These three strategies are just a few of the numerous alternatives that are available to manage the dairy product buyer’s price risk by using futures, options and combinations of contracts. They provide the dairy buying hedger with the flexibility to adjust their market risk exposure to a level that they are willing to assume. A dairy buyer may want to contact their broker, market advisor or state dairy marketing specialist to discuss additional strategies to manage their risk.

CHAPTER 10

OPTION STRATEGIES FOR DAIRY PRODUCT SELLERS

Remember that the selling hedger has downside market risk. That is, the profitability of a dairy product seller will be impacted negatively should market prices fall. The early chapters covered the use of a futures contract to hedge or lock in a selling price, thereby eliminating the risk of lower prices. While the short futures strategy mitigates the selling hedger's risk of a price decline, it does not allow him to benefit from more favorable prices should market prices increase.

Dairy options are another tool to manage the downside price risk associated with selling dairy products. Some of the option strategies will provide downside price protection similar to the short futures hedge but unlike the short futures hedge, dairy product sellers will also be able to benefit from higher market prices.

A key benefit of adding Dairy options to a portfolio is the flexibility they add to price risk management plans. By using options, futures and cash market alternatives either alone or in combination, the short hedger can eliminate, minimize or adjust their price risk exposure to a level they are comfortable with.

Two of the primary option strategies that highlight the benefits and flexibility of using Dairy options to protect a selling price are the Long Put option, and Long Put/Short Call Combination strategy.

Long Put: Establishing a “Minimum” Selling Price

Similar to the short futures hedge, a long put option strategy will provide price protection against lower prices but unlike the short futures hedge, the long put strategy also provides additional opportunity for a more favorable selling price should the market move higher. Hence, the long put option strategy will establish a minimum selling price while not limiting the upside potential.

The short (selling) dairy hedger can choose from a multitude of put option strike prices, which provide different levels of risk management at different costs. In other words, each strike price represents a different put option and therefore, will establish a different minimum selling price.

So why don't all short (selling) dairy hedgers use the put option market rather than short futures if the put provides both price protection and opportunity? Again, it comes down to one key element of the option markets: premium.

Long Put Minimum Selling Price Equation

The cost of the long put option needs to be factored into the strategy results. Also, because the put option is being used to protect a cash market sale, the equation must also include the basis, in addition to the brokerage commission.

Expected Minimum Selling Price =

Put Strike Price - Put Premium + Expected Basis - Brokerage Commission

PUT STRIKE PRICES AND OPTION PREMIUM

Remember that choosing a different strike price will result in a different option cost and therefore a different result of the strategy. The following examples shows how different put strike prices can impact the net selling price, using an expected basis of - 0.02 (under). Commission is not included in this example.

CME APRIL CHEESE FUTURES @ 1.75/lb

1700 (put strike) – 0.05 (premium) – 0.02 (expected basis) = \$1.63/lb
 1750 (put strike) – 0.07 (premium) – 0.02 (expected basis) = \$1.66/lb
 1800 (put strike) – 0.10 (premium) – 0.02 (expected basis) = \$1.68/lb
 1850 (put strike) – 0.13 (premium) – 0.02 (expected basis) = \$1.70/lb

The higher the put strike price, the higher the premium, but the resulting minimum selling price is also higher. However, should market prices rally, the lower strike price put option which cost the least will yield the best net selling price for the hedger

Long Put Strategy – Advantages

- Risk is limited to the cost of the premium paid for the option
- Protection against the risk of lower price levels
- Opportunity for higher prices remains
- Stronger basis at the time of the actual dairy sale will raise the effective selling price
- No margin requirements
- Variety of strike prices offering different levels of protection
- Short hedger retains the flexibility to choose the cash market buyer

Long Put Strategy – Disadvantages

- Must pay the full amount of the put option premium when the position is initiated
- Weaker basis at the time of the dairy sale will lower the effective selling price
- Brokerage commission must be paid

Long Put Strategy – Example

A cheese exporter decides to hedge inventory against falling prices by buying CME Cash-Settled Cheese Put options.

Initial Market Conditions:

- April Cheese futures are currently at \$1.75/lb
- April 1750 Cheese put option is trading at a premium of \$0.07/lb
- Expected local cash basis in early April is – 0.02/lb (under) the April futures

The following are three different scenarios that could occur when the cash milk is sold:

APRIL CLASS III MILK FUTURES	BASIS	MAILBOX CHECK	1750 PUT OPTION VALUE AT EXPIRATION	LONG PUT GAIN (+) OR LOSS (-)	SELLING PRICE = CASH PRICE +/- PUT OPTION GAIN OR LOSS
1.60/lb	– 0.02/lb	1.58/lb	0.15/lb	+ .08/lb gain	1.66/lb
1.65/lb	– 0.02/lb	1.63/lb	0.10/lb	+ .03/lb gain	1.66/lb
1.75/lb	– 0.02/lb	1.73/lb	0	- .07/lb loss	1.66/lb
1.85/lb	– 0.02/lb	1.83/lb	0	- .07/lb loss	1.76/lb
1.90/lb	– 0.02/lb	1.83/lb	0	- .07/lb loss	1.81/lb

Example Notes:

- As the risk of lower futures prices occurs, the cash selling price will also be lower but the gain on the long put option will offset the decline in the cash market. Therefore, the net sale price in a falling market is set at a minimum level.
- If the market moves higher, the cash selling price will also be higher and the loss on the long put option is capped at the premium paid. Therefore, in a rising market the short dairy hedger has the opportunity to improve their effective cash selling price. Note that in this situation, the selling hedger using a long put option will actually “lose” money on the option, while benefitting from a better (higher) net selling price. It is important to remember that the effective net selling price (combined results of the cash market and put option positions) is going to determine the profitability of the dairy operation, and not whether there was a profit or loss on the put option position.
- Another factor that could impact the results of the long put option strategy is if the basis is different than expected at the time of the cash market sale. If it is stronger (e.g., + 01) the net selling price will be higher and if it is weaker (e.g., - 0.05), the net selling price will be lower.
- The long put option strategy also allows the selling hedger to choose the cash market buyer, which is usually the dairy buyer offering the best cash price, or in other words, the best (strongest) basis.

Long Put/Short Call Combination: Establishing a Selling Price Range

There could be a variety of reasons why a dairy short hedger would want to establish a selling price range. The most obvious reason is that the Long Put/Short Call strategy provides yet another way to manage the risk of lower prices in the local cash market, at a lower cost because of the premium collected by selling the call option. Effectively this strategy lowers the cost of the downside price risk management provided by purchasing the put.

However, by selling the call option, not only is the minimum selling price set by the long put increased, there is also a maximum (or ceiling) selling price established. In other words, the opportunity for a higher selling price

is limited with the sale of the call option. As such, selling hedgers will usually choose to sell an out-of-the money call option.

The difference between the put strike price and the call strike price will determine the selling price range. There are many different put and call option strike prices that a short (selling) dairy hedger can choose from, allowing them to effectively determine the parameters, or width of their selling price range. This is another risk management alternative that provides flexibility for the short hedger.

Long Put/Short Call Combination: Selling Price Range Calculations

Unlike the short dairy futures or long Dairy put option strategy that each require a single calculation, the Long Put/Short Call Combination requires two calculations: one calculation to determine the minimum (floor) selling price of the range and the other to determine the maximum (ceiling) selling price.

The put premium paid and the call premium collected are factored into the results of the strategy. Also, because the call and put options are being used to protect a cash market purchase, the equation must also include the concept of basis, in addition to the brokerage commission.

Long Put/Short Call Combination: Expected Minimum Selling Price =

Put Strike Price – Put Premium + Call Premium + Expected Basis – Brokerage Commission

Long Put/Short Call Combination: Expected Maximum Selling Price =

Call Strike Price – Put Premium + Call Premium + Expected Basis – Brokerage Commission

Long Put/Short Call Combination Strategy – Advantages

- Call premium received reduces cost of price protection
- Retain some opportunity for higher selling prices
- Stronger basis at the time of the dairy sale will increase the effective selling price
- No margin on the long put option position
- Variety of strike prices offer different selling price ranges
- Short hedger retains the flexibility to choose the cash market buyer

Long Put/Short Call Combination Strategy – Disadvantages

- Must pay the full amount of the put option premium when the position is initiated
- Establishes a maximum selling price
- Margin is required on the short call option
- Short call option position may be exercised earlier than expected
- Weaker basis at the time of the dairy product sale will lower the effective selling price
- Brokerage commission must be paid for the call and put option

LONG PUT/SHORT CALL STRIKES

Put options with different strike prices will also have different premiums, which will result in different selling price ranges. Although the objective of the Short Call in combination with the Long Put option is to lower the cost of the downside market risk protection, the short call establishes a maximum selling price. In other words, the short hedger’s upside opportunity is limited.

Long Put/Short Call Combination Strategy – Example

A cheese exporter decides to hedge against lower prices and establish a selling price range by buying Cash-Settled Cheese put options and selling Cash-Settled Cheese call options.

Initial Market Conditions:

- April Cheese futures are currently at \$1.75/lb
- April 1750 Cheese put option is trading at a premium of \$0.07/lb
- April 1850 Cheese Call option is trading at a premium of \$0.03/lb
- Expected local cash basis in early April is – 0.02/lb (under) the April futures

The following are three different scenarios for when the cash cheese is sold:

APRIL CASH-SETTLED CHEESE	BASIS	CASH MARKET FOR CHEESE	1.75 PUT OPTION VALUE & 1.85 CALL OPTION VALUE AT EXPIRATION	RESULTS FOR LONG PUT SHORT CALL & NET RESULT	SELLING PRICE = CASH PRICE +/- NET OPTION GAIN/LOSS
1.60/lb	- 0.02/lb	1.58/lb	0.15 Put 0 Call	0.08 put gain 0.03 call gain Result: 0.11 net gain	1.69/lb
1.65/lb	- 0.02/lb	1.63/lb	0.10 Put 0 Call	0.03 put gain 0.03 call gain Result: 0.06 net gain	1.69/lb
1.75/lb	- 0.02/lb	1.73/lb	0 Put 0 Call	0.07 put gain 0.03 call gain Result: 0.04 net gain	1.69/lb
1.85/lb	- 0.02/lb	1.83/lb	0 Put 0 Call	0.07 put gain 0.03 call gain Result: 0.04 net gain	1.79/lb
1.90/lb	- 0.02/lb	1.88/lb	0 Put 0.05 Call	0.07 put loss 0.02 call gain Result: 0.09 net loss	1.79/lb

Example Notes:

- As the risk of lower market prices occurs, the cash sale price will also be lower, but the gain on the Long Put / Short Call Combination strategy will offset the lower cash market selling price. Therefore, the net selling price in a falling market is protected at a minimum level. This is a higher minimum selling price than that established by the previously discussed Long Put strategy. The amount of premium collected for selling the call option is the difference in the higher minimum price.
- If the market moves higher, the cash selling price will be higher. However, the hedger will experience a maximum loss of the premium paid on the long put component of the strategy, and increasing losses on the short call component. Therefore, unlike the Long Put strategy, the opportunity for a higher net selling price in a rising market is capped because of the short call option position.
- The effective selling price range is determined by the difference in the put and call option strike prices. In the example, the price range of \$0.10/lb was determined by the difference of the put strike price (1750) and the call strike price (1850). Depending on the amount of risk a short hedger is willing to assume, the hedger could adjust the selling price range by choosing different strike prices.
- Another factor that could impact the results of the Long Put / Short Call Combination strategy is if the basis is different than expected at the time of the cash market sale. If it is stronger than expected (e.g., +0.01) the net selling price will be higher and if it is weaker (e.g. – 0.04), the net selling price will be lower. The scenarios in the example assume there is no time value left at expiration of the options. If there is time value remaining, it will impact the effective selling price.
- The Long Put / Short Call Combination strategy also allows the selling hedger to choose the cash market buyer, who is usually the buyer who bids the best cash price, or in other words, the best (strongest) basis.

Short Hedger Highlights

This booklet has illustrated three different ways a seller of dairy products can use futures or options to manage the risk of lower market prices.

- The short futures strategy establishes a “selling price level” regardless if the market risk occurs (lower prices) or does not occur (higher prices).
- The Long Put strategy establishes a “minimum selling price level” which provides protection if the market risk of lower prices occurs, but also the opportunity for a better selling price if the market moves higher.
- The Long Put / Short Call Combination strategy establishes a selling price “range”, which is determined by the difference in the put and call strike prices.

These three strategies are just a few of the numerous strategies that are available to manage the dairy short hedger’s price risk by using futures, options and combinations of contracts. These strategies provide the dairy short hedger with the flexibility to adjust their market risk exposure to a level that they are willing to assume. A dairy product seller may want to contact their broker, market advisor or their state dairy marketing specialist to discuss additional strategies to manage their risk.

CHAPTER 11

ADDITIONAL RISKS OF THE DAIRY HEDGER

This guide focused on how Dairy hedgers can manage the price risks associated with buying and selling dairy products. There are many other risks that a dairy operation is exposed to, and the same concepts of managing dairy risk can also be applied to other price risks that these operations may face. For dairy producers, another critical price risk is the cost of feed.

As the prices and production of grain and oilseed crops are impacted by various factors, it will in turn affect the cost and profitability of producing milk. CME Group Grain and Oilseed products, including Corn, Wheat (Chicago Soft Red Winter and KC Hard Red Winter), Soybean, Soybean Meal and Oat futures and options, can be used as tools to manage feed risk costs.

Dairy Feed Cost Example

A dairy producer plans to buy corn in April to meet his feed requirements and is concerned that the cash price may be much higher when he needs to purchase the physical corn. To protect against a possible price increase, the dairy producer buys May Corn futures at \$5.00 per bushel.

Nearly every dairy business consumes **energy**, which could have a major impact on a firm's bottom line. At times, the energy markets may be quite volatile.

Regardless of the types of energy consumed — gasoline, natural gas, heating oil, diesel fuel, crude oil or others — CME Group has a variety of Energy futures and options products available to help manage these risks.

Depending on the size of the dairy related business, the **financial portfolio** or the ability to borrow to fund operations may be at risk to changing interest rates. Whether the hedger has short or long term interest rate exposure, the CME Group financial products, such as Eurodollars and U.S. Treasury futures and options, can help minimize the risks of fluctuating interest rates.

If a business is buying or selling dairy products outside their own borders, fluctuating **foreign currency** values (i.e., FX risk) may also have an impact on the firm's bottom line. CME Group FX products can help manage these market exposures, including Mexican Peso, British Pound, Canadian Dollar, Japanese Yen, Euro Currency, Australian Dollar and many others.

Dairy is one of many industries that face a business risk of changing climates. CME Group has **Weather** products to help your operation manage the market risks associated with changing climates or forecasts. A commodity broker or advisor will be able to advise dairy hedgers on structuring strategies to address the various risks they face.

DATE	CASH MARKET	FUTURES MARKET	BASIS
December 1	\$5.40/bushel (bu) Forward quote for information only	Long May Corn @ \$5.00/bu	+ \$0.40
April 15	Buy cash Corn @ \$6.50/bu	Sell (offset) May Corn @ \$6.10/bu	
Results	Paid higher price for feed	\$1.10 gain	Unchanged
	Bought physical corn at:	\$ 6.50/bu	
	Futures gain:	- 1.10/bu	
	Effective corn purchase price	\$5.40/bu	

Note: Hedging with Corn futures protected their effective purchase price when the risk of higher prices occurred.

CONCLUSION AND OTHER CONSIDERATIONS

Summary

One of the main objectives of this publication was to provide a good general understanding of the futures industry and how Dairy futures and option contracts could be used to protect hedgers against adverse price moves. However, the primary goal was to highlight the overall importance of price risk management, using whatever alternatives are available to manage risk. As such, this booklet should be used by dairy hedgers as a stepping stone to continue their education and training.

CME Group Dairy futures and options markets offer many benefits for buyers and sellers of dairy products who are looking to manage their price risk. These include:

- Variety of products and services to help manage all aspects of business related risks, including production, feed, energy, currency and interest rates
- Flexibility to adjust risk exposure to a level of their choice
- Liquidity that provides the hedger with efficient entry and exit of their market positions
- Transparency of two trading platforms providing openly available market information
- Regulations that provide orderly trading rules for all market participants
- Financial integrity of CME Clearing behind all transactions

Keys to Successful Dairy Risk Management

For both dairy product buyers and dairy sellers, the following are some general keys to successful risk management.

1. **Develop a team:** When it comes to risk management, a team approach may work best. This applies to individual operations, family operations, cooperatives or corporate entities. Family, cooperatives and corporate operations may find it easier to follow this key to success, but an individual can also develop a team by working with friends or family in similar situations.
2. **Consult with advisors:** Advisors may be especially helpful when a dairy hedger is first getting started in the futures and options markets. There are different types of advisors that charge different fees. These include commodity brokers, commodity consultants, universities, state dairy marketing specialists and USDA staff. If a hedger feels they do not have the time or expertise to devote to the important function of risk management, they should feel comfortable getting professional assistance and guidance from those who specialize in this field.
3. **Learn the alternatives:** Whether or not the hedger consults with an advisor, they should learn about all the alternatives for managing the risk associated with purchasing or selling dairy products. Even when consulting with an advisor, the hedger should make the final decisions, as it is their business that is at risk.
4. **Develop a hedging policy:** A hedging policy could range from a very basic set of rules for the individual or family dairy operation, to a complex legal document for a cooperative or corporate hedging operation. Regardless, it may be important to have some form of written document to keep decisions within a specific set of trading rules.
5. **Get management buy-in:** Management approval comes in different forms depending on the size of the operation. It can range from a simple nod of acceptance by a spouse or other family member, to a signed legal approval on a formal corporate or cooperative plan. Regardless, if there are others that are impacted by the decisions, they should at least be aware of the risk management plans and sign

off on them at some level. Especially with larger dairy operations, it is important that others in management are comfortable with the objectives and the plan to achieve them.

6. **Develop a plan:** Whereas a hedging policy is more or less a permanent document with general rules of trading, a plan pertains to a specific time period or for a specific dairy sale or purchase that may occur in the near future. A written plan will help the dairy hedger stick to their risk management goals and objectives. It will include decisions such as which risk management tool to use, pricing objectives and timing. A dairy hedger can develop a different plan for each year, or for each individual purchase or sale due to different market conditions, such as price levels and market volatility.
7. **Have the discipline to stay with the plan,** but flexibility to adjust: Depending on changes in the market environment during the course of a hedging plan, this key may require a difficult combination of discipline and flexibility. If there are minor changes in market conditions that appear to be moving against the hedger, he needs discipline to stick with the plan. However, on occasion, due to major unexpected market conditions, it may be appropriate to make adjustments to the initial plan. One of the worse things a hedger can do is to make continuous changes in the plan for every little market hiccup. This could lead to a negative situation called being “whipsawed.”
8. **Keep good records:** Record keeping is an often overlooked task requiring a minimal amount of time, but it is essential to good risk management for dairy buyers and sellers. It could be as simple as keeping records on paper, to more advanced computer spreadsheets. Hedgers should keep track of the futures and cash market prices, as well as their local basis. Additionally, they must keep track of the risk management strategies used and the resulting profits and losses. Good records will assist in tax preparation and future risk management plans.
9. **Review the results:** A thorough analysis of the risk management strategies and overall plan is necessary to determine what worked, what didn't work and most importantly, why? Similar to keeping good records, reviewing results—both positive and negative—will

help a dairy product buyer or seller become a more effective hedger in the future.

10. **Don't look back:** Simply stated, this means to learn from past experiences and realize not all experiences are going to be positive, but not become fixated on the negative. A dairy hedger may actually learn more from a negative experience than a positive one. Remember that everyone has 20-20 hindsight vision and it is then easy to look back and complain about what should have been done. However, the successful dairy hedger will use past experiences to move forward in a positive manner.

Getting Started in Dairy Risk Management

The selection of a Futures Commission Merchant (FCM) or commodity broker to assist with a hedger's trading needs should not be taken lightly. One of the first steps to take when considering a commodity broker is to ensure they are registered with the National Futures Association (NFA).

There are two general types of brokers: Full Service and Discount brokers. The difference is in the amount of service beyond trade execution that is offered.

If the dairy hedger is relatively new to risk management, they may prefer to pay a relatively higher commission for a Full Service broker's additional trading advice and consultation. A more experienced dairy trader may prefer a Discount broker solely for their execution function, and forego additional consulting services for a relatively lower commission. Regardless of the type, the execution of the trades should be similar.

One of the best ways to select a commodity broker for hedging purposes is word of mouth. Check with neighbors or dairy industry colleagues to get their opinions or referrals. The “Find a Broker” page on the CME Group website also provides a list of commodity brokers and their services. Visit cmegroup.com/findabroker.

In addition to brokers, a dairy hedger may also seek the services of a hedging consultant or advisor. The hedger must make sure that their broker and/or consultant is fully aware of their dairy business operation and their risk management objectives.

Additional Resources

There are numerous books and periodicals that focus on dairy risk management alternatives. The CME Group website has a considerable amount of information on the agricultural markets, including price quotes, market commentary, educational publications, webinars and tutorials.

Other resources are state dairy marketing specialists, usually found at the state land grant universities. Regardless of how information is obtained on the dairy markets, it is imperative to continue learning about this invaluable subject of price risk management.

To learn more visit cmegroup.com/dairy

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