CME Group

AGRICULTURAL PRODUCTS

Self-Study Guide to Hedging with Livestock Futures and Options

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In a world of increasing volatility, CME Group is where the world comes to manage risk across all major asset classes – agricultural commodities, interest rates, equity indexes, foreign exchange, energy and metals, as well as alternative investments such as weather and real estate. Built on the heritage of CME, CBOT, KCBT and NYMEX, CME Group is the world's largest and most diverse derivatives exchange encompassing the widest range of benchmark products available, providing the tools customers need to meet business objectives and achieve financial goals. CME Group brings buyers and sellers together on the CME Globex electronic trading platform. CME Group also operates CME Clearing, one of the world's leading central counterparty clearing providers, which offers clearing and settlement services across asset classes for exchange-traded contracts and over-the-counter derivatives transactions. These products and services ensure that businesses everywhere can substantially mitigate counterparty credit risk.

AGRICULTURAL PRODUCTS

MORE AGRICULTURAL FUTURES AND OPTIONS. GREATER OPPORTUNITY.

CME Group offers the widest range of agricultural derivatives of any exchange, with trading available on a variety of grains, oilseeds, livestock, dairy, lumber and other products. Representing the staples of everyday life, these products offer liquidity, transparent pricing and extraordinary opportunities in a regulated centralized marketplace with equal access for all participants.

INTRODUCTION TO THE GUIDE

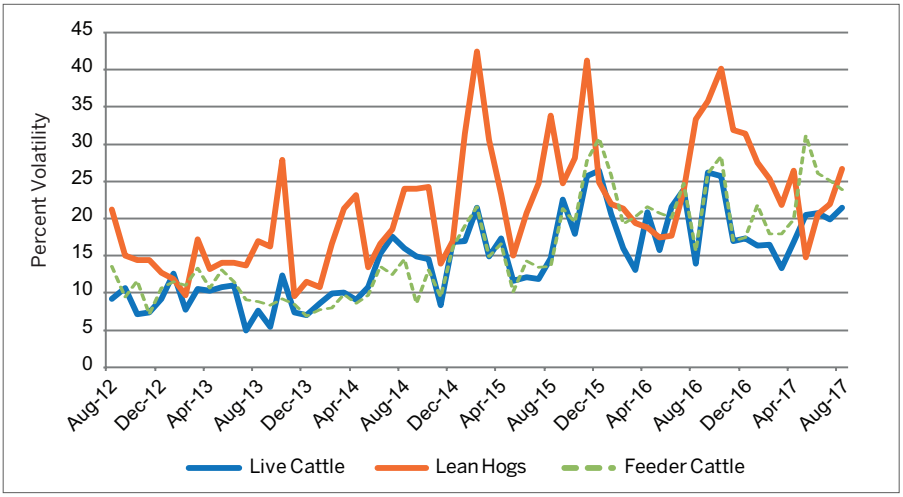
The agricultural commodity markets have experienced increased volatility in recent years. As part of this market trend, livestock buyers and sellers are facing an ever-increasing level of price risk. Doing nothing to manage price risk is tantamount to speculating in the physical (or "cash") markets, which can prove unhealthy to the bottom line of a livestock producer or commercial firm.

CME Group livestock futures and options provide livestock buyers and sellers with valuable tools to manage price risk and have more control over their bottom line. This guide is designed to provide a detailed overview of using futures and options for risk management in the livestock markets.

The early chapters will establish a foundation that the latter chapters will build on. For someone new to livestock price risk management, it may help to move sequentially through the chapters to get a basic understanding of the core concepts and fundamentals. Those with some experience may wish to proceed to the chapters with topics on which they may need a refresher, or perhaps would like a different perspective. Each chapter ends with a brief quiz which allows readers to test their grasp of the material.

Regardless of how the guide is used, the objective is to enhance the hedger's knowledge of using livestock futures and options to manage market risk.

Monthly Historical Volatility – Livestock Aug 2012 to Aug 2017



Source: CME Group

CHAPTER 1

OVERVIEW OF THE LIVESTOCK FUTURES MARKET

What is a Livestock Futures Contract?

A Livestock futures contract is a legally binding agreement for a buyer to accept delivery and a seller to make delivery of:

- a *standardized* quantity and quality of a specified livestock product (live cattle, feeder cattle or lean hogs),
- during a *standardized* time period,
- to a *standardized* delivery point,
- for a price negotiated at the Chicago Mercantile Exchange (CME), on the CME Globex electronic trading platform.

Important Concepts of Livestock Futures

A futures contract is not a written document. Hedgers will get regular statements regarding their futures position from their brokers, but they will never receive a written contract. However, a futures contract is still *a legally binding agreement* that is just as enforceable as a written contract, to the full extent of the law.

Price is the only negotiable element of a futures contract. Futures contract prices are determined through the interaction between the buyer and the seller, representing demand and supply, respectively. The prices are *not* set by the CME. The CME simply provides the marketplace, futures products, technology, rules and regulations for the buyers and sellers to come together.

Although every futures contract involves a buyer (making bids) and a seller (making offers), neither party knows who is on the other side of the transaction. The buy or sell obligation is with the marketplace and not with an individual participant. A common misconception is that a speculator is always on the other side of a hedger's position, which is not accurate. A transaction could involve two hedgers, two speculators, or a hedger and a speculator.

Futures Terminology

The futures industry uses some terms that are very unique to this market, and some that are common to other markets. A few of the more important terms are described below; related terms are listed together for comparison and better understanding.

The **cash market** is also known as the physical or underlying market. These are specific market locations where the exchange of a physical product for payment takes place. As such, there are many cash markets located throughout the world. Hedgers may even have several cash markets near their location. Cash market prices may be different based on where they are located.

A **futures market** is a centralized market place that is often described as a "benchmark" market. Note that a futures market price is the same for buyers and sellers, regardless of the type of trader they are or where they are located.
A futures market price is determined through the interaction of the buyers (demand) and the sellers (supply).

A **bid** is an expression to buy and represents the demand for a product. Although a buying hedger would like to buy at the bid, in reality, they will usually buy at the offer, i.e., where someone is willing to sell.

An **offer** is an expression to sell and represents the supply of a product. Although a selling hedger would like to sell at the offer, in reality, they will usually sell at the bid, i.e., where someone is willing to buy.

A **tight bid/offer spread** occurs when the bids and offers are close together, and is a reflection of the market's efficiency and liquidity. Market efficiency and liquidity are important to a hedger when they are initiating and closing out their futures market positions.

A **long futures position** is an initial buy position that represents an obligation to accept delivery of the standardized commodity.

A **short futures position** is an initial sell position that represents an obligation to make delivery of the standardized commodity.

To **offset or close-out** an existing futures position is to simply take the opposite position in the same futures contract and delivery month.

- If initially long, offset by selling back the identical contract
- If initially short, offset by buying back the identical contract

Bear or bearish reflects lower or declining market prices and are directional terms often used to describe a trader, market movement, trend, strategy or opinion. A bearish strategy provides opportunity if the market moves lower.

Bull or bullish reflects higher or increasing prices and are also directional terms often used to describe a trader, market movement, trend, strategy or opinion. A bullish strategy provides opportunity if the market moves higher.

Volume is the number of futures contracts that are traded in a given time period. Although volume is quoted for different time periods, the most common is daily volume.

Open Interest is the number of contracts that have traded, but have not been closed out either through offset or delivery. Many market participants view open interest as a measure of the contract's liquidity or pricing efficiency.

A **Futures Commission Merchant (FCM)** is another term for a commodity broker. The only way to trade futures or options is through a broker or FCM.

Livestock Contract Specifications

A futures contract is designed with specifications to match cash market commodities and industry standards. The CME constantly monitors industry standards and cash market practices. If there are significant changes, the Exchange will consult with market participants to determine if modifications to the futures contract specifications are necessary.

The specifications help to ensure that there is a two-way relationship between the benchmark livestock futures market and the numerous livestock cash markets. The price that is discovered in a futures market comes from the interaction between the supply (sellers' offers) and demand (buyers' bids). Many of these bids and offers come from cash market participants. In turn, the futures contract price is then used by cash market participants to transact in the spot (current) market or for cash forward type contracts. Note that many cash market contracts are "based on" or "referenced to" the futures market price.

Physical Delivery versus Cash Settlement

Although many futures contracts are traded, very few will ever result in actual delivery of the physical commodity. The great majority of futures contracts are closed out, or "offset" prior to delivery by taking an opposite position in the same contract and delivery month. In other words, if someone initially buys a futures contract for a specific product and delivery month, and later sells a futures contract for the same product and delivery month, their position and market obligation is closed out. Conversely, if someone initially sells a futures contract and later buys back the same contract, the market obligation is closed out.

There are two types of settlement for futures contracts: physical delivery and cash-settlement.

- The Live Cattle futures contract requires physical delivery settlement in which live cattle are delivered. The CME Rulebook dictates the specific standards in terms of the quantity and quality (USDA Grades) of cattle that can be delivered. The seller of the Live Cattle futures contract makes the final decision regarding the actual quality and quantity that will ultimately be delivered, but it must be within the standards authorized by the Exchange. Any variations to the standardized quantity or quality may be subject to premiums or discounts to the futures price. The specific details of the physical delivery requirements specified in the CME Rulebook can be found at cmegroup.com/rulebook.
- The Feeder Cattle and Lean Hog futures contracts are cash (or "financially") settled contracts. All outstanding contracts that remain open after the last trading day will be automatically closed out at a price set equal to the CME Feeder Cattle Index or the CME Lean Hog Index on the last trading day. This final cash settlement cancels the obligation of the buyer and the seller. The specific details of the cash-settlement process are also specified in the CME Rulebook at cmegroup.com/rulebook.

The CME's Live Cattle futures contract requires delivery of live cattle during the contract month for all market participants who still have an open long position (obligations to accept physical delivery) or short position (obligation to make physical delivery) based on the latest Exchange rules and regulations.

The primary purpose of a futures contract is price risk management and not delivery of the actual or physical commodity on the futures contract. As such, it is usually more feasible in economic terms to deliver or accept delivery in a local cash market. Physical delivery on a Live Cattle futures contract is normally less than 1% of the total futures volume.

Then, why is there a physical delivery requirement on a futures contract? It is the possibility of physical delivery that causes the cash and the futures markets to converge at contract expiration. It also contributes to the necessary and vital market economic function known as price correlation, which keeps the cash and futures markets' prices moving in the same direction throughout the life of the futures contract.

As previously mentioned, the CME's Feeder Cattle and Lean Hog futures contracts have a cash settlement requirement. Although it is a different type of delivery system than Live Cattle, the objectives are the same: cash/futures convergence and correlation.

In the cash-settlement procedures, all long contracts still open after the last trading day are automatically offset against all remaining open short contracts. They are settled to a price equal to the CME Feeder Cattle Index or to the CME Lean Hog Index on that day (see insert).

FEEDER CATTLE AND LEAN HOG INDEXES

The CME Feeder Cattle Index and the CME Lean Hog Index are calculated by CME Group staff using United States Department of Agricultural (USDA) data. The data and the formula used to calculate the final cash settlement price are made available to the public and can be found at cmegroup.com/feedercattle and cmegroup.com/leanhogs, respectively. Additional details on the cash-settlement process for Lean Hogs and Feeder Cattle futures can be found in the CME Rulebook located at cmegroup.com/rulebook.

The following table indicates the key features of the CME Livestock futures contracts. This will facilitate understanding of the basics of each contract, allowing readers to follow the examples used in this Hedging Guide.

Highlights of CME Livestock Futures Contracts

	CME LIVE CATTLE	CME FEEDER CATTLE	CME LEAN HOGS
Contract Size	40,000 Pounds (lb.) = 400 hundredweight (cwt)	50,000 Pounds (lb.) = 500 cwt	40,000 Pounds (lb.) = 400 cwt
Price Unit	Cents per pound or Dollars and Cents per cwt	Cents per pound or Dollars and Cents per cwt	Cents per pound or Dollars and Cents per cwt
Tick (minimum price change)	$0.00025 per pound = $0.025 per cwt = $10/contract	$0.045 per pound above or below the previous day's settlement price, expandable to $0.0675	$0.03 per pound above or below the previous day's settlement price, expandable to $0.045
Daily Price Limits	$0.03 per pound above or below the previous day's settlement price, expandable to $0.045	$0.03 above or below the previous day's settlement price	$0.03 above or below the previous day's settlement price
Delivery Type	Physical Delivery	Cash (financial)	Cash (financial)
Contract Months	Feb(G), Apr (J), Jun(M), Aug(Q), Oct(V), Dec (Z)	Jan (F), Mar(H), Apr(J), May(K), Aug(Q), Sep(U), Oct(V), Nov(X)	Feb(G), Apr(J), May(K), Jun(M), Jul(N), Aug(Q), Oct(V), Dec(Z)
Ticker Symbol CME Globex	LE	GF	HE
Trading Hours CME Globex	Monday - Friday: 8:30 a.m. to 1:05 p.m. CT		

For additional livestock futures contract specifications visit **cmegroup.com/agriculture**.

Participants

All futures markets participants can be classified in one of two ways, depending on their objectives of either managing price risk, or assuming price risk.

A **hedger** is an individual or firm that uses the futures market to manage or reduce the price risk associated with their cash market position. A livestock hedger eventually buys or sells the physical livestock product or by-product in the cash market. Hedgers will choose the futures contract that matches their underlying physical market commodity.

Sometimes there are physical livestock products that do not have a corresponding futures contract that directly matches the underlying market. As such, a *cross-hedge strategy* can be employed, using a CME Livestock futures contract to manage the price risk of a different, but related, livestock/meat product which is not traded in the futures market. To ensure the efficiency of a cross-hedge, there must be a strong correlation between the futures price and the cash price of the different livestock/meat product.

The other type of futures industry participant is the **speculator**, an individual or firm that assumes price risk by buying or selling livestock futures in an attempt to profit from a potential change in price or price relationship. The futures market speculator usually does not hold or plan to acquire the cash product.

Speculators provide a major benefit to hedgers and the marketplace alike – market liquidity. *Market liquidity* is a measure of the market's efficiency, and it is this efficiency that results in better bids and offers for all market participants, including the hedger. Liquidity is also key to the ability to initiate and offset futures positions.

Platforms

CME Globex is the premier global electronic platform for trading livestock futures and options as well as other products at CME Group exchanges.

CHAPTER 1 QUIZ

1. In which market does a livestock hedger usually deliver or accept delivery of the physical livestock?

    a. Futures market

    b. Option market

    c. Swap market

    d. Local cash market

2. What happens to the obligations of most futures contracts used in a hedge?

    a. They expire worthless

    b. They are physically delivered

    c. They are closed-out by an offsetting transaction

    d. They are converted into a swap contract

3. Which of the following is the only variable element of a standardized livestock futures contracts?

    a. Quantity

    b. Quality

    c. Time of delivery

    d. Place of delivery

    e. Price

4. If you are long a CME livestock futures contract:

    a. You have an obligation to accept delivery

    b. You have an obligation to make delivery

    c. You have the right but not an obligation to accept delivery

    d. You have the right but not an obligation to make delivery

5. Where does a livestock futures price come from?

    a. The contract buyer sets the price

    b. The Exchange sets the price

    c. Prices are discovered through bids and offers between buyers and sellers

    d. The contract seller dictates the price

6. Who is on the other side of a hedger's position?

    a. Speculator

    b. Another hedger

    c. Could be either a hedger or a speculator

    d. The Exchange

7. Who provides the greatest amount of market liquidity?

   a. Hedgers

   b. Speculators

   c. The Exchange

   d. The Clearing House

8. Who has the right to choose the trading platform when initiating or closing out a position?

   a. CME Group

   b. Broker

   c. You, the customer

   d. Clearing firm

Answers are located in the Appendix.

CHAPTER 2

FINANCIAL INTEGRITY OF THE LIVESTOCK FUTURES MARKET

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 FCM's 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 2 QUIZ

1. What guarantees the financial integrity of a futures contract?

   a. Premium

   b. Individual trader's word

   c. Margin

   d. Commission

2. When will a trader get a margin call on a short futures position?

   a. When a futures market increase causes the margin account balance to fall below the specified maintenance level

   b. Whenever the broker wants

   c. When the market settlement price remains steady

   d. Every day regardless of what happens to the market settlement price

3. What happens to a customer's margin funds that are posted?

   a. Invested

   b. Used to pay the commissions

   c. Put in a segregated margin account to ensure contract performance

   d. Deposited in any bank

4. Generally speaking, what percentage of a contract value is initial margin?

   a. 50%

   b. 100%

   c. 5-15%

   d. 200%

5. Which futures market participants are required to have a margin account?

   a. Hedgers

   b. Speculators

   c. All traders

Answers are located in the Appendix.

CHAPTER 3

LIVESTOCK CASH MARKET, BASIS AND GENERAL HEDGE THEORY

"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 livestock or meat buyer and seller 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 actual livestock from or sell it to in the cash market

What is Basis?

Basis is the relationship between a *cash market price* and a *futures contract price*. As such, basis reflects the correlation of *the hedger's* local cash market to the futures market. The better the correlation between the two markets, the more effective the hedge strategy will be.

Basis equation:

Cash Market Price – Futures Market Price = Basis

Examples of Different Basis Levels:

CASH PRICE	MINUS FUTURES PRICE	EQUALS BASIS
$92.00/cwt.	$90.00/cwt.	+ 2.00 or 2.00 over
$85.00/cwt.	$90.00/cwt.	- 5.00 or 5.00 under
$90.00/cwt.	$90.00/cwt.	0, even or no basis

BASIS EQUATION

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 local basis information should never be under-estimated.

Which Cash Market Price is Used?

Cash markets are the locations where the hedger regularly buys or sells the physical livestock product. There are numerous livestock cash markets in the world, but a hedger only needs to be concerned with *their local cash market(s)*. If they have more than one local cash market that they regularly buy livestock from or sell to, then they will have more than one basis to monitor.

Note that even if a hedger uses futures contracts to manage price risk, the eventual purchase or sale of the physical livestock product will usually occur at one of their local cash markets. As stated earlier, basis will be one of the deciding factors to determine the cash market in which they eventually transact.

Which Futures Market Price is Used?

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

For calculating a *current* basis, the hedgers 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 March 1, then use the April Live Cattle futures contract

Example 2: If today is September 5, then use the October Lean Hog futures contract

Example 3: If today is December 10, then use the January Feeder Cattle 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 local cash market. Although basis history is not an exact science, it is a valuable 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 which is closest to but not before the specific time period when he plans to buy or sell the physical livestock product.

Example: In January, if a hedger gets a cash forward market quote for March physical delivery of cattle, they would use the April Live Cattle futures contract price in calculation of the deferred basis, i.e.,

Cash Forward Price (for March delivery) minus April Futures
= Deferred Basis

A *deferred basis* can be compared to what the hedgers expects 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 choose to use 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 livestock product.

How Can Basis Change?

Cash market prices and a futures market price for the same livestock product should be correlated, meaning that the two 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 change 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 live cattle increased by $2 per hundred weight (cwt) and the Live Cattle futures price increased by $1 per cwt, then the basis strengthened by $1 from the previous basis level.

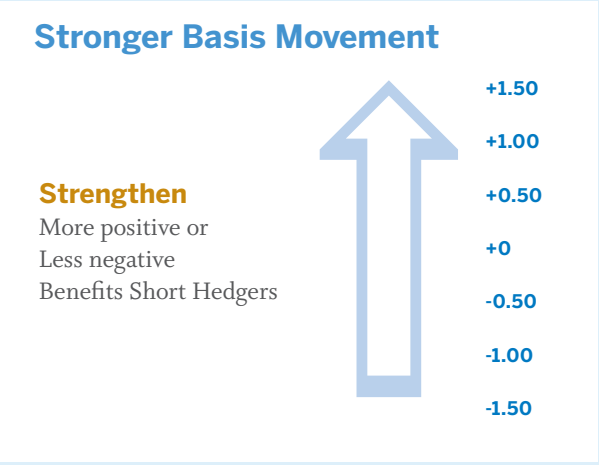
Stronger Basis When Price Levels Decrease

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 hogs declined by 50 cents per cwt and the Lean Hog futures price declined by 70 cents per cwt, the basis strengthened by 20 cents per cwt.

STRENGTHENING BASIS

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



Who Benefits From a Stronger Basis?

As we have learned so far, the cash market price is a local factor and the futures market price is a global benchmark that affects everyone who buys or sells that livestock 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 his local area. Therefore, the hedger's basis is a reflection of his local cash market relative to the global benchmark futures market. As such, *selling hedgers of physical livestock 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 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.

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 feeder cattle decreased by $1.50 per cwt and the Feeder Cattle futures market price decreased by $1 per cwt, then the basis weakened by 50 cents from the previous basis level.

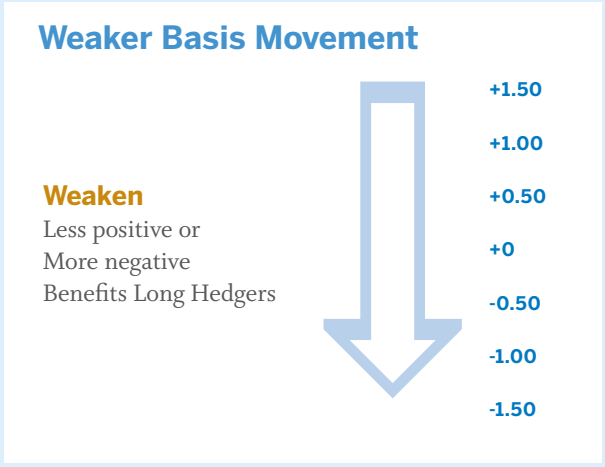
Weaker Basis When Price Levels Increase

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 hogs increased by 50 cents per cwt and the Lean Hog futures price increased by 60 cents per cwt, the basis weakened by 10 cents per cwt.

WEAKENING BASIS

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



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 livestock products (buying hedgers) will 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 daily basis is the most common. The hedger should use the local cash market price that occurs around the time of the futures market settlement (currently 1:00 p.m. Chicago time) and the futures contract's daily settlement price.

Some people prefer to track the weekly basis. For this type of information, it is important to be consistent in using data from the same day every week. Many market participants who track basis weekly may prefer to use data from Tuesday, Wednesday or Thursday, rather than from Monday or Friday, which may have greater volatility.

Although initiating a historical basis table and/or basis chart and moving forward may be easy, it may take a little more work to obtain local basis information 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 hedge brokers, county extension offices, lenders, or market advisors. Also, university livestock marketing professors may have basis information for their area.

Tracking Basis

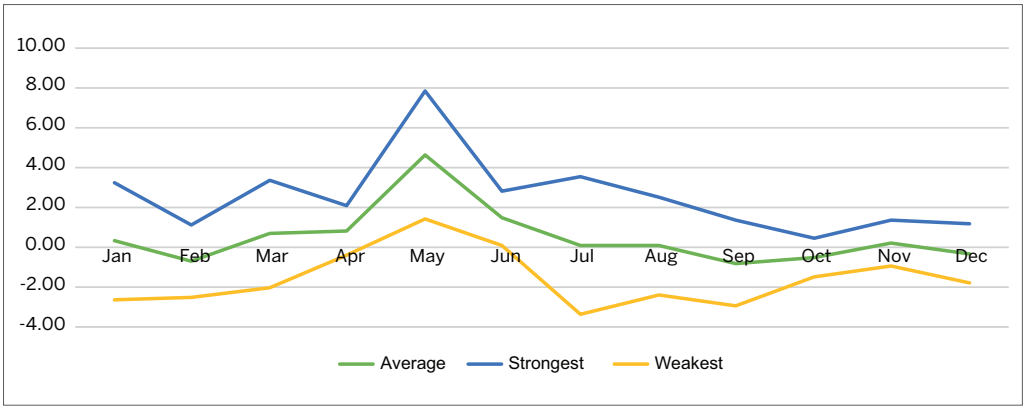
Basis can be done with pencil and paper, or on a computer spreadsheet. The following is a sample cattle basis table:

Sample Basis Spreadsheet

DATE (MM/DD/YR)	CASH MARKET	FUTURES CONTRACT MONTH	BASIS	COMMENTS
03/15/xxxx	115.00	120.00 (April)	- 5.00	Heavy local selling
03/16/xxxx	116.50	121.00 (April)	- 4.50	Selling slows pace
03/17/xxxx	115.00	120.50 (April)	- 5.50	No news

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.

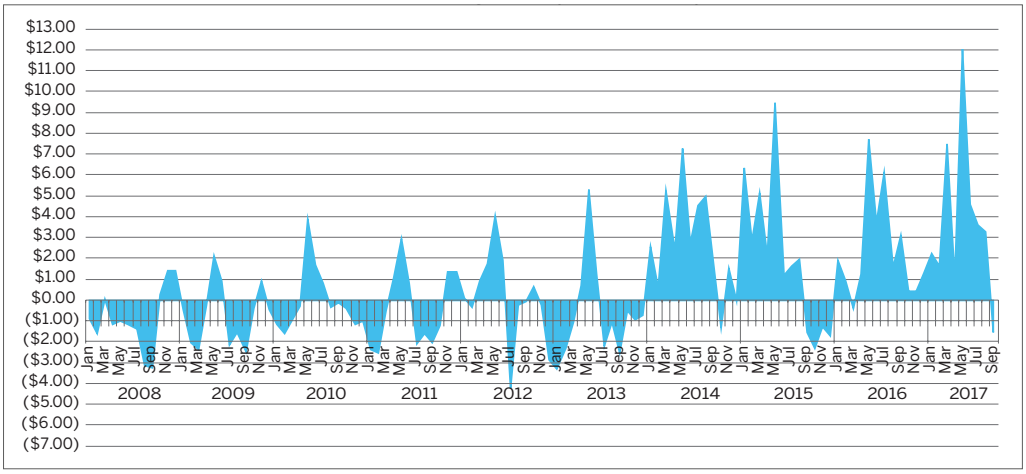
Seasonal Live Cattle Basis 2008 – 2016



Source: CME Group and USDA

With several years of basis information, a chart can be created to highlight the strongest, weakest, average and range of basis for a particular week of the calendar year.

Live Cattle Monthly Basis (Cash-Futures)



Source: CME Group and USDA

As stated earlier, knowing what the forward quoted basis is compared to where the basis is expected to be during any calendar week of the year, will help make the decision of which risk management contract and strategy appears to work best.

BASIS DATA

The format or frequency of basis data collection is a choice. The most important thing is to just get started collecting it.

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. As such, a good student of basis should have an easier task of becoming a good student of price risk management.

General Hedging Theory

There are two primary elements to hedging theory: the cash/futures price relationship and the market positions of the hedge.

1. For a hedge to be effective there has to be a positive relationship, or correlation, between the hedger's local cash market price and a futures market price for the same or related commodity. If there is a positive correlation, as one market moves the other market also moves in the same direction, even though their prices may not change on a 1 to 1 basis. That change would indicate a 100% correlation or perfect correlation, but it

is usually less than this. A general rule of thumb is that 80% or better correlation should result in an effective hedge.

2. To be hedged is to have opposite positions in the cash market and the futures market. That is, one would be long the cash market and short futures, or short the cash market and long futures. These opposite positions need to be maintained throughout the life of the hedge.

Hedge Results

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.

HEDGING INCLUDES CASH + FUTURES

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 3 QUIZ

1. What is Basis?

   a. Relationship between two different futures contract prices

   b. Relationship between two different cash market prices

   c. Relationship between a cash market price and a futures market price

   d. Relationship between a margin level and the commission

2. In the basis equation, which factor is the same for all locations in the world?

   a. The cash market price

   b. The option strike price

   c. The futures market price

   d. The basis

3. What happens if a cash market price gains relative to a futures price over time?

   a. Basis strengthens and benefits the long hedger

   b. Basis strengthens and benefits the short hedger

   c. Basis weakens and benefits the short hedger

   d. Doesn't have an impact on basis

4. What is the relationship between a cash market position and a futures market position in a hedge?

   a. The positions are identical

   b. Opposite of each other

   c. The futures position is always larger than the cash market position

   d. The futures position is always smaller than the cash market position

5. For a hedge to be effective, what is necessary?

   a. Integration between the cash and futures market

   b. Simulation between the cash and futures market

   c. Correlation between the cash and futures market prices

   d. Inflation in the economy

Answers are located in the Appendix.

CHAPTER 4

SHORT FUTURES HEDGE: PRICE RISK MANAGEMENT FOR LIVESTOCK 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) livestock or meat at some point in the future. A potential seller of livestock or livestock 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

- Cattle ranchers
- Hog producers
- Feedlots
- Packers holding inventory
- Exporters
- Food related businesses holding inventory (e.g., restaurants, butchers, 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 short term or long term sales, 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 livestock futures market and one in a local cash market. The initial short futures market position in a short hedge is solely for the protection against falling cash livestock prices. As such, the short futures position acts as a temporary substitute for the eventual cash market sale of the actual livestock or livestock product.

   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 livestock or livestock product, which they are either producing or own in the case of inventory. Therefore, the initial futures position of a short 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 livestock or inventory is sold or priced in the cash market. Immediately upon the sale or pricing of the actual livestock 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 by 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 the price risk does not occur and prices 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. When initiating a position, 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 Hog Prices with Basis Remaining as Expected

DATE	CASH MARKET	FUTURES MARKET	BASIS
March 15	Expected hog price at $70.00/cwt based on expected September basis of -5.00 (under) October futures	Short October Lean Hogs/cwt at $75.00	- 5.00
September 25	Sell hogs at $65.00/cwt	Buy (offset) October Lean Hogs at $70.00/cwt	- 5.00
Results	Lower revenue of $5.00	$5.00 gain	No change

Sell cash hogs at	$65.00/cwt
Futures gain	+ 5.00
Net selling price	**$70.00/cwt**

Note: Although the cash market for hogs declined from March to September resulting in lower revenue from the cash sale, the futures market position resulted in a gain, which offset the lower cash selling price. As such, the short hedger achieved price protection and the expected selling price of $70.00.

SHORT HEDGE EXAMPLE # 2

Rising Prices with Basis Remaining as Expected

DATE	CASH MARKET	FUTURES MARKET	BASIS
March 15	Expected hog price at $70.00/cwt based on expected September basis of -5.00 (under) October futures	Short October Lean Hogs at $75.00/cwt	- 5.00
September 25	Sell hogs at $73.00/cwt	Buy (offset) October Lean Hogs at $78.00/cwt	- 5.00
Results	Higher revenue of $3.00	$3.00 loss	No change

Sell cash hogs at	$73.00/cwt
Futures gain	- 3.00
Net selling price	**$70.00/cwt**

Note: Although the cash market for hogs rallied from March to September resulting in higher revenue from the cash sale, the futures market position resulted in a loss, which offset the higher cash selling price. As such, the short hedger again achieved the expected selling price of $70.00.

SHORT HEDGE EXAMPLE # 3

Falling Prices with Stronger than Expected Basis

DATE	CASH MARKET	FUTURES MARKET	BASIS
March 15	Expected hog price at $70.00/cwt based on expected September basis of -5.00 (under) October futures	Short October Lean Hogs at $75.00/cwt	- 5.00
September 25	Sell hogs at $68.00/cwt	Buy (offset) October Lean Hogs at $70.00/cwt	- 2.00
Results	Lower revenue of $2.00	$5.00 gain	3.00 basis gain

Sell cash hogs at	$68.00/cwt
Futures gain	+ 5.00
Net selling price	**$73.00/cwt**

Note: As a result of the cash market declining less than the futures market price, the basis improved (strengthened). Although the cash market for hogs declined from March to September resulting in lower revenue from the cash sale, the gain on the futures market position more than offset the lower revenue. Due to a stronger basis at the time of the cash sale, the short hedger received $3.00 more than the expected selling price of $70.00.

SHORT HEDGE EXAMPLE # 4

Rising Prices with Weaker than Expected Basis

DATE	CASH MARKET	FUTURES MARKET	BASIS
March 15	Expected hog price at $70.00/cwt based on expected September basis of -5.00 (under) October futures	Short October Lean Hogs at $75.00/cwt	- 5.00
September 25	Sell hogs at $71.00/cwt	Buy (offset) October Lean Hogs at $77.00/cwt	- 6.00
Results	Higher revenue of $1.00	$2.00 loss	1.00 basis loss

Sell cash hogs at	$71.00/cwt
Futures gain	- 2.00
Net selling price	**$69.00/cwt**

Note: Overall, the basis weakened as a result of the cash market increasing less than the increase in the futures market price. Although the cash market for hogs rallied from March to September resulting in higher revenue from the cash sale, the loss on the futures market position exceeded the gain in the cash market. As a result of the weaker basis at the time of the cash sale, the short hedger received $1.00 less than the expected selling price of $70.00.

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 selling price that will determine the profitability of the business. Although there may be different nuances to each type of livestock, this key concept applies to any individual or firm who plans to sell cattle, feeder cattle or hogs.

CHAPTER 4 QUIZ

1. What are the short hedger's initial positions?
    a. Short cash market and long futures market
    b. Short cash market and short futures market
    c. Long cash market and short futures market
    d. Long cash market and long futures market?
2. What change will benefit a short hedger?
    a. Falling prices
    b. Rising prices
    c. Stronger basis
    d. Weaker basis
3. After a short hedge is initiated, what changes impact the result of the hedge?
    a. Change in the cash market price
    b. Change in the futures market price
    c. Change in the margin level
    d. Change in the basis
4. If price levels go lower after a short hedge is initiated, what are the results?
    a. Gain in the cash market and gain in the futures market
    b. Loss in the cash market and loss in the futures market
    c. Gain in the cash market and loss in the futures market
    d. Loss in the cash market and gain in the futures market
5. What will have an impact on the net hedged selling price?
    a. Stronger basis will improve the results of the hedge
    b. Brokerage commission must be subtracted from the results
    c. Interest costs associated with the short hedger's margin account
    d. All of the above

Answers are located in the Appendix.

CHAPTER 5

LONG FUTURES HEDGE: PRICE RISK MANAGEMENT FOR LIVESTOCK 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) livestock or livestock products at some point in the future. A potential buyer of livestock or livestock products is primarily concerned about rising prices in their local markets, which would have a negative impact on their profitability.

Examples of Potential Long Livestock Hedgers

- Packers
- Feedlots
- Importers
- Restaurants
- Food processors
- Livestock producers/feedlots (also potential long feed grain hedgers)

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 livestock futures market and one in a local cash market. The initial long futures market position in a long hedge is solely for protection against rising livestock prices in the hedger's local 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 livestock or product, which means they do not currently own it but will need to buy it in the future. Therefore, the initial futures position of a long hedge is long futures. As such, 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 livestock or livestock product is bought or priced in the cash market. Immediately upon the purchase or pricing of the livestock or livestock 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.

Long Hedge Results

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 one 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 Feeder Cattle Prices with Basis Remaining as Expected

DATE	CASH MARKET	FUTURES MARKET	BASIS
September 4	Expected feeder cattle price at $152.00/cwt based on expected February basis of + 2.00 (over) March futures	Long March Feeder Cattle at $150.00/cwt	+ 2.00
February 25	Buy feeder cattle at $160.00/cwt	Sell (offset) March Feeder Cattle at $158.00/cwt	+ 2.00
Results	Higher cost of $8.00	$8.00 gain	No change

Sell cash feeder cattle at	$160.00/cwt
Futures gain	- 8.00
Net selling price	**$152.00/cwt**

Note: Although the cash market for feeder cattle rallied from September to February resulting in higher cash costs, the futures market position resulted in a gain, which lowered the net cash purchase price. As such, the long hedger achieved price protection and the expected purchase price of $152.00.

LONG HEDGE EXAMPLE # 2

Falling Feeder Cattle Prices with Basis Remaining as Expected

DATE	CASH MARKET	FUTURES MARKET	BASIS
September 4	Expected feeder cattle price at $152.00/cwt based on expected February basis of + 2.00 (over) March futures	Long March Feeder Cattle at $150.00/cwt	+ 2.00
February 25	Buy feeder cattle at $148.00/cwt	Sell March Feeder Cattle at $146.00/cwt	+ 2.00
Results	Lower cost of $4.00	$4.00 loss	No change

Buy cash feeder cattle at	$148.00/cwt
Futures loss	+ 4.00
Net selling price	**$152.00/cwt**

Note: Although the cash market for feeder cattle declined from September to February resulting in lower cash costs, the futures market position resulted in a loss, which increased the net cash purchase price. As such, the long hedger again achieved the expected purchase price of $152.00.

LONG HEDGE EXAMPLE # 3

Rising Feeder Cattle Prices with Weaker than Expected Basis

DATE	CASH MARKET	FUTURES MARKET	BASIS
September 4	Expected feeder cattle price at $152.00/cwt based on expected February basis of + 2.00 (over) March futures	Long March Feeder Cattle at 150.00/cwt	+ 2.00
February 25	Buy feeder cattle at $155.00/cwt	Sell March Feeder Cattle at 156.00/cwt	- 1.00
Results	Higher cost of $3.00	$6.00 gain	3.00 basis gain

Buy cash feeder cattle at	$155.00/cwt
Futures gain	- 6.00
Net purchase price	**$149.00/cwt**

Note: Although the cash market for feeder cattle rallied from September to February resulting in higher cash costs, the futures market position resulted in a gain, which more than offset the higher cash purchase price. As such, the long hedger improved (lowered) their expected net purchase price by the amount of the basis improvement (weakening) of 3.00.

LONG HEDGE EXAMPLE # 4

Falling Prices with Stronger than Expected Basis

DATE	CASH MARKET	FUTURES MARKET	BASIS
September 4	Expected feeder cattle price at $152.00/cwt based on expected February basis of + 2.00 (over) March futures	Long March Feeder Cattle at 150.00/cwt	+ 2.00
February 25	Buy feeder cattle at $148.00/cwt	Sell March Feeder Cattle at 144.00/cwt	+ 4.00
Results	Lower cost of $4.00/cwt	$6.00/cwt loss	2.00 basis loss

Buy cash feeder cattle at	$148.00/cwt
Futures Loss	+ 6.00
Net purchase price	**$154.00/cwt**

Note: Although the cash market for feeder cattle declined from September to February resulting in lower cash costs, the futures market position resulted in a greater loss, which more than offset the lower cash purchase price. As such, the long hedger's net purchase price was $2.00 greater than expected due to the amount that the basis strengthened at the time of the cash transaction.

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 a purchase price, and it is this price that will determine the profitability of the business. Although there may be different nuances to each type of livestock, this basic and key concept applies to any individual or firm who plans to buy cattle, feeder cattle or hogs.

CHAPTER 5 QUIZ

1. What type of potential hedger is a livestock producer?

    a. Only a short hedger

    b. A short hedger for the sale of their livestock

    c. A long hedger for the purchase of their feed

    d. Both B and C

2. What will benefit a long livestock hedge after it is initiated?

    a. Weaker basis

    b. Stronger basis

    c. Higher prices

    d. Lower prices

3. Who are potential long livestock hedgers?

    a. Restaurants

    b. Packers

    c. Feedlots who buy feeder stock

    d. All the above

4. Which market has an impact on the final net result of a long futures hedge?

    a. Cash market

    b. Futures market

    c. Option market

    d. Both A and B

5. What market condition is necessary for an effective long hedge?

    a. Simulation between the cash and futures market

    b. Integration between the cash and futures market

    c. Variation between the cash and futures market

    d. Correlation between the cash and futures market

Answers are located at the end of this publication in the Appendix.

CHAPTER 6

OVERVIEW OF THE LIVESTOCK OPTIONS MARKET

The extensive array of livestock risk management tools offered by the CME includes options on Live Cattle, Feeder Cattle and Lean Hog futures. These option contracts can be utilized in a variety of ways to provide protection and opportunity.

For example, a livestock 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 livestock 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 futures contract. 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 that 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 livestock options as effective risk management tools, it is imperative to understand the unique terminology, concepts and pricing of these instruments.

CME LIVESTOCK OPTION CONTRACT SPECIFICATIONS

Livestock Option Contract Highlights

	LIVE CATTLE OPTIONS	FEEDER CATTLE OPTIONS	LEAN HOG OPTION
Underlying Contract	40,000 pound (lb.) CME Live Cattle futures	50,000 pound (lb.) CME Feeder Cattle futures	40,000 pound (lb.) CME Lean Hog futures
Pricing unit (premium)	Cents per pound	Cents per pound	Cents per pound
Tick size (minimum premium fluctuation)	Full tick: $0.00025/lb. Half tick: $0.000125/lb.	Full tick: $0.00025/lb. Half tick: $0.000125/lb.	Full tick: $0.00025/lb. Half tick: $0.000125/lb.
Strike Price Intervals	$0.02/lb. for all months plus $0.01/lb. for nearest three months	$0.02/lb. for all months plus $0.01/lb. for nearest three months plus $0.005/lb. for spot mo.	$0.02/lb. for all months plus $0.01/lb. for nearest three months
Contract Months	Standard: Feb, Apr, Jun, Aug, Oct, Dec Serial: Jan, Mar, May, Jul, Sep, Nov	Standard: Jan, Mar, Apr, May, Aug, Sep, Oct, Nov	Standard: Feb, Apr, May, Jun, Jul, Aug, Oct, Dec
Ticker Symbol CME Globex	LE	GF	HE
Ticker Symbol Trading Floor	CK/PK	KF/JF	CH/PH
Trading Hours CME Globex	Monday-Friday: 9:05 am to 1:05 pm Central Time		
Trading Hours Trading Floor (Chicago)	Monday-Friday: 9:05 am to 1:05 pm Central Time		

For additional Livestock option contract specifications, visit **cmegroup.com/agriculture**.

Option Terminology Concepts

An option is a legally binding contract that provides a 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. Livestock *call options contain the right to buy* a specific livestock futures contract at a specific price prior to a specific expiration date. Livestock *put options contain the right to sell* a specific livestock 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 livestock 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 livestock 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 livestock 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 livestock 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.

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.

Note that only the call option buyer can exercise (use) the right to buy livestock futures. The call option seller is obligated to fulfill that right any time the buyer chooses to exercise it.

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 livestock 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 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 livestock 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 livestock 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 livestock 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.

Again, note that only the put option buyer can exercise (use) the right to sell livestock futures. The put option seller is obligated to fulfill that right any time the buyer chooses to exercise it.

Summary of Option Positions

	JULY 86 LEAN HOG CALL OPTIONS	APRIL 110 LIVE CATTLE PUT OPTIONS
Long (Buy) Option Position (Pays premium)	Right to buy July Lean Hog futures at $86.00/cwt.	Right to sell April Live Cattle futures at $110.00/cwt.
Short (Sell) Option Position (Receives premium)	Obligation to sell July Lean Hog futures at $86.00/cwt.	Obligation to buy April Live Cattle futures at $110.00/cwt.

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 different but 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 livestock commodity. As the underlying livestock 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 livestock option's underlying contract is the respective livestock futures contract of a specific contract month. For example, the underlying contract to a February Live Cattle option (call or put) is a February Live Cattle futures contract. The underlying contract to a September Feeder Cattle option (call or put) is a September Feeder Cattle futures contract.

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

In addition, other options with shorter life cycles are available for trading. They are used by livestock hedgers who want short-term protection at a relatively lower cost, or by a speculator interested in short term opportunities.

Serial options are listed for the months which are not a part of the standard livestock futures contract cycle, and usually have a lifespan of 45 to 60 days until to expiration. Since serial options have months not included in the standard livestock futures cycle, their underlying futures contract is the one closest, but not prior to, the serial option month.

The primary advantage to serial 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.

LIVESTOCK OPTION EXPIRATION INFORMATION

Live Cattle options expire on the first Friday of the option contract month at 1:00 p.m. Chicago time. Feeder Cattle options expire on the last Thursday of the option contract month at 12:00 p.m. Chicago time, unless it is an Exchange holiday. Lean Hog options expire on the 10th business day of the option contract month at 12:00 p.m. Chicago time. Note, for a livestock hedger using grain and oilseed options to manage the price risk of their feed, it is important to know that the grain and oilseed options normally expire on the third Friday of the calendar month prior to the option month.

Option Pricing

Premium is one of the most important concepts in 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 its 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 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:**

Option Premium = Intrinsic Value + 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 option *strike price and the current underlying 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 August Feeder Cattle call option has a strike price of 120 (i.e., the right to buy August Feeder Cattle futures at $120/cwt) and the underlying August Feeder Cattle futures contract is currently trading at 122, the call option's intrinsic value is $2.00/cwt.

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 futures at a price that is above the current underlying futures price. For example, if an August Feeder Cattle put option has a strike price of 120, i.e., contains the right to sell August Feeder Cattle futures at 120) and the underlying August Feeder Cattle futures contract is currently trading at 115, the intrinsic value of that put option is $5.00/cwt.

Option Classifications

An 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 option) and the current underlying futures contract price (a variable element).

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

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

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

Option Classifications

	CALL OPTION	PUT OPTION
In-the-Money	Call Strike Price < Futures Price	Put Strike Price > Futures Price
At-the-Money	Call Strike Price = Futures Price	Put Strike Price = Futures Price
Out-of the-Money	Call Strike Price > Futures Price	Put Strike Price < Futures Price

Time Value

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

Time Value = Option Premium – 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.

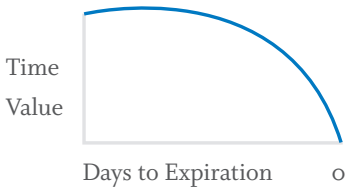
Time, or the number of days to expiration, is the obvious factor that impacts time value. Everything else remaining equal, the greater the amount of time left in the life of an option, the greater the time value portion of the premium. "Time decay" is the decline in time value as there are fewer days 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 livestock price risk. Their shorter lifespans mean lower time value, resulting in lower premiums.

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

Note that 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

Call option and put option premiums react differently when the underlying futures contract price changes. Call option premiums have a direct relationship with changes in the underlying futures contract price. As such, call premiums should increase as the underlying 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, put premiums should increase as the underlying 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.

Option Premium Movement

	CALL OPTIONS	PUT OPTION
As futures price declines	Call premium declines	Put premium increases
As futures price increases	Call premium increases	Put premium decreases

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 livestock hedger, the main Greek factor to take into consideration is the options "**Delta**," which is the change in an option premium for a given change in the underlying 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:

1. **Vega: option premium sensitivity to a change in volatility**
2. **Theta: the sensitivity of option premium to time decay**
3. **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 livestock 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.

PREMIUM

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

Livestock Option Quotations

Livestock futures and option contracts are quoted in pounds, which can be easily converted to hundredweight, the common industry practice. For example, Live Cattle and Lean Hogs are 40,000 pound contracts, which is equivalent to 400/cwt. Feeder Cattle are 50,000 pound contracts, which is equivalent to 500 cwt.

As such, option pricing can be referenced in either cents per pound, or dollars per hundred pounds, or dollars per contract.

Examples of livestock futures and option pricing:

- Lean Hog futures at 89.00 is $0.89/lb or $89.00/cwt
- Live Cattle option strike price of 110 is $1.10/lb or $110/cwt
- Feeder Cattle option premium of 1.85 is $925/contract [(1.85 x 50,000 lbs = 92500 cents) / 100 = $925]

Where Can I Find Option Premiums?

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

1. The CME Group website at cmegroup.com
2. Commodity brokers
3. Quote vendors
4. Newspapers

CHAPTER 6 QUIZ

1. What is conveyed in a livestock option contract?

   a. Right to either buy or sell an underlying livestock futures contract

   b. Right to either buy or sell livestock in a local cash market

   c. Obligation to either buy or sell livestock futures

   d. Obligation to either buy or sell livestock in a local cash market

2. What do you have if you buy a Live Cattle call option?

   a. Obligation to sell a Live Cattle futures contract

   b. Obligation to buy a Live Cattle futures contract

   c. Right to buy a specific Live Cattle futures contract

   d. Right to sell a specific Live Cattle futures contract

3. If you buy a Lean Hog put option, what is the cost of these rights?

   a. Strike price

   b. Futures price

   c. Commission

   d. Premium

4. What is a livestock option's strike price?

   a. A component of an option contract that doesn't change

   b. Price at which you have the rights to buy (call) or sell (put)

   c. A variety of price levels at which you have to choose from

   d. All of the above

5. What is the relationship between livestock option premiums and futures price movement?

   a. Call premiums move in the same direction as futures prices and put premiums move in the opposite direction as futures prices

   b. Call and put premiums move in the same direction as futures prices

   c. Call and put premiums move in the opposite direction as futures prices

   d. There isn't any relationship between livestock option premiums and livestock futures prices

Answers are located at the end of this publication in the Appendix.

CHAPTER 7

OPTION STRATEGIES FOR LIVESTOCK BUYERS

A buyer of physical livestock or livestock 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 livestock 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 market prices. A key benefit of including livestock 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 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 livestock buying hedger that highlight the benefits and flexibility of using livestock options: 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.

So why don't all livestock 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 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 + 5.00 (over) the futures. Commission is not included in this example.

June Live Cattle futures @ 124

120 (call strike)	+ 10.45 (premium)	+5.00 (expected basis)	= $135.45/cwt
124 (call strike)	+ 7.05 (premium)	+5.00 (expected basis)	= $136.05/cwt
130 (call strike)	+ 3.15 (premium)	+5.00 (expected basis)	= $138.15/cwt
136 (call strike)	+ 0.95 (premium)	+5.00 (expected basis)	= $141.95/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 livestock 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 livestock and/or livestock 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 livestock purchase will increase the effective purchase price
- Brokerage commission must be paid

Long Call Strategy Example

A cattle buyer decides to hedge against higher prices by purchasing Live Cattle call options.

Initial Market Conditions:

- August Live Cattle futures are currently at $130.00/cwt.
- August 130 Live Cattle call option is trading at a premium of $3.15/cwt
- Expected local cash basis in late July is +5.00/cwt over the August futures

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

AUGUST LIVE CATTLE FUTURES	BASIS	CASH PRICE	130 CALL OPTION VALUE	LONG CALL GAIN/LOSS	PURCHASE PRICE = CASH PRICE –/+ OPTION GAIN/ LOSS
120.00	+5.00	$125.00	0 (expires worthless)	$3.15/Max. loss is premium paid	$128.15
130.00	+5.00	$135.00	0 (expires worthless)	$3.15/ Max. loss is premium paid	$138.15
140.00	+5.00	$145.00	$10	$6.85 gain ($10- 3.15)	$138.15

Example Notes:

1. As the risk of higher futures prices occurs, the cash purchase price will also be higher but the gain on the long call option will offset the increase in the cash market. Therefore, the net purchase in a rising market is capped at a maximum level.
2. If the market moves lower, the cash purchase price will be lower and the loss on the long call option is capped at the premium paid. Therefore, the buying 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 livestock operation, and not whether there was a gain or loss on the option position.
3. 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 (e.g., +3.00) the net purchase price will be lower and if it is stronger (e.g., 8.00, the net purchase price will be higher.
4. 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 basis.

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

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

Unlike the long futures or long call option strategies that each require a single calculation, the Long Call/Short Put Combination strategy requires two calculations: one determines the maximum (ceiling) 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 livestock 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 livestock and/or livestock 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 livestock 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 cattle buyer decides to hedge against higher prices and establish a purchase price range by buying Live Cattle call options and selling Live Cattle put options.

Initial Market Conditions:

- June Live Cattle futures are currently at $130.00/cwt.
- June 130 Live Cattle call option is trading at a premium of $3.15/cwt
- June 124 Live Cattle put option is trading at a premium of $1.35/cwt
- Expected local cash basis in late May is +5.00/cwt over the May futures

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

JUNE LIVE CATTLE FUTURES	BASIS	CASH PRICE	130 CALL OPTION VALUE 124 PUT OPTION VALUE	LONG CALL RESULT SHORT PUT RESULT NET OPTION RESULT	PURCHASE PRICE = CASH PRICE –/+ OPTION GAIN/ LOSS
120.00	+5.00	$125.00	Call Value = $0 Put Value = $4	Long Call: $3.15 loss Short Put: $2.65 loss Net Result: $5.80 loss	$130.80
130.00	+5.00	$135.00	Call Value = $0 Put Value = $0	Long Call: $3.15 loss Short Put: $1.35 gain Net Result: $1.80 loss	$136.80
140.00	+5.00	$145.00	Call Value = $10 Put Value = $0	Long Call: $6.85 gain Short Put: $1.35 gain Net Result: $8.20 gain	$136.80

Example Notes:

1. As the risk of higher futures market prices occurs, the cash purchase price will also be higher, but the gain on the long call option and the short 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 earlier Long Call strategy; the amount of premium collected for also selling the put is the difference in the lower maximum price.

2. 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.

3. 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 $6 was determined by the difference in the call strike price (130) and the put strike price (124). 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.

4. 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 (e.g., +3.00) the net purchase price will be lower and if it is stronger (e.g., 8.00), 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.

5. 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 livestock or livestock 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 livestock buyer's price risk by using futures, options and combinations of contracts. They provide the livestock buying hedger with the flexibility to adjust their market risk exposure to a level that they are willing to assume. A livestock buyer may want to contact their broker, market advisor or state livestock marketing specialist to discuss additional strategies to manage their risk.

CHAPTER 7 QUIZ

1. What market risks does a buyer of livestock face?

   a. Lower prices and weaker basis

   b. Higher prices and stronger basis

   c. Higher prices and weaker basis

   d. Lower prices and stronger basis

2. What is a basic option position for a buyer of livestock?

   a. Long put option

   b. Short call option

   c. Long call option

   d. Short futures

3. What combination of option positions establishes a livestock buying range?

   a. Long call and long put

   b. Short call and long put

   c. Long call and short put

   d. Short call and short put

4. What are the benefits of a long call strategy for livestock buyers?

   a. No margin requirements

   b. Protection against higher prices

   c. Opportunity if prices move lower

   d. All of the above

5. What can impact the final results of a long call strategy for a livestock buying hedger?

   a. A change in the basis

   b. A change in the underlying futures price

   c. Commission on the option

   d. All the above

Answers are located in the Appendix.

CHAPTER 8

OPTION STRATEGIES FOR LIVESTOCK SELLERS

Remember that the selling hedger has downside market risk. That is, the profitability of a livestock or livestock 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. However, the short futures strategy does not allow the selling hedger to benefit from more favorable prices should market prices increase.

Livestock options are another tool to manage the downside price risk associated with selling livestock and/or livestock products. Some of the option strategies will provide downside price protection similar to the short futures hedge but unlike the short futures hedge, livestock sellers will also be able to benefit from higher market prices. A key benefit of adding livestock options to a portfolio is the flexibility that is added 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 livestock 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 selling 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 livestock selling 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 - 6.00 (under). Commission is not included in this example.

May Lean Hog Futures @ 96.00

102 (put strike)	– 8.85 (premium)	– 6.00 (expected basis)	= $87.15/cwt
96 (put strike)	– 4.90 (premium)	– 6.00 (expected basis)	= $85.10/cwt
90 (put strike)	– 2.80 (premium)	– 6.00 (expected basis)	= $81.20/cwt
86 (put strike)	– 1.25 (premium)	– 6.00 (expected basis)	= $78.75/cwt

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 livestock 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 livestock sale will lower the effective selling price
- Brokerage commission must be paid

Long Put Strategy Example

A hog producer decides to hedge against falling prices by selling Lean Hog put options.

Initial Market Conditions:

- April Lean Hog futures are currently at $96.00/cwt.
- April 96 Lean Hog put option is trading at a premium of $4.90/cwt
- Expected local cash basis in early April is – 6.00/cwt (under) the April futures

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

APRIL LEAN HOG FUTURES	BASIS	CASH PRICE	96 PUT OPTION VALUE	LONG PUT PROFIT/LOSS	SELLING PRICE = CASH PRICE +/– OPTION GAIN/LOSS
80.00	- 6.00	$74.00	$16/cwt	$11.10/gain	$85.10
96.00	- 6.00	$90.00	0 (expires worthless)	$4.90/max. loss	$85.10
112.00	- 6.00	$106.00	0 (expires worthless)	$4.90/max. loss	$101.10

Example Notes:

1. 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.

2. 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 livestock 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 livestock operation, and not whether there was a profit or loss on the put option position.

3. 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., - 3.00) the net selling price will be higher and if it is weaker (e.g., - 8.00, the net selling price will be lower.

4. The long put option strategy also allows the selling hedger to choose the cash market buyer, which is usually the livestock 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 livestock selling 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, with the premium collected by selling the call option effectively lowering 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 put and call option strike prices that a selling 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 futures or long 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 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: Advantages

- Call premium received reduces cost of price protection
- Retain some opportunity for higher selling prices
- Stronger basis at the time of the livestock 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 livestock 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 livestock sale will lower the effective selling price
- Brokerage commission must be paid for the call and put option

Long Put/Short Call Combination Strategy Example

A hog producer decides to hedge against lower prices and establish a selling price range by buying Lean Hog put options and selling Lean Hog call options.

Initial Market Conditions:

- April Lean Hog futures are currently at $96.00/cwt.
- April 96 Lean Hog put option is trading at a premium of $4.90/cwt
- April 102 Lean Hog call option is trading at a premium of $2.60/cwt
- Expected local cash basis in early April is 6.00/cwt under the April futures

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

APRIL LEAN HOG FUTURES	BASIS	CASH PRICE	96 PUT OPTION VALUE/ 102 CALL OPTION VALUE	LONG PUT RESULTS SHORT CALL RESULTS NET RESULT	SELLING PRICE = CASH PRICE +/– OPTION GAIN/LOSS
86.00	- 6.00	$80.00	Put Value = $10 Call Value = $0	Long Put: $5.10 gain Short Call: $2.60 gain Net Gain: $7.70	$87.70
96.00	- 6.00	$90.00	Put Value = $0 Call Value = $0	Long Put: $4.90 loss Short Call: $2.60 gain Net Loss: $2.30	$87.70
106.00	- 6.00	$100.00	Put Value = $0 Call Value = $4	Long Put: $4.90 loss Short Call: $1.40 loss Net Loss: $6.30	$93.70

Example Notes:

1. 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 earlier Long Put strategy. The amount of premium collected for selling the call option is the difference in the higher minimum price.

2. If the market moves higher, the cash selling price will be higher. However, the hedger will experience a maximum loss of the premium he 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.

3. 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 $6 was determined by the difference of the put strike price (96) and the call strike price (102). 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.

4. 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., -2.00) the net selling price will be higher and if it is weaker (e.g., -9.00), 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.

5. 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 livestock or livestock 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 selling hedger's price risk by using futures, options and combinations of contracts. These strategies provide the livestock selling hedger with the flexibility to adjust their market risk exposure to a level that they are willing to assume. A livestock seller may want to contact their commodity broker, market advisor or their state livestock marketing specialist to discuss additional strategies to manage their risk.

CHAPTER 8 QUIZ

1. What market risks does a seller of livestock face?

   a. Lower prices and weaker basis

   b. Higher prices and stronger basis

   c. Higher prices and weaker basis

   d. Lower prices and stronger basis

2. What is a basic option position for a seller of livestock?

   a. Long put option

   b. Short call option

   c. Long call option

   d. Short futures

3. What combination of option positions establishes a livestock selling range?

   a. Long put and short call

   b. Short call and short put

   c. Long call and short put

   d. Long call and long put

4. What are the benefits of a Long Put strategy for livestock sellers?

   a. No margin requirements

   b. Protection against lower prices

   c. Opportunity if prices move higher

   d. All of the above

5. What can impact the final results of a Long Put strategy for a livestock seller?

   a. A change in the basis

   b. A change in the underlying futures price

   c. Commission on the option

   d. All the above

Answers are located in the Appendix.

CHAPTER 9

KEYS TO SUCCESSFUL LIVESTOCK RISK MANAGEMENT

For both livestock buyers and livestock sellers, the following are 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 or corporate entities. Family or 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 livestock 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 livestock 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 livestock. 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 livestock operation, to a complex legal document for a 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. **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 livestock sale or purchase that may occur in the near future. A written plan will help the livestock 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 livestock 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.

6. **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 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 livestock operations, it is important that others in management are comfortable with the objectives and the plan to achieve them.

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 livestock 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 livestock 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 livestock 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 livestock hedger will use past experiences to move forward in a positive manner.

CHAPTER 9 QUIZ

1. When may it be a good time for a livestock hedger to adjust their risk management plan?

   a. Never

   b. Whenever the market moves slightly against you

   c. When global market conditions change significantly from initial expectations

   d. Always when your advisor tells you to change

2. Who should make the final decisions when developing and executing a risk management plan?

   a. Management team

   b. Spouse

   c. Advisor

   d. You, the hedger

3. What are some valid reasons for keeping good records

   a. Tax returns

   b. Using historical basis information for future risk management decisions

   c. Identify potential market price trends that could influence future decisions

   d. All the above

4. Why is a written risk management plan important?

   a. Makes it more difficult to forget or change at random

   b. The CFTC and Exchange will need a copy

   c. The Internal Revenue service requires a plan

   d. May be helpful when reviewing and/or defending the plan to your management

   e. Both A and D

5. What risk management strategies should a good livestock hedger learn?

   a. Futures contract strategies

   b. Option contract strategies

   c. Cash market alternatives

   d. Government programs

   e. All of the above and any other new risk management methods

Answers are located at the end of this publication in the Appendix.

CHAPTER 10

ADDITIONAL RISKS OF THE LIVESTOCK HEDGER

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

For livestock 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 livestock. CME Group grain and oilseed products, including corn, wheat, soybean meal and oats futures and options, can be used as feed risk management tools. The following example provides a simple illustration.

Feed Hedging Example

A livestock producer plans to buy corn in November to meet his feed requirements. The current cash market price in July for corn to be delivered in November is $6.50 per bushel. He 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 livestock producer buys December Corn futures at $6.50 per bushel.

DATE	CASH MARKET	FUTURES MARKET
July	Cash Corn is $6.50 per bushel	Buy December Corn futures at $6.50 per bushel
November	Buy cash Corn at $7.00 per bushel	Sell December Corn futures at $7.00 per bushel
Change	$.50 per bushel loss	$.50 per bushel gain
Results	Buy cash corn $7.00 Gain on futures position -.50 Net purchase price $6.50	

Nearly every livestock 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 livestock 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 livestock or livestock 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.

A commodity broker or advisor will be able to advise livestock hedgers on structuring strategies to address the various risks they face.

CHAPTER 10 QUIZ

1. What types of market risk does a Livestock producer have?
    a. Livestock prices
    b. Energy costs
    c. Feed costs
    d. Interest rates
    e. All of the above
2. If a livestock hedger is buying or selling livestock or livestock products to or from another country, what are some of the market risks they have?
    a. Livestock prices
    b. Foreign Currency Exchange Rates
    c. A and B
    d. No market risk
3. What impact would higher feed prices and higher energy prices have on a livestock operation?
    a. Lowers profitability
    b. Raises profitability
    c. No impact on profitability
4. Which of the following is the most basic hedging strategy to protect from higher feed and energy costs
    a. Long put
    b. Short call
    c. Long futures
    d. Short futures
5. What does a long call do for a livestock hedger who uses feed and energy?
    a. Provides price protection against higher feed and energy costs
    b. Provides opportunity for lower feed and energy costs
    c. Not a valid strategy for feed and energy
    d. A and B

SUMMARY

One of the main objectives of this publication was to provide a good general understanding of the futures industry and how livestock 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 livestock hedgers as a stepping stone to continue their education and training.

CME Group Livestock futures and options markets offer many benefits for buyers and sellers of livestock 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

APPENDIX

Getting Started

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 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 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 livestock 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.

In addition to brokers, a 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 business operation and their risk management objectives.

Additional Resources

There are numerous books and periodicals that focus on livestock 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 livestock marketing specialists, usually found at the state land grant universities.

Regardless of how information is obtained on the livestock markets, it is imperative to continue learning about this invaluable subject of price risk management.

Chapter Quiz Answer Key

Chapter 1:
1.d 2.c 3.e 4.a 5.c 6.c 7.b 8.c

Chapter 2:
1.c 2.a 3.c 4.c 5.d

Chapter 3:
1.c 2.c 3.b 4.b 5.c

Chapter 4:
1.c 2.c 3.d 4.d 5.d

Chapter 5:
1.d 2.a 3.d 4.d 5.d

Chapter 6:
1.a 2.c 3.d 4.d 5.a

Chapter 7:
1.b 2.c 3.c 4.d 5.d

Chapter 8:
1.a 2.a 3.a 4.d 5.d

Chapter 9:
1.c 2.d 3.d 4.e 5.e

Chapter 10:
1.e 2. c 3.a 4.c 5.d

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