Basic Livestock Futures, Part 3:

Principles of Livestock Hedging

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This Fact Sheet is part three of a three-part series that discusses the fundamentals of livestock futures markets, the mechanics of futures trading, and the principles of hedging livestock. Part three focuses on the principles of hedging livestock with futures markets. This Fact Sheet demonstrates the concepts of forward pricing cattle and managing price risk through hedging.

Basic Livestock Futures, Part One (OSU Extension Facts 430) discusses the fundamentals of futures markets and futures contracts. Basic Livestock Futures, Part Two (OSU Extension Facts 431) discusses the mechanics of futures trading, including choosing a broker and opening a futures trading account.

The Hedging Concept

Hedging is a procedure that allows livestock producers to forward price livestock and manage the risk of market price changes by taking a futures position that is opposite to the producer's cash market position. One method of completing a hedge would be to sell a futures contract at an acceptable price, hold the contract until maturity, and then deliver hedged livestock to a futures delivery point. While this sounds simple, actual delivery on a futures contract is not. First, the seller must pay all costs of delivery, including grading, yardage, feed, weighing, commission, etc., in addition to shrinkage and cost of transportation, to a designated delivery point. Second, the livestock delivered must meet the specifications of the futures contract. In many cases some animals must be culled and sold separately, and others may have to be purchased to replace them.

In general, the livestock producer should not plan to make delivery of livestock on the basis of the futures contract. There are sufficient livestock traders, marketing agencies, livestock brokers, etc. who are in a much better position than the producer to make deliveries. Such deliveries make hedging without delivery effective for other producers.

In most cases, it is neither necessary nor desirable to fulfill a futures commitment by delivery in completing a successful hedge. Less than 3 percent of initial futures commitments actually result in delivery. The other commitments are offset prior to maturity of the futures contract. For example, when a hedger sells a June live hog futures contract, a firm commitment to deliver hogs as specified in the futures contract has been made. Any time prior to the maturity of that contract on June 20, a June live hog futures contract which represents a commitment to accept delivery of hogs as specified in the contract may be purchased. Since all June live hog futures are identical, the two commitments nullify each other. This leaves no obligation to either make or take delivery of hogs. The producer is then free to deliver the hogs to the local market. A hedger can price livestock in the futures market and yet make delivery at a local market. The arithmetic of hedging is an illustration of this procedure.

For feeder cattle, cash settlement takes the place of delivery. If a producer maintains a futures commitment until the contract expires, the position is automatically offset at the cash settlement value. This eliminates the costs and inconvenience of delivery which are major attractions of cash settlement over delivery. Of course, a producer who wishes to remove a futures obligation prior to contract expiration may do so with an offsetting futures transaction. See OSU Extension Facts 509 for more discussion of cash settlement.

The Arithmetic of a Hedge

Assume that a cattle feeder in October estimates that slaughter cattle for sale in April would sell for $1.00/cwt. less than cattle futures prices quoted during April. Example 1 reflects this situation. This $1.00 difference is the "basis" and based on the combined factors of quality, location, and delivery methods. This basis estimate is the key to the forward pricing process. The basis estimate of -$1.00 indicates that, regardless of whether cattle prices in April are high or low, the price expected for the cattle in April will be $1.00 below the April futures price at the time the cattle are ready for sale. The basis is much more predictable than is the overall price level that will prevail in the future. For example, slaughter cattle prices in all areas of the country for all grades of cattle will tend to move in the same general direction by a similar magnitude. It is quite difficult to predict how much prices in general may move up or down over the next four to six month period.

Livestock basis is discussed in much more detail in OSU Extension Facts 433. Historical basis estimates for feeder heifers and steers at Oklahoma City can be found in OSU Extension Facts 499 and 500. Information on fed cattle basis is available in OSU Extension Facts 531. To use basis in hedging, the hedger adjusts the quoted futures price by the amount of the estimated basis. This accounts for differences between the local cash price and the futures price that are expected to exist at the time the hedge is to be completed. For example, assume that April cattle futures are currently quoted at $75.00/cwt. The hedger would subtract $1.00 from $75.00 which would give an expected hedged price of $74.00. The

expected hedged price represents an offer made by the futures market for cattle delivered to the local market in April.

Next, potential hedgers must decide if they are willing to take this offer. To arrive at a minimum price that will be acceptable, an estimate of production costs will be needed. Producers will need to evaluate their ability and willingness to take the risk of a price lower than that offered by the futures market. Based on the difference between expected hedged price and breakeven price, the producer may then make the hedging decision. Assuming that the producer estimates a breakeven price of $70.00 and has an expected hedged price of $74.00, $4.00/cwt will be available to cover fixed costs, overhead, management charges, and profits.

Finally, the decision whether or not to hedge will be influenced by the producer's assessment of market outlook. Hedging is one of several marketing alternatives available to the producer. In instances where there appears to be a high probability that prices will fall before the cattle are ready to market, hedging may be the best marketing alternative. Producers who feel that prices might go up but still need some risk protection against lower prices may be more interested in minimum pricing with options on futures than in fixing prices by hedging. See OSU Extension Facts 487 for more discussion of live cattle options trading.

To hedge, the producer would sell a futures contract. Returning to Example 1, in October the feeder would sell April live cattle futures in quantities equal to the number of cattle subject to forward price for delivery in April. By selling the April futures at $75.00/cwt., an attempt is made to forward price or hedge the cattle at a price of $74.00.

Before hedgers can make the initial sale of a futures contract, their broker must find someone who is willing to buy a contract. For every seller there must be a buyer and for every buyer, a seller. After the initial transaction, the hedger (or the seller in this case) has an obligation to deliver, and the buyer has an obligation to take delivery. The buyer may be either a trader trying to hedge the purchase price of cattle or a speculator who thinks the market is going up. Assuming that the buyer is a speculator, the buyer will want to offset the futures commitment in the future. If prices for April futures drop, they will likely cut losses short by selling an offsetting futures contract before making a margin call. If prices for April futures move as high as expected, the contract will be sold to another trader. This would offset the commitment to take delivery of the cattle by transferring that commitment to a new buyer.

Many trades may take place between the time a hedge is placed and the time it is completed. It may appear by the volume of futures trading that many cattle are being traded, whereas the same cattle commitments are being traded many times. Open interest, as reported for futures trading, reflects the number of open positions, i.e. commitments which have not been offset, that exist in the market at any point in time. As long as the hedger has a commitment to deliver, someone will have the opposite commitment to take delivery, although that commitment to take delivery may have changed hands many times.

Before the futures contract matures, the hedger will complete the hedge by selling the cattle and buying a futures contract to offset the previous sale. This action will clear all commitments associated with the initial sale. No one, not even the hedger, will be obligated to make or take delivery of the cattle through the futures market. The hedger is free to sell the cattle at the local market. Although no deliveries were made, the futures market will have performed its task. Between the time of the hedger's initial sale and later purchase, the price risks will have been absorbed by speculators and will have been avoided by the hedger.

This concept of shifting risk may be made clearer by returning to the previous example of cattle hedged in October for April delivery. Assume that by April, local cash market prices were $68.00/cwt. instead of the hedged price of $74.00 expected in October, a difference of $6.00. In this case, if the producer had not hedged, the price received for cattle would be only $68.00, the cash price at the local market.

Since the producer hedged, the risk of that $68.00 price was absorbed by the futures market. The April futures contract represents a physical claim to live cattle during the April delivery period. A lower cash market price means that the April futures price will also be lower. If futures prices were significantly higher than cash market prices at the delivery points, cattle traders would sell April futures and make deliveries. If futures were significantly lower than cash prices, traders would buy April futures and take delivery. This possibility of delivery forces futures prices to approach cash market prices at par delivery points as the time of contract maturity nears. This also brings futures prices into line with the cash market in other areas as well. Assume that with a local cash price of $68.00/cwt. in April, the April futures which were sold at $75.00 in October were forced to drop to $69.50 by April. The hedger would make a profit in the futures market of $5.50/cwt. by being able to buy back the commitment at a lower price than the price at which it was sold.

In this example, if the futures trader had been a speculator, a $5.50/cwt. profit would have been made. But since the trader was a hedger having possession of cattle in the amount of the futures position, $5.50 must be applied to the $68.00 price received from the sale of the cattle to bring the total back to near the hedged price expected in October. The hedger's futures market profits simply offset the lower cash market price for the cattle. The $68.00 cash price plus the $5.50 futures profit gives a net realized price of $73.50 for the hedged cattle. The realized price of $73.50 is only $.50 different from the expected hedged price of $74.00 which is probably typical of the price expected by hedging.

Any difference between the expected and realized price is always reflected in the difference between the expected and actual, or realized, basis. Example 1 shows the total hedging example, including date of transaction, type of transaction, cash market, futures market, and basis relationships. The expected basis was -$1.00 (or $1.00/cwt. under the futures price), resulting in an expected hedged price in October of $74.00 compared to the futures price of $75.00.

The realized basis was -$1.50 or $1.50 under the futures price, which was the actual difference between the local cash price of $68.00 and the April futures price in April of $69.50. The basis was $.50 different than expected because cash prices were $.50 lower than expected relative to futures. Thus, the $5.50/cwt. profit in the futures market did not fully offset the $6.00 lower cash price received for the cattle. Considering both cash and futures results, the hedger realized a net price $.50 lower than expected.

Example 2 shows the same hedging situation except for the assumption that the basis estimate is absolutely correct. The realized basis equals the expected basis, which was $1.00 under. Therefore, the futures price must be $.50 lower relative to the cash market price than in the previous example. Assume that the hedge was completed at a futures price of $69.00 and a cash price of $68.00, yielding a realized basis of -$1.00 as expected. In this case the net realized price will be

$74.00, which is exactly equal to the expected hedged price. Futures profits exactly offset the lower cash price. This is called an ideal or perfect hedge. It is perfect in that the hedger realized the exact price that he expected at the time the hedge was placed.

The perfect or ideal hedge is rarely achieved by the hedger. Even though the basis is typically much more predictable than cash prices, it is still rarely accurately anticipated at the time a hedge is placed.

If the basis estimate is accurate, the hedger will get the price expected for the cattle regardless of whether money is made or lost in the futures market. Example 3 shows a situation in which the basis is again assumed to be accurately estimated, but in this case the futures price rose between October and April. Assume that the April futures price in April was $80.00/cwt. compared to $75.00 when the hedge was placed in October. The higher futures price was the result of a higher cash market. Thus, the hedger was able to sell the cattle locally for $79.00, at $1.00 under the futures prices.

In this case, if the producer had not hedged, an unexpected profit would be received from the sale of cattle at a price of $79.00. But since the producer hedged, it will take $5.00 of that higher cattle price to offset the futures losses, leaving a net realized price of only $74.00. In Example 2, the producer sells the cattle locally for $68.00, and in Example 3, the cattle sell locally for $79.00. But since a hedge was placed, the $74.00 net hedged price was realized in both cases. Regardless of whether the futures market goes up or down, the same price is received for the hedged cattle. This is why hedging is often called forward pricing.

If the futures trader in Examples 2 and 3 had been a speculator, they would either have made $6.00 as in Example 2 or would have lost $5.00 as in Example 3. The speculator has no cattle to sell to offset the futures losses or gains. But many hedgers are much more concerned with pricing their cattle than with futures profits. From a forward pricing standpoint, the hedger did equally well in both examples.

The hedging procedure for hogs is identical to that for cattle. Example 4 shows a hog hedging situation. Assume that a hedge is to be placed in May for hogs to be delivered in July. The hog producer estimates the July delivery basis at $.50 under the futures price. So the quoted futures price of $58.00 represents an offer of about $57.50 for the hogs delivered to the local market. The producer sells July futures in March to place the hedge.

By July, local hog prices are being quoted at $54.00, and the July live hog futures are trading at $54.00, giving a $.00 basis. The hedge is completed with a $4.00 futures profit which is added to the $54.00 price received from the hogs, giving a realized net price of $58.00. Again, as in the first example, the expected price was missed by $.50 because the basis estimate was missed by $.50. But in this case, the miss was favorable. In all cases, the hedger will receive the price expected from hedging only to the extent that the basis was correctly estimated. Conceptually, the hedger trades the large risk associated with the unpredictability of cash market for the much smaller risk associated with a more predictable basis. The last example is one of a buying hedge on feeder cattle. Assume that a cattle feeder has forward priced slaughter cattle and feed costs so an $80.00 feeder cattle price will give acceptable profit. Assume that it is now August and the cattle will not be placed on feed until October. October feeder cattle futures are currently priced at $78.50, and the estimated basis is $1.50. The hedging transaction and price relationships are shown in Example 5. In this case, the feeder wants to hedge the buying price, so the hedge is initiated by buying on October futures. The hedge is completed in October by buying the feeder cattle locally and selling feeder cattle futures to offset the previous purchase. Assuming $85.00 must be paid for the cattle and the October futures is sold for

Example 1

		Transactions	
Date	*Cash Market*	*Futures Market*	*Basis*
October	(Expected hedged price at $74.00)	Sell April Futures at $75.00	Expected $1.00
April	Sell cattle locally at $68.00	Buy April futures at $69.50	Realized $1.50
	Difference $6.00	Profit $5.50	Difference $.50

Hedging Results

Cash Price	68.00
Futures Profit	5.50
Realized Price	73.50

Example 2

		Transactions	
Date	*Cash Market*	*Futures Market*	*Basis*
October	(Expected hedged price at $74.00)	Sell April Futures at $75.00	Expected $1.00
April	Sell cattle locally at $68.00	Buy April futures at $69.00	Realized $1.00
	Difference $6.00	Profit $6.00	Difference $.00

Hedging Results

Cash Price	68.00
Futures Profit	6.00
Realized Price	74.00

Example 3

		Transactions	
Date	*Cash Market*	*Futures Market*	*Basis*
October	(Expected hedged price at $74.00)	Sell April futures at $75.00	Expected $1.00
April	Sell cattle locally at $79.00	Buy April futures at $80.00	Realized $1.00
	Difference $5.00	Profit -$5.00	Difference $.00

Hedging Results

Cash Price	79.00
Futures Profit	-5.00
Realized Price	74.00

Example 4

		Transactions	
Date	*Cash Market*	*Futures Market*	*Basis*
March	(Expected hedged price at $57.50)	Sell July futures at $58.00	Expected $0.50
July	Sell hogs locally at $54.00	Buy July futures at $54.00	Realized $0.00
	Difference $3.50	Profit $4.00	Difference $.50

Hedging Results

Cash Price	54.00
Futures Profit	4.00
Realized Price	58.00

Example 5

		Transactions	
Date	*Cash Market*	*Futures Market*	*Basis*
August	(Expected hedged price at $80.00)	Buy October futures at $78.50	Expected $1.50
October	Buy feeder locally at $87.50	Sell October futures at $86.00	Realized $1.00
	Difference $7.00	Profit $7.50	Difference $.50

Hedging Results

Cash Price	87.00
Futures Profit	-7.50
Realized Price	79.50

$86.00, the realized basis will be $1.00 instead of the $1.50 anticipated. Thus the $7.50 futures profit will more than offset the $7.00 higher purchase price, giving a net purchase price of $79.50 for the feeders compared to an expected price of $80.00

In these hedging examples, brokerage fees and interest cost on margin money would have to be deducted from the net price. Brokerage fees are variable but generally amount to about $50-$60 per contract or roughly $.15-.20/cwt. of livestock hedged. Initial margin deposits vary according to livestock prices and market conditions. Assuming that the futures market is as likely to move in hedgers' favor as it is to move against them, the long run interest cost can be calculated on the initial margin requirement. Assuming a four month hedge at 12 percent interest, the interest cost on a hedge might run another $.10-.15 per cwt. So hedging costs of $.25-.35 might have to be deducted from the expected hedged price in making the hedging decision and in calculating the final results.

Summary

The hedging examples show that hedging is simply forward pricing. Futures profits or losses offset higher or lower cash market prices, bringing the hedger back to a realized price near the expected hedged price. Hedging does not guarantee the highest price, but gives a more certain price. The speculator makes or loses money in the futures market. The hedger makes profits from livestock. The futures market is used only to help establish prices and manage the risk of price changes.

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