

A producer's decision as to when and how to market crops or livestock can have as great an impact on net profit as any production decision. Farmers today have more marketing alternatives than in the past and face a complex marketing system. They need to compare the traditional marketing method of making a cash sale at harvest or when livestock are ready for market to forward contracting or hedging with futures or options. To do this, they need to understand the relationship between different price-quotes to be able to compare them equally in terms of time, place, and quality.

The relationship between the cash and futures price is known as the basis. In marketing, basis generally refers to the difference between a price in a particular cash market and a specific futures contract price. Basis "localizes" the futures price with respect to location, time, and quality. Understanding basis makes it possible to compare futures market price quotes with cash and forward contract price quotes.

Calculating Basis

The formula for calculating basis is: $\text{Cash Price} - \text{Futures Price} = \text{Basis}$ at a specific point in time. A negative basis implies the futures price is greater than the cash price, and a positive basis implies the futures price is less than the cash price. Because basis can be either negative or positive, it is helpful to include the (-) or (+) sign when calculating or quoting basis to avoid confusion.

In the formula, the *cash price* is for a specific location, time, and quality of product. The location may be a specific

Basis: The Cash/ Futures Price Relationship

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elevator or packer, or it may represent an average price for the local area. The time may represent a specific day or, possibly, a weekly average. Quality may be #2 yellow corn or 600-pound medium-framed steers. The *futures price* in the formula is for a contract for the same time the cash price represents. The quality of the product in the futures contract price is standardized.

Basis is most often calculated as the difference between the cash price and the nearby (closest to expiration) futures contract. For example, in June the wheat basis would be calculated using the current cash price minus the July futures contract price. However, basis with grains may also be calculated using the cash price and a more distant (deferred) futures contract to see if the market is offering returns to storage. With livestock, only the nearby basis needs to be considered for hedging and cash sale purposes because, unlike grains, livestock are a perishable commodity and cannot be stored for any length of time.

Figures 1 through 3 on the following page show different types of basis data that can be calculated and used in

marketing decisions. Figure 1 is the daily nearby basis for wheat in Garden City, Kansas, during 1990, calculated off the July Kansas City Board of Trade (KCBT) wheat futures contract. Basis reflects local supply and demand for a commodity relative to the futures market. In this case, basis became more negative as the 1990 wheat harvest got underway and the supply of cash wheat in the Southern Plains began to increase compared to the rest of the U.S. The cash price in Garden City fell as supplies increased

while the futures price remained relatively constant, causing the basis to become more negative. A basis chart like figure 1 does not show the actual price changes; rather, it tracks the difference between cash and futures prices.

Figure 2 is the 5-year average weekly basis (Wednesday's cash and futures prices) for soybeans in Topeka, Kansas, calculated off the July Chicago Board of Trade (CBOT) soybean futures contract. This is an example of a basis calculated using a deferred futures contract. The improvement in basis from harvest until the contract expires in July represents the market's payment for storing soybeans. The deferred basis will generally be more negative than the nearby basis (the deferred futures contract is normally priced higher than the nearby futures contract). Multi-year average basis calculations computed off a deferred futures contract are useful in evaluating the potential profitability of grain storage.

Figure 3 is the 5-year average weekly basis for western Kansas direct choice steers weighing 1,100-1,300 pounds



Figure 1 Garden City Wheat Basis
July KCBT Wheat Futures

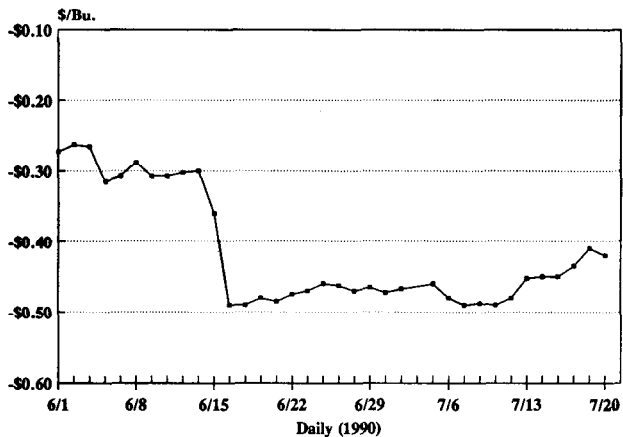


Figure 2 Topeka Soybean Basis
July CBOT Soybean Futures

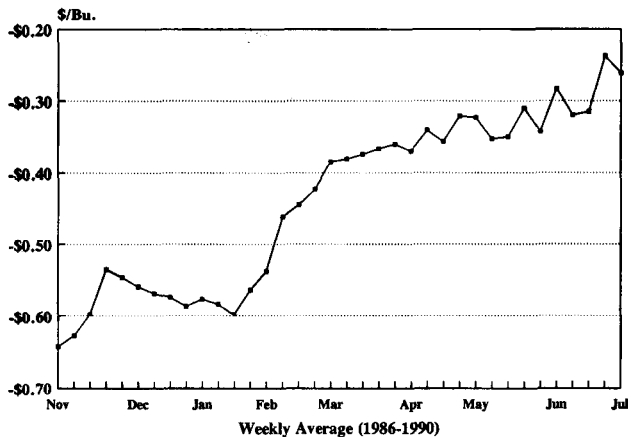


Figure 3 Western Kansas 11-13 Cwt. Choice Steer Basis
Nearby CME Live Cattle Futures

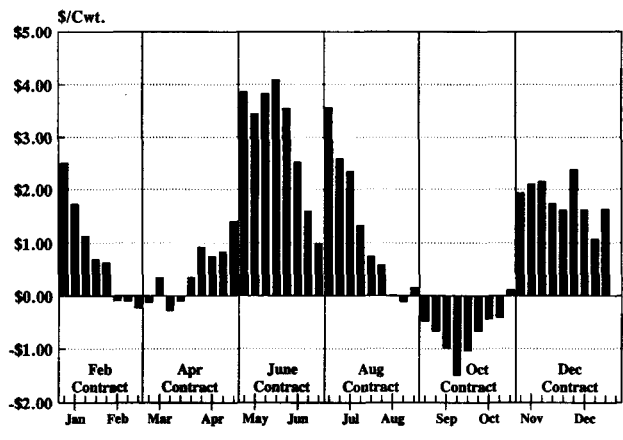


Figure 4 Wheat Cash and Futures Prices
1985-1989 Average

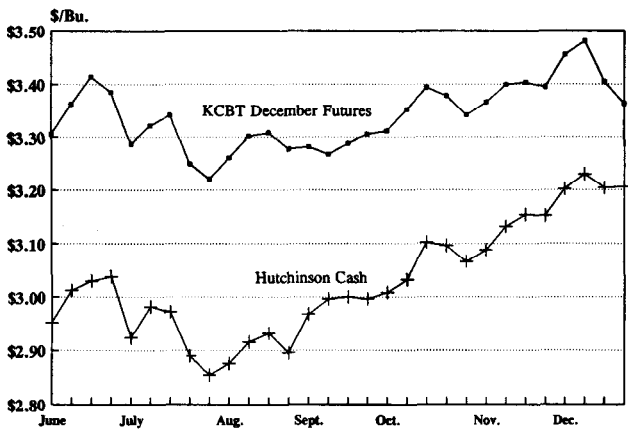


Figure 5 Dodge City Wheat Price

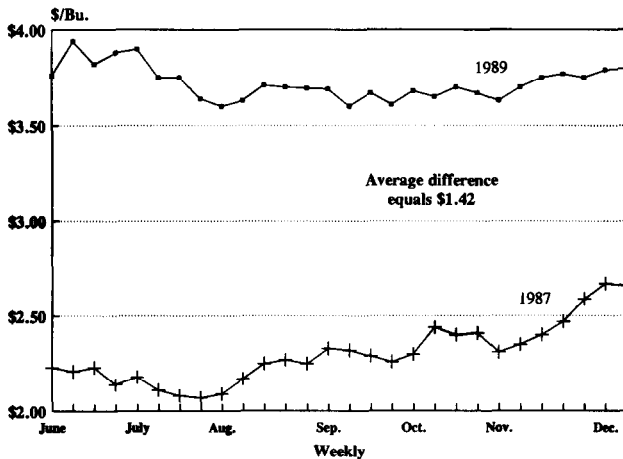
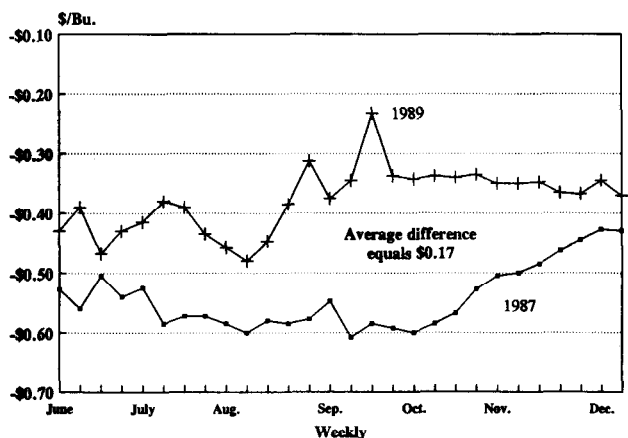


Figure 6 Dodge City Wheat Basis
KCBT December Wheat Futures



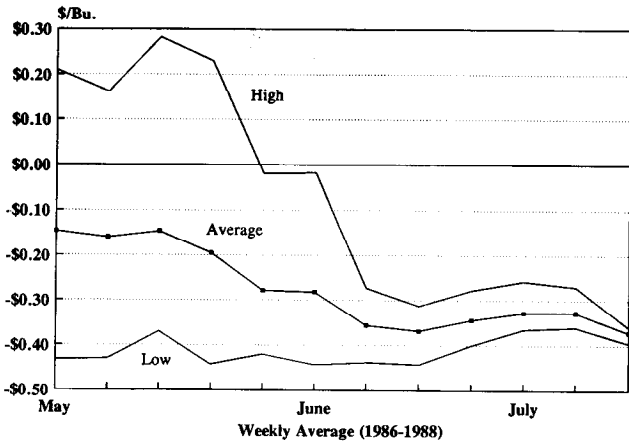
12 Week Basis Hand Worksheet

Location Colby, KS
 Futures Contract July
 Commodity KCAT WHEAT

Month	Week	Year 1986		Year 1987		Year 1988		Average Basis*
		Cash - Futures = Basis	Cash - Futures = Basis	Cash - Futures = Basis	Cash - Futures = Basis	Cash - Futures = Basis	Cash - Futures = Basis	
	1	3.06 - 2.85 = .21	2.60 - 2.81 = <.21	2.65 - 3.08 = <.43	<.146			
	2	2.79 - 2.62 = .16	2.76 - 2.97 = <.21	2.68 - 3.11 = <.43	<.159			
	3	3.05 - 2.76 = .28	2.49 - 2.86 = <.37	2.83 - 3.18 = <.35	<.146			
	4	2.76 - 2.53 = .23	2.45 - 2.82 = <.37	2.94 - 3.38 = <.44	<.195			
	5	2.43 - 2.45 = <.02	2.31 - 2.70 = <.39	3.00 - 3.42 = <.42	<.278			
	6	2.48 - 2.49 = <.01	2.26 - 2.64 = <.38	3.23 - 3.67 = <.44	<.282			
	7	2.18 - 2.45 = <.27	2.29 - 2.64 = <.35	3.54 - 3.97 = <.43	<.356			
	8	2.10 - 2.41 = <.31	2.28 - 2.63 = <.35	3.48 - 3.92 = <.44	<.362			
	9	2.15 - 2.42 = <.27	2.20 - 2.55 = <.35	3.19 - 3.59 = <.40	<.344			
	10	2.09 - 2.34 = <.25	2.23 - 2.59 = <.36	3.56 - 3.92 = <.36	<.328			
	11	2.11 - 2.33 = <.22	2.20 - 2.55 = <.35	3.56 - 3.92 = <.36	<.328			
	12	2.20 - 2.56 = <.36	2.16 - 2.52 = <.36	3.34 - 3.73 = <.39	<.372			

* Three year average

Figure 7 Colby Wheat Basis July KCBT Wheat Futures



calculated off the nearby Chicago Mercantile Exchange (CME) live cattle futures contract. As one contract expires, the next (nearby) contract is used to calculate the basis. A graph such as this reveals the seasonality of livestock basis as well as expected future basis levels. The basis varies considerably between futures contracts. During May, the nearby basis averaged almost +\$4.00, but during September the nearby basis averaged approximately -\$ 1.00. This is often caused by changes in the futures price combined with relatively constant cash prices when switching from one futures contract to the next. The seasonal variation is much more evident with livestock basis than with grain basis.

Figures 1-3 show different types of basis information that a producer may want to keep, depending on marketing strategies used and expected sale times.

Predicting Basis

Basis levels generally can be predicted with more accuracy than either futures or cash price levels. One reason for this is basis convergence—the tendency for the difference between cash and futures prices (basis) to approach transportation costs from the cash market to a futures contract delivery point at contract expiration. Basis convergence is largely due to arbitrage, the simultaneous purchase (sale) of the cash commodity and the sale (purchase)

of the corresponding futures contract, in order to profit from price distortions.

Figure 4 illustrates basis convergence with wheat price data from Hutchinson, Kansas. While the changes are not smooth over time, the cash price does converge on the futures price (basis becomes less negative) as contract maturity approaches. This type of convergence generally prevails where grain is shipped out to be processed or fed at another location. When grain is processed or fed locally, the basis often will converge to a level less than transportation costs, and possibly become positive, due to greater local demand for the grain.

Because livestock cannot be stored, the same basis convergence pattern does not occur, but the threat of delivery should cause convergence to occur (less delivery costs) at a contract delivery location as the contract expires. As a result, the basis level is easier to predict than the actual price, but the basis patterns in livestock tend to be more variable and somewhat harder to predict than for grains.

Another reason basis levels tend to be more predictable than cash or futures prices is that changes in cash and futures prices (up as well as down) tend to occur in concert, as shown in figure 4. Cash and futures prices tend to move in the same direction because the same market fundamentals tend to affect both cash

and futures prices. While the absolute difference between these prices (basis) fluctuates less than the prices themselves, it is possible for cash and futures prices to move in opposite directions for short periods. Figure 5 shows the year-to-year variability in *cash wheat prices* for Dodge City in 1989 and 1987, June through December. Figure 6 shows the *wheat basis* during the same time. There was an average difference of \$1.42 per bushel in price levels between the two years, but only a \$0.17 per bushel average difference in basis.

This year-to-year stability in basis means that historical basis patterns are useful in forecasting future basis levels. The most common method of forecasting basis is to simply use a historical average (3-5 years). Once calculated, the average basis for a particular location and contract month can be used as an initial basis forecast for the next period, with adjustments to account for current market conditions.

Recording Basis Data

Identifying basis for a commodity requires the location, date, grade, futures contract, and the basis amount (+ or -). Generally, an average basis is calculated for a specific location and futures contract over several years. Ideally, grain basis calculations should be made using daily cash and futures prices. However, because this is time-consum-

ing and day-to-day changes are usually quite small, it is common to record grain basis information once per week (i.e. Wednesday cash and futures prices). Livestock basis calculations can be made in the same manner, or they can be computed using a weekly average cash and futures price. If the cash price represents a specific day, as with feeder cattle auctions, the basis should be calculated daily rather than by a weekly average, using the auction cash price and the futures price for the same day.

Worksheets can be used to record and summarize this data (see sample, page 3). Many producers also plot basis data in graphic form to make trends easier to see. Plotting the range (high and low) for basis over the period the average is calculated shows the variability (expected range) as well as the average basis. Figure 7 shows the worksheet data in graphical form with the high and low range plotted. The average basis is approximately the same in June and July, but the range or variability is much narrower in July.

Another way to examine variability is to calculate the statistical measure known as standard deviation. This requires more sophisticated calculations, and if data are available for only a few years, is probably no better than simply looking at the high and low range.

The futures contract(s) you use in calculating basis will depend on your particular farm marketing needs. As a rule, producers should keep track of basis using the futures contract closest to expiration (nearby) at the time of all expected sales and purchases. For example, a Kansas wheat producer who plans to sell the entire crop at harvest (June-July) would track basis using the July KCBT wheat futures contract. On the other hand, someone finishing cattle who plans to buy feeder steers sometime between September 1 and November 30

would need to track basis using the September, October, and November CME feeder cattle futures contracts, as any one could be the nearby contract when the cash purchase is made.

Factors Affecting Basis

Many factors can affect the basis in any location: local, national and international supply and demand, quality of the commodity, transportation and storage availability and cost, seasonality, and geographical location. These factors are variable and hard to measure. The key when analyzing and using basis is to first have a firm understanding of what the historical basis has been. Then, whenever basis is out of its normal range, ask yourself what is causing this. The answer will provide insights into the factors affecting basis locally and whether year-to-year changes are permanent or temporary.

Cash Marketing and Basis

Tracking basis information is just as important for producers who market their crops or livestock in the cash market as for those who use the futures and options market. For example:

1) When judging cash prices:

Determining whether a local cash price

is "acceptable" can be evaluated if the historical or expected basis is known. The following wheat price example illustrates this:

Actual cash price		\$2.50
Futures price	\$3.00	
Expected basis	+ \$-.25	
Expected cash price		= \$2.75

One would expect the cash bid to be about \$2.75, based on the historical relationship between cash and futures prices (basis); however, it is only \$2.50. By offering a weaker or wider than normal basis, the market is discouraging cash sales and encouraging storage.

2) When judging forward contract bids:

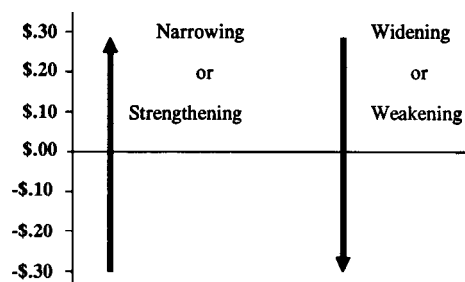
If an expected basis is known, a forward contract bid can be evaluated. The following 500 lb. steer calf price example illustrates this:

Forward contract bid		\$85.00
Deferred futures price	\$79.00	
Expected basis	+ \$3.00	
Expected contract bid		= \$82.00

In this situation the forward contract bid is higher than expected. The basis offered by the buyer is stronger than what the historical cash-futures relationship would suggest. The buyer is providing a strong financial incentive to sell the calves today for future delivery by offering a basis bid that is stronger than normal.

Basis Terminology

If the current basis is more positive than the expected (average) basis for the period, it is often referred to as "narrower" or "stronger" than normal. For example, if the current basis is $-.10$, when $-.25$ is "normal," the market is offering a strong, or narrow, basis. A basis of $-.40$ when $-.25$ is "normal" would be a weak or wide basis. When the grain basis is stronger or narrower than normal, the market is providing a financial incentive to make cash sales. When there is a wide or weak basis the market is discouraging cash sales and encouraging storage.



Cooperative Extension Service, Manhattan, Kansas

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