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Factors Affecting Live Cattle Basis

Joe L. Parcell, Ted C. Schroeder, and Kevin C. Dhuyvetter

ABSTRACT

Cattle producers and beef packers need to understand basis determinants as they develop price expectations and make pricing, hedging, and forward contracting decisions. This study empirically estimated factors explaining variability in monthly fed cattle basis. The five main results regarding live cattle basis are 1) corn price is an important determinant, 2) a change in the value of the Choice-to-Select spread positively affects basis, 3) changes in the levels of captive supplies have no significant statistical or economic impact on basis, 4) the June 1995 live cattle futures contract did not impact basis, and 5) both market fundamentals and seasonal components are important basis determinants.

Key Words: *basis, fed cattle, cattle prices.*

Fed cattle basis, the difference between local fed cattle cash and nearby live cattle futures prices, is an important concern of fed cattle market participants. Cattle producers and beef packers use expected basis when formulating price forecasts (Kastens, Jones, and Schroeder). In addition, fed cattle buyers and sellers rely on basis expectations when making forward pricing decisions. Therefore, a thorough understanding of factors affecting fed cattle basis over time is important for beef producers, packers, processors, and market analysts. Considerable variability exists in live cattle basis over time (Figure 1). Monthly average live cattle basis in Western Kansas varied from −$4/cwt to +$4/cwt from 1990 to 1997. The purpose of this study is to quantify factors explaining variability in monthly fed cattle basis so that producers, processors, and analysts can better understand the factors impacting basis.

Despite wide recognition that understanding basis determinants is essential for making marketing and pricing decisions, little recent published research has specifically examined factors affecting live cattle basis. Numerous structural changes have occurred in the fed cattle market since the most recent comprehensive study by Leuthold (1979). In particular, beef packing concentration increased from the top four firms representing 36 percent of the market in 1980 to 80 percent in 1997 (GIPSA, 1998). In addition, fed cattle marketed by feedlots with a one-time capacity over 8000 head represented 74 percent of total marketings in 1980 and increased to 81 percent of marketings by 1997 (LMIC, 1998). Significant changes have occurred since 1980 in the ways fed cattle are marketed. In 1980, 77 percent of cattle were purchased in nonpublic markets and this has increased to 85 percent in 1996 (GIPSA, 1998). Also, fed cattle forward contracting, marketing agreements, and other forms of captive supplies that were not even measured in 1980 have come to represent 25 percent or more of fed steer and heifer trade

Joe Parcell is an assistant professor, Department of Agricultural Economics, University of Missouri. Ted Schroeder is a professor and Kevin Dhuyvetter is an associate professor, Department of Agricultural Economics, Kansas State University. Comments and suggestions by Terry Kastens and Jim Mintert are gratefully acknowledged. We acknowledge Box Dix, ContiGroup. for providing cash price data used in this analysis.

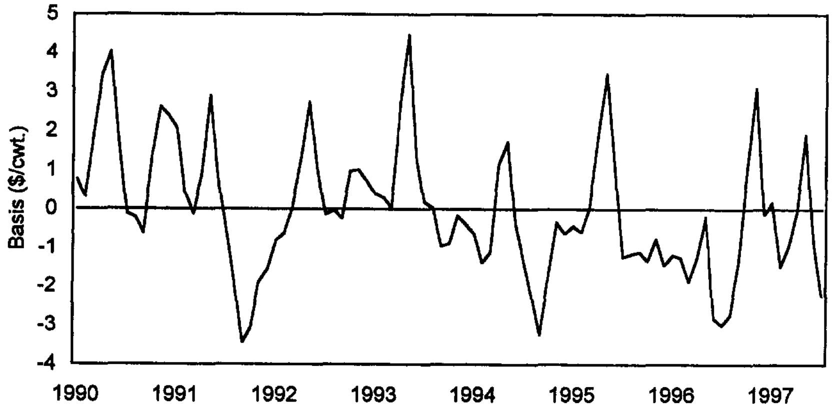

Figure 1. Monthly Kansas live cattle nearby contract basis (1990–September 1997)

in recent years (GIPSA, 1998). These plus dramatic changes in availability of market information may have caused basis determinants to change in recent years.

No previous study has explicitly considered whether captive supplies impact fed cattle basis. Several studies have incorporated captive supplies in modeling price determination (e.g., Eilrich *et al.*; Elam; Hayenga and O'Brien; Schroeder *et al.* 1993; Ward 1988; Ward *et al.*; Walburger and Foster). Elam; Schroeder *et al.* (1993); Ward *et al.*; and Walburger and Foster found that increases in the quantity of captive supply cattle decreased cash prices by a small amount. This study builds on these and previous fed cattle basis studies to determine whether deliveries of captive supply cattle influence live cattle basis.

In addition to the effects of captive supplies on basis, there is interest regarding the effects of specification changes to the live cattle futures contract. Beginning with the June 1995 contract, the live cattle futures contract underwent significant specification changes. In particular, contract specifications reduced the required percentage of Choice grade cattle deliveries from 100 percent to 55 percent and established substantial discounts for delivered cattle of poorer quality or yield grade. The contract change also shifted the level of risk incurred from long to short positions as longs were given the option of taking delivery on a live or dressed weight basis.[1] By comparing averages before and after the contract specification changes, Murphy and Boris concluded that fed cattle basis declined as a result of the contract change. One of the objectives of this study is to determine what impact the June 1995 live cattle contract specification change had on the live cattle basis using multi-variate analysis.

Liu *et al.* developed an across-contract-month-basis forecasting model. Forecasting basis is important; however, many persons may not deem forecasting models useful if the proposed model is too complex to generalize from reality. The current study proposes a model to explain monthly basis changes from observable and measurable occurrences. For example, when corn price decreases, *ceteris paribus,* what happens to basis historically? A simple understanding of the effect on live cattle basis from changes in supply-demand factors allows cattle industry participants to better assess marketing alternatives given current information.

Empirical Model

Live cattle basis is a function of the factors affecting the relationship between local cash

[1] Prior to the June 1995 contract cattle were delivered by short position holders strictly on a live-weight basis.

prices and live cattle futures prices over time. The local cash and futures prices are affected by local and expected aggregate supply-demand shifters, respectively. The basis in month t is defined as the cash price at location i minus the nearby live cattle futures price. The ith location (i = 1, 2, 3) refers to 1 = Kansas, 2 = Colorado, or 3 = Texas. Taking the difference between a cash price and nearby live cattle futures price yields the empirical model to be estimated:

$$(1) \quad BASIS_{it} = P_{it} - LCF_t$$
$$= f(BASIS_{it-1}, WGHT_{it}, CHEAD_{it}, CORNF_t, CSSPREAD_t, COFR_{it}, COLD_t, CONCH_t, MONTH_{tm}),$$

Variable definitions and expected signs are described in the rest of this section. A lagged dependent variable for basis ($BASIS_{it-1}$) is included in the equation to capture price inertia across months (Nerlove). The average weight of the cattle marketed ($WGHT_{it}$) is included as a measure of the total quantity of beef sold. As the average weight of cattle marketed increases, it is expected that the cash price will decline (Trapp *et al.*). Thus, it is expected that basis will be negatively correlated with market cattle weight.

The quantity of cattle marketed through forward contract agreements as a percentage of total head marketed ($CHEAD_{it}$) is included because captive supplies are perceived to affect the cash live cattle market (Schroeder *et al.* 1997). Procurement of cattle well in advance of slaughter has provided packers with the opportunity to control supplies (Purcell 1990a). Beef packers undertake forward cash purchasing (contracted or formula priced) to ensure plants operate at capacity, thus reducing cost risk of operating below capacity (Purcell 1990b and Ward 1990). Cattle feeders have indicated that forward cash selling enables them to reduce financial risk and secure a known buyer (Ward and Bliss). Thus, there are incentives for both cattle feeders and beef packers to enter into these agreements. However, many cattle feeders contend that in the presence of captive supplies the packer has more information regarding current and expected supply and demand than cattle feeders because contracting activity involves private treaties that are not public information. They argue that this provides beef packers with leverage that places downward pressure on prices (Schroeder *et al.* 1997). Previous studies have found small negative cash price impacts when captive supplies increased (Elam; Schroeder *et al.* 1993; Wallburger and Foster; Ward *et al.*); therefore, an increase in the number of captive supply deliveries to total deliveries within a region would be expected to decrease basis. Walburger and Foster suggested that captive supplies may be endogenous because when cash prices are high packers may call in forward contracted cattle to drive down the cash price. The window for delivery of forward contracted cattle is typically one month. Thus endogeneity would be more of a concern when analyzing daily or weekly price changes and less of a concern when analyzing monthly price changes. This study uses monthly data and captive supplies are typically predetermined over a monthly horizon. Therefore captive supplies were assumed exogenous in the basis model described in equation 1.

The nearby corn futures price ($CORNF_t$) serves as a proxy for feed costs. An increase in nearby corn futures price is expected to increase the current supply of cattle as producers find it more profitable to liquidate cattle inventories in the short-run, i.e., the marginal cost of gain is greater than the value of the extra pound of beef. Thus an increase in the price of corn is expected to decrease the local cash price. As the price of corn increases and current fed cattle inventories decline, fewer cattle are available for future delivery, causing the futures price to increase. In the short run the combined effects are expected to weaken basis.

The Choice-to-Select price spread for 700- to 850-pound boxed beef cutout equivalent ($CSSPREAD_t$) is expected to have varied effects depending on the quality of cattle for the different states. The local live cattle cash price depends on the quality of cattle supplied. Alternatively, the live cattle futures price has specific fixed quality characteristics. Thus basis changes occur with varying levels of cattle quantity and quality in particular areas. As the Choice-to-Select price spread widens, it is hypothesized that locations with higher (lower) quality cattle would receive a premium (discount) and the basis would strengthen (weaken).

The variable $COFR_{it}$ represents the ratio of cattle on feed in location i to the seven-state cattle on feed.[2] The number of cattle on feed is a proxy for the potential quantity of cattle available for slaughter at each location. The greater the local number of cattle on feed the lower the expected cash price and thus basis. The seven-state cattle on feed can be used as an instrument for the substitutability between cattle in one region and cattle in other regions.[3] As the seven-state cattle on feed number increases the futures price is expected to decrease. The effect on basis from a change in local-cattle-on-feed estimates relative to the seven-state cattle-on-feed estimate is ambiguous because of the opposing effects of the two cattle-on-feed measures.

Cold storage stocks ($COLD_t$) is included in the basis model as a proxy for the availability of storage facilities in the current market and the futures market. As cold storage stocks increase, demand in the local cash market is expected to decline as the space to store stocks is exhausted. Similarly, an increase in cold storage stocks would decrease expected demand and place downward pressure on the futures price. Thus the expected effect of an increase in cold storage stocks on basis is unknown because of this increase having similar effects on the local cash price and futures price. Leuthold and Peterson found cold storage stocks to be positively associated with live hog basis.[4]

A separate binary variable was included to account for the change in live cattle futures contract specifications beginning with the June 1995 contract ($CONCH_t$). The new contract specifications reduced the required percentage of Choice grade cattle deliveries from 100 percent to 55 percent and established substantial discounts for delivered cattle of poorer quality or yield grade. This change in contract quality specification should lower futures price, thus strengthening basis. However, the transfer of quality risk from the buyer to the seller with the new contract should increase futures price, thus weakening basis. Therefore, no *a priori* exists for changes in the contract specification. Seasonality ($MONTH_{tm}$) is expected to have varied effects on basis depending on production decisions and consumer choices.

Data

Monthly data for January 1990 to July 1997 were used for estimation of equation (1). Table 1 provides descriptive statistics by state for basis, cash price, futures price, and selected explanatory variables. Monthly fed cattle prices by state were calculated from daily Agricultural Marketing Service (USDA) prices as a weighted average of all steers and heifers sold on a live and dressed weight basis during that month.

Daily nearby Chicago Mercantile Exchange live cattle futures prices were obtained from Bridge. The nearby contract was allowed to roll-over into the next contract month at the end of the week before expiration. The average live cattle futures price was \$71.88/cwt with a standard deviation of \$8.47/cwt.

To calculate nearby basis, nearby live cattle futures prices were subtracted from cash prices. Daily basis values were aggregated to monthly averages. For Colorado, Kansas, and Texas, the average basis was −\$0.07/cwt, −\$0.02/cwt, and −\$0.05/cwt, respectively. The standard deviation of basis ranged from

[2] This was put in a ratio to reduce multicollinearity between cattle on feed in location i and the seven-state cattle on feed. There is a tendency for cattle-on-feed numbers between locations to vary similarly.

[3] For the cash market, if the cost of procurement of cattle (including transportation and shrink) outside of the local market is below the local cost of procurement, processors will procure cattle outside the local region and drive down local prices.

[4] Leuthold and Peterson defined *live hog basis* as futures minus cash.

Table 1. Summary Statistics of monthly data used to estimate live cattle basis determinants 1990–July 1997

Variable	Unit	Average	S.D.	Minimum	Maximum
Colorado					
Basis (*BASIS*)	($/cwt)	−0.07	1.76	−3.77	4.43
Cash price (*P*)	($/cwt)	71.80	6.07	59.41	82.85
Market weight (*WGHT*)	(lbs)	1151.60	32.87	1074.60	1216.60
Head marketed (*HEAD*)	(head)	108360	21465	74650	167850
Captive supplies/Head marketed (*CHEAD*)	(%)	26.68	12.62	2.78	48.16
Colorado COF/ Seven-state COF (*COFR*)	(%)	11.19	0.79	9.73	13.70
Kansas					
Basis (*BASIS*)	($/cwt)	−0.02	1.68	−3.45	4.47
Cash price (*P*)	($/cwt)	71.87	6.21	59.29	82.22
Market weight (*WGHT*)	(lbs)	1142.20	32.50	1072.90	1201.20
Head marketed (*HEAD*)	(head)	302060	57305	189100	467900
Captive supplies/Head marketed (*CHEAD*)	(%)	19.99	6.56	6.65	32.02
Colorado COF/ Seven-state COF (*COFR*)	(%)	22.26	2.25	18.88	27.12
Texas					
Basis (*BASIS*)	($/cwt)	−0.05	1.62	−3.60	4.25
Cash price (*P*)	($/cwt)	71.84	6.18	59.16	82.50
Market weight (*WGHT*)	(lbs)	1118.40	26.56	1063.70	1174.30
Head marketed (*HEAD*)	(head)	335030	68722	193700	517000
Captive supplies/Head marketed (*CHEAD*)	(%)	13.76	7.89	1.20	35.95
Colorado COF/ Seven-state COF (*COFR*)	(%)	28.10	2.03	24.26	32.39
Aggregate					
Futures price (*LCF*)	($/cwt)	71.88	8.47	59.79	82.12
Corn price (*CORNF*)	($/bu)	2.69	0.54	2.10	4.79
Choice-Select Spread (*CSSPREAD*)	($/cwt)	5.53	2.91	1.65	17.97
Cold storage (*COLD*)	(mil lbs)	318.00	51.99	234.72	429.19
Seven-state COF (*SSCOF*)	(000 hd)	8178.30	688.27	6365.50	9328.30

$1.62/cwt to $1.76/cwt. The range between the minimum and maximum basis over the period was large. The basis ranges were $8.10/cwt for Colorado, $7.92/cwt for Kansas, and $7.85/cwt for Texas.

Total head marketed, captive supply cattle deliveries, and average marketing weight were collected from weekly USDA Agricultural Marketing Service publications. Weekly values were aggregated to monthly values. The monthly quantity of captive supply cattle for Colorado (USDA, *Livestock Market News*), Kansas (USDA, *Agricultural Market News*), and Texas (USDA, *Livestock Market News*) was expressed as a percent of total head marketed for that month in the respective state. The average weight of cattle marketed is the weighted-average of the number of head marketed via live and dressed weight for each state. Nearby daily corn futures prices were obtained from Bridge. Daily corn futures prices were aggregated to monthly averages. The nearby corn futures price series was rolled forward at the beginning of the month of expiration.

The average Choice-to-Select price spread for 700- to 850-pound carcass boxed beef cutout equivalent was $5.53/cwt and the standard deviation was $2.91/cwt. Monthly cattle on feed were revised values reported in the USDA *Cattle on Feed Report.* Monthly cattle on feed were expressed as the percentage of cattle on feed in the state evaluated to the seven-state cattle on feed. Monthly cold storage of beef was reported in the USDA *Cold Storage Report.*

Results

Empirical results for each of the three basis models estimated are presented in Table 2. Parameter estimates refer to the change in basis in $/cwt from a one-unit change in the explanatory variable, *ceteris paribus.* Positive coefficients represent a strengthening/narrowing basis and negative coefficients indicate a weakening/widening basis. The state names Colorado, Kansas, and Texas refer to the respective locations' basis models. The explanatory variables explained 85 percent of the variation in live cattle basis for each state.

Naik and Leuthold and Liu *et al.* have suggested that basis might be impacted from changes in hog price, poultry price, and per-capita income. Therefore, in the present study models were re-estimated using per-capita consumption of pork and broiler and per-capita disposable income; however, none of these variables was statistically significant in any of the basis models and a computed *F*-statistic rejected the null-hypothesis that the variables were jointly different from zero for any of the basis models. Thus models were estimated as specified in equation 1. Also, a pooled model of the three states was estimated. An *F*-statistic was used to test the null-hypothesis that parameter estimates between the pooled and different state models were similar. The null hypothesis was rejected at the 0.05 level, so models were estimated separately.

Because the market for live cattle typically encompasses areas beyond individual state boundaries, it is expected that the errors from estimating equation (1) for Colorado, Kansas, and Texas would be contemporaneously correlated. Under the null hypothesis of a diagonal covariance matrix, the Breusch-Pagan Lagrange Multiplier test statistic was 177.40. This test statistic is distributed Chi-square with three degrees of freedom and a critical value of 11.34 at the 99 percent level. Therefore, the null-hypothesis of a diagonal covariance matrix was rejected. To accommodate this covariance specification, Zellner's seemingly unrelated regressions (SUR) was used in the estimation of the basis equations.

Each basis series was tested for the presence of a unit root using the Dickey-Fuller unit root test statistic without a trend. The lag length was chosen by minimizing the Akaike Information Criteria. The 10 percent critical value of the Dickey-Fuller test statistic is −2.57. The Dickey-Fuller test statistics for Colorado, Kansas, and Texas were −4.31, −4.36, and −4.25, respectively. For each basis series, the null-hypothesis of a unit root was rejected. Factors affecting basis in one month may affect basis in the following month, suggesting the error structure from estimating the basis model may be autocorrelated over time.[5] Because a lagged dependent variable was specified, the Ljung-Box test for autocorrelated errors was used. The Ljung-Box test is a relatively powerful test compared to the Durbin-*h* test (Greene). The Ljung-Box test statistic is distributed Chi-square with 1 degree of freedom and a critical value of 5.02 at the 95-percent level. Under the null hypothesis of no first-order autocorrelation, the null hypothesis was rejected for each of the basis models. Therefore, autocorrelation was corrected for by allowing the value of *rho* to vary across

[5] Another reason for autocorrelation may be model mis-specification. Autocorrelation may arise due to variables included in the time-series model being correlated across observations or from variables not included in the model being correlated across observations (Greene).

Table 2. Regression results of factors affecting monthly live cattle basis (cash minus futures) in Colorado, Kansas, and Texas, 1990 through July 1997

	Dependent Variable (basis, \$/cwt)		
Variable	Colorado	Kansas	Texas
Lagged live cattle basis (*BASIS*$_{t-1}$)	0.450**	0.392	0.358
	(0.214)	(0.248)	(0.283)
Weight (*WGHT*)	−0.003	−0.002	−0.002
	(0.002)	(0.002)	(0.002)
Captive supply deliveries (*CHEAD*)	−0.001	−0.001	−0.004
	(0.013)	(0.262)	(0.004)
Corn futures (*CORNF*)	−0.746**	−0.815*	−0.896**
	(0.340)	(0.415)	(0.326)
Choice-Select Spread (*CSSPREAD*)	0.114**	0.117**	0.115**
	(0.044)	(0.403)	(0.418)
Cattle-on-feed ratio (*COFR*)	0.072	−0.028**	0.015
	(0.084)	(0.013)	(0.012)
Contract change (*CONCH*)	0.284	−0.075	−0.142
	(0.280)	(0.260)	(0.785)
Cold storage (*COLD*)	−0.001	−0.001	−0.001
	(0.003)	(0.001)	(0.004)
Monthly Dummy (*default* = January)			
February	−0.301	−0.527	−0.399
	(0.345)	(0.340)	(0.319)
March	0.534	0.098	−0.034
	(0.358)	(0.338)	(0.333)
April	1.920**	1.456**	1.426**
	(0.372)	(0.365)	(0.336)
May	2.021**	1.789**	1.813**
	(0.515)	(0.531)	(0.471)
June	−0.927	−1.093	−0.940
	(0.752)	(0.806)	(0.788)
July	−0.985**	−1.384**	−1.325**
	(2.450)	(3.855)	(3.859)
August	−0.690*	−1.058**	−1.161**
	(0.404)	(0.449)	(0.492)
September	−0.963**	−1.297**	−1.458**
	(0.418)	(0.479)	(0.544)
October	0.063	−0.413	−0.476
	(0.557)	(0.608)	(0.712)
November	0.409)	0.064	−0.022
	(0.437)	(0.454)	(0.500)
December	−0.600	−0.752**	−0.464
	(0.377)	(0.349)	(0.327)
Constant	3.944*	4.583**	4.446**
	(2.171)	(1.485)	(1.524)
RMSE	0.400	0.424	0.464
Adjusted R^2	0.854	0.852	0.851
rho (First order autocorrelation)	0.136	0.135	0.172
	(0.289)	(0.329)	(0.358)
No. of observations	90	90	90

Table 2. (Continued)

Variable	Dependent Variable (basis, $/cwt)		
	Colorado	Kansas	Texas
Wald nested test statistics			
Market Fundamentals	104.818**	118.064**	109.397**
Market Fundamentals other than lagged basis	16.696**	22.197**	20.588**
All variables	336.308**	359.834**	332.935**

Note: Values in parentheses are standard errors. Two and one asterisk(s) denote coefficients which are significantly different from zero at the 0.05 and 0.10 level percent, respectively.

basis equation. Using the basis model equation specified in equation (1), basis equations were estimated as a system in SHAZAM 8.0 using the Nonlinear Regression command and allowing the value of *rho* to vary across equations.

Often basis analysts evaluate basis purely on seasonal fluctuations. Therefore, the relevance of market information in the basis model (equation 1) is assessed by testing whether market fundamentals are statistically important basis determinants. Failure to find significance would suggest basis variability over time is primarily seasonal and one does not gain by also considering market fundamentals. Wald nested test statistics were computed to determine the importance of market fundamentals and the lagged dependent variable in affecting basis (Table 2). The null hypothesis of all variables jointly zero was rejected at the 0.05 level for each of the models. The computed Wald test statistics indicated that market fundamental variables add information beyond that contained in seasonal dummies alone. Additionally, market fundamentals other than the lagged dependent variable significantly contribute information to the basis models.

The lagged dependent variable was statistically significant (0.05 level) for only Colorado. However, the lagged dependent variable is marginally significant for Kansas (0.06 level one-tailed test) and Texas (0.10 level one-tailed test). The lagged dependent variable coefficients were positive and in the unit interval as necessary for model stationarity for all states. The estimated coefficients were $0.45/cwt, $0.39/cwt, and $0.36/cwt for Colorado, Kansas, and Texas, respectively. Thus, for Colorado, $0.45/cwt of a $1/cwt increase in live cattle basis this month would persist into next month. This suggests that long-run adjustments to a shock to the independent variables are nearly twice the magnitude of the reported parameter estimates for Colorado. Similarly, for Kansas and Texas the long-run adjustments are nearly 1.5 the magnitude of the reported parameter estimates. Average marketing weight was not statistically significant for any of the basis models at the specified levels of significance. However, these coefficients can be shown to have a substantive economic effect on basis. Marketing weight per head ranged nearly 150 lbs over the period of the current study (Table 1). A 50-pound increase in the average marketing weight decreases basis by around $0.10/cwt, which is between two- and five-times the average basis level observed. Thus, a change in marketing weight has a substantive economic effect that is not statistically significant at the conventional significance level.

An increase in captive supply deliveries relative to total head marketed was not statistically significant for any of the basis models. Though previous studies found small negative statistically significant impacts on cash price from an increase in captive supply marketings, e.g., Elam and Schroeder *et al.* (1993), no significant impact on live cattle basis is apparent.

A $1/bushel increase in corn futures led to a $0.75/cwt, $0.82/cwt, and $0.90/cwt decline in live cattle basis for Colorado, Kansas, and Texas, respectively. This result is considerably less than Leuthold's estimate ($1.33/cwt). The large difference in parameter estimates for the corn variable across the studies may be due to the increased rate of gain in cattle because of improved feed rations and changing genetics.

A $1/cwt increase in the Choice-to-Select price spread for 700- to 850-pound boxed beef cutout equivalent strengthened basis by approximately $0.12/cwt in each of the states. Therefore, greater demand for higher quality cuts is reflected through the cash price offered in these states, strengthening basis.

An increase in the ratio of local cattle on feed to the seven-state cattle on feed had a statistically significant impact on Kansas basis where an increase in local cattle on feed relative to regional cattle on feed caused basis to decline. Because packers in Kansas are located near feedlots in other states, they may bid prices down locally when large cattle inventory exists elsewhere. Leuthold found that as the number of 900- to 1100-pound cattle on feed increased, basis weakened; however, this could not be examined in the present study as inventories by weight categories are no longer reported in *Cattle on Feed* reports.

The live cattle futures contract specification change binary variable was not statistically significant for any of the states. These results suggest that the potential increase in basis from a decrease in the futures contract quality specification, i.e., 100 percent Choice grade to 55 percent Choice grade, may have been offset by a decrease in the basis due to shifting cattle quality risk for delivery against futures contracts from buyer to seller. Murphy and Boris found live cattle basis decreased after the contract change, but they used means and not regression analysis. The contract change coincided with near record corn prices which they did not account for. As previously noted, a $1/bushel increase in corn price decreased live cattle basis between $0.75/cwt and $0.90/cwt.

Leuthold and Peterson suggested cold storage provided a link between cash price and live hog futures price in the short-term. Here, cold storage stocks was not statistically significant in any of the basis models. Stocks of beef are typically not held for long periods in cold storage because of the change in appearance that becomes aesthetically displeasing to consumers. Therefore, it is not surprising that cold storage stocks did not have a significant impact on basis.

As expected, live cattle basis exhibits seasonality. Seasonality in basis follows similar patterns for each of the basis models estimated. The seasonal basis pattern correspond to the seasonal pattern in cattle production.

Conclusions

Cattle producers and beef packers need to better understand factors affecting basis variability for determining expected prices and to make pricing, hedging, and forward contracting decisions that involve basis expectations. Inability to accurately account for these factors makes formulating basis expectations more difficult. This study estimated an empirical model to explain the variability in monthly fed cattle basis in Colorado, Kansas, and Texas.

Live cattle basis is affected by factors that shift local spot market and expected futures market supply and demand. Several conclusions can be drawn from this analysis. First, monthly live cattle basis for Colorado, Kansas, and Texas is positively correlated with the Choice-Select spread. Second, previous studies found corn price a significant factor affecting live cattle basis. Corn price remains an important basis determinant although its magnitude has diminished to about three-fourths of what it was twenty years ago. Nonetheless, a $1.00/bushel corn price increase weakens basis by $0.75/cwt to $0.90/cwt. Third, changes in the levels of captive supplies have no significant statistical or economic impact on live cattle basis in Colorado, Kansas, or Texas. Fourth, the June 1995 live cattle futures contract specification change did not have a statistically significant impact on live cattle basis in Colorado, Kansas, or Texas. Finally, both market fundamentals and seasonal components are worth considering when evaluating live cattle basis.

This study could be used by cattle feeders, packers, and market analysts to better formulate basis expectations and better understand how fed cattle basis changes throughout the year and as the level of exogenous market fundamentals change. Evolving agricultural policy and low profitability in the cattle industry has made and will continue to make risk management an important component of management decisions. Understanding basis determinants is important in managing price risk.

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