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Cornhusker Economics

Cooperative Extension

Institute of Agriculture & Natural Resources
Department of Agricultural Economics
University of Nebraska – Lincoln

The Relationship Between Captive Supplies and Spot Cattle Prices: Is it Causation or Merely Correlation?

Market Report	Yr Ago	4 Wks Ago	2/4/00
<u>Livestock and Products,</u>			
<u>Average Prices for Week Ending</u>			
Slaughter Steers, Ch. 204, 1100-1300 lb Omaha, cwt.	60.99	67.75	68.09
Feeder Steers, Med. Frame, 600-650 lb Dodge City, KS, cwt.	73.00	91.52	87.25
Feeder Steers, Med. Frame 600-650 lb, Nebraska Auction Wght. Avg.	81.63	97.13	97.97
Carcass Price, Ch. 1-3, 550-700 lb Cent. US, Equiv. Index Value, cwt.	91.41	105.34	105.80
Hogs, US 1-2, 220-230 lb Sioux Falls, SD, cwt.	30.50	36.75	40.50
Feeder Pigs, US 1-2, 40-45 lb Sioux Falls, SD, hd.	23.00	46.41	56.23
Vacuum Packed Pork Loins, Wholesale, 13-19 lb, 1/4" Trim, Cent. US, cwt.	92.60	99.20	108.30
Slaughter Lambs, Ch. & Pr., 115-125 lb Sioux Falls, SD, cwt.	61.50	*	*
Carcass Lambs, Ch. & Pr., 1-4, 55-65 lb FOB Midwest, cwt.	150.00	156.00	148.00
<u>Crops,</u>			
<u>Cash Truck Prices for Date Shown</u>			
Wheat, No. 1, H.W. Omaha, bu.	3.06	2.84	2.84
Corn, No. 2, Yellow Omaha, bu.	2.01	1.81	1.90
Soybeans, No. 1, Yellow Omaha, bu.	4.78	4.41	4.67
Grain Sorghum, No. 2, Yellow Kansas City, cwt.	3.47	3.04	3.23
Oats, No. 2, Heavy Sioux City, IA, bu.	*	1.19	1.24
<u>Hay,</u>			
<u>First Day of Week Pile Prices</u>			
Alfalfa, Sm. Square, RFV 150 or better Platte Valley, ton.	*	100.00	82.50
Alfalfa, Lg. Round, Good Northeast Nebraska, ton.	*	33.75	32.50
Prairie, Sm. Square, Good Northeast Nebraska, ton.	70.00	60.00	*
* No market.			

Attempts by agricultural economists to estimate the relationship between captive supplies¹ and spot cattle prices span over thirty years. What we know is that the relationship is negative. That is, when captive supply usage goes up, spot cattle prices go down. What we don't know is whether or not the negative relationship means that an increase in captive supply usage causes a decline in cattle prices, thus hurting independent cattle producers. Results of a recent investigative research report,² using an extensive data set from the Texas Panhandle, suggests that the observed negative relationship should not be taken as causation.

The report made a point of distinguishing between two different "levels of analysis" at which the relationship between captive supplies and spot prices can be explored. At the "plant level" the question was whether packing plants that anticipate relatively large volumes of captive supply deliveries in the near-term future tend to pay spot market cattle prices that are low *relative to regional average prices* (the region being the Texas Panhandle). At the "regional level" the question was whether or not weekly spot cattle prices decrease when captive supply slaughter increases.

¹Captive supplies include marketing agreements, forward contracts and packer-fed cattle.

²The full report, "Econometric Analysis of Fed Cattle Procurement in the Texas Panhandle," by J. R. Schroeter and A. Azzam is available at: www.gipsa.gov/gipsa/progser/p&s/txpeer/reportindex.htm.

This article is an edited excerpt from the Executive Summary of the Report.



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When a packing plant purchases cattle on the spot market, it is purchasing those cattle not for immediate slaughter, but to fulfill slaughter needs for some future period. It stands to reason that the average price a plant pays for a lot of spot cattle would be influenced, at least to some extent, by the proportion of the future period's desired slaughter that is already met with pre-scheduled deliveries of captive supplies (assuming, as seems justified, that captive supply deliveries for the near-term future are known at least roughly, by the packer). So it makes sense to search the data for a connection between a packer's near-term future slaughter of captive supplies and the prices the packer is paying for spot market cattle "today."

The finding was that if a typical plant's proportion of slaughter accounted for by captive supplies were to increase by one percentage point, relative to the competing plants' proportions, then one would expect the spot market prices paid by that plant for cattle of given quality to decline somewhere between 0.002 \$/cwt. and 0.004 \$/cwt. (on a live-weight basis) relative to regional average prices.

When the relationship between captive supply usage and price at the regional level was investigated, it was also found that cattle prices declined as captive supply usage increased. The results, moreover, when taken at face value, suggest that the impact of captive supplies on price is reasonably substantial.³

But does that mean that increases in aggregate cattle supply deliveries cause the spot market price to fall? Or, for that matter, does the causality run in the other direction: do low spot market prices create an incentive to deliver large volumes of captive supplies?

To understand the economic mechanism responsible for the short-run of the negative relationship at the plant level, one must recognize that any given regional market, at any given point in time, is characterized not by a single price but by a distribution of prices for fed cattle. Prices paid for individual lots of cattle vary, in part, because of lot-to-lot variation in cattle quality. But they also vary due to random variation in the strength of competitive forces throughout the market area. On a given day, a feed-yard in one part of the region may be visited by only one buyer and, consequently, receive relatively "low" bids. In other

parts of the region, competition among bidders from two or three firms may be the norm and transaction prices may be higher.

When a packer enters the spot market knowing that a relatively large proportion of its typical slaughter volume is committed for the near-term future in the form of already-scheduled captive supply deliveries, it will usually want to purchase correspondingly fewer spot market cattle. This can normally be accomplished with relatively conservative bidding. As a result, it will succeed in procuring the desired number of spot market cattle at relatively low prices where only one or, perhaps, no other bidders contend for cattle, but will generally be outbid (or will decline to bid in the first place) where it finds two rival bidders already vying to make purchases. When, on the other hand, a packer enters the market needing to secure a relatively large share of near-term future slaughter volume with cash purchases, bidding behavior must be more aggressive and the resulting transactions prices correspondingly higher. So it is not surprising that packers with a relatively high captive supply proportion of near-term future slaughter will pay spot prices that are slightly below the regional average price, other things equal.

For a given distribution of transaction prices, it is of little or no consequence to feeders that packers who currently have a relatively high degree of reliance on captive supplies tend, other things equal, to be the ones paying relatively low prices within the distribution. What matters to feeders is whether the use of captive supplies causes the regional average price to fall, shifting the entire distribution downward. To be sure, the regional-level analysis did uncover evidence of a negative correlation between the weekly volume of captive supply slaughter and the week's average spot market price for the region. The crucial question is: what economic mechanism is responsible for the finding? One candidate explanation has to do with the impact that current prices and the expectation of future prices have on the incentives of feeders and packers to schedule delivery of captive supplies.

From interviews with packers and feeders in the Texas Panhandle, it was found that marketing agreements normally give feeders the right to determine the number of cattle delivered in a given week, but require that they notify packers of this number two weeks in advance of actual delivery. Thus, in the current week, feeders determine the number of marketing agreement cattle they will deliver to packers two weeks hence. Under conventional pricing formulas, marketing agreement cattle delivered in two weeks will bring a price based on the spot market price paid for (non-formula) cattle next week. So the expectation of a "high" spot price next week, other things equal, will incline feeders toward delivery of a "large" volume of

³ For example, if the weekly volume of captive supply deliveries were to increase from its sample average level (about 26,400 head) by one sample standard deviation (about 7,730 head), the result, other-factors-held-fixed, of this change would be a decrease in the spot price by \$0.69/cwt. (on a live-weight basis).

marketing agreement cattle in the week after next. At the same time, however, if feeders currently expect price in two weeks to be high relative to next week's price, they have an incentive to postpone delivery of some of those cattle until three weeks hence, when formula prices will be based on spot prices for the week after next. Consequently, we would expect that the number of marketing agreement cattle delivered two weeks from now will be positively correlated with this week's expectation of next week's spot market price, and negatively correlated with the forecast formed this week, of spot market price in the week after next.

Now consider the incentives packers face when deciding on the scheduling of forward contract cattle deliveries. Because the typical lag between purchase and slaughter of spot market cattle is about one week, from the packer's point of view forward contract cattle deliveries next week substitute for spot market purchases this week. Assume, for the moment, that the typical interval between scheduling and delivery of forward contract cattle is about one week. Then a "high" spot market price this week will prompt packers to economize on spot market purchases, to some extent, by scheduling a large volume of the fixed-price contract cattle deliveries next week. On the other hand, if packers this week forecast a "high" spot price for next week, they will hoard their limited inventory of forward contract cattle, reserving them for delivery in the week after next when they can substitute for spot market cattle that would otherwise have to be purchased at next week's anticipated "high" price. Thus, we would expect the number of forward contract cattle delivered next week to be positively correlated with the current spot price and negatively correlated with the forecast formed this week, of next week's spot price. Were we to assume on the other hand, that the typical lag between scheduling and delivery of forward contract cattle is two weeks instead of one week, a similar result would be obtained. Just as with marketing agreement cattle, delivery numbers for two weeks from now should be positively correlated with this week's expectation of next week's spot price and negatively correlated with this week's expectation of spot price the week after next. Evidence of the predicted correlations were found in the data; especially in the case of marketing agreement cattle.

In summary, when the capability exists for packers and feeders to speed-up or postpone captive supply deliveries in response to economic incentives dictated by changing market conditions, deliveries of marketing agreement and forward contract cattle will tend to be

"high" other things equal, when the spot market price is expected to be "low." But because the experienced market participants who make the scheduling decisions are undoubtedly quite good forecasters of price (at least over a relatively short forecast horizon such as one or two weeks), their forecasts are likely to be quite highly correlated with the actual price. So the tendency for weekly captive supply deliveries to be negatively correlated with the unobserved two- (or one) week-ahead forecasts of price, could manifest itself in a negative correlation between weekly deliveries and the observed price. This, of course, is exactly the kind of relationship researchers find when estimating the short-run relationship between captive supply usage and spot cattle prices.

This line of reasoning counsels caution in the interpretation of the negative relationship between captive supplies and spot cattle prices. The tendency for spot market cattle prices to be "low" other things equal, in weeks in which captive supply slaughter is "high" does not necessarily mean that there is an underlying mechanism whereby large deliveries of captive supply cattle in a particular week cause that week's spot market price to fall. Even if the week-to-week fluctuations in a region's spot market price of fed cattle were generated completely independently of the region's use of captive supplies, the incentives that influence the delivery scheduling decisions of feeders and packers would still give rise to a negative correlation between the observed spot price and the volume of captive supplies.

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