



Captive Supply Price Relationships and Impacts

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To view this fact sheet visit <http://osuextra.okstate.edu/dept/econ/mktingoutlook.shtml> along with its companion F-597, "Captive Supply Trends since Mandatory Price Reporting." F-597 compared what was known about captive supplies prior to mandatory price reporting (MPR), largely from Grain Inspection, Packers and Stockyards Administration data, versus what has been learned in the three years since MPR began in April 2001. MPR data on prices and volumes are reported by meatpackers to the Agricultural Marketing Service (AMS) of the U.S. Department of Agriculture (USDA).

While the previous publication focused on the volume or quantity of captive supplies, this one examines price relationships between various types of procurement or marketing methods, some of which constitute captive supplies. Lastly, results are reported from recent analyses of now-available data regarding price impacts associated with captive supplies since MPR.

Pricing Method Data from Mandatory Price Reports

Recall, captive supplies refer to slaughter livestock that are committed to a specific buyer (meatpacker) two weeks or more in advance of slaughter. The three most common types of captive supply methods include marketing/purchasing agreements, forward contracts, and packer feeding.

As discussed in F-597, MPR made data available on various methods of pricing fed cattle. These include negotiated, formula priced, forward contract, and packer owned trades. All but negotiated trades might be considered a form of captive supplies, though there can be some exceptions to this general statement.

Information discussed in this extension fact sheet deals primarily with negotiated pricing, formula pricing, and forward contract pricing of fed cattle. Price data are not reported for packer owned cattle since packer owned livestock are transferred from one business area of the company (cattle feeding) to another (slaughter-fabrication). No doubt an internal transfer price is assigned to the packer owned livestock but it is considered proprietary information and not reported publicly. However, the impacts portion of this extension fact sheet covers packer-owned trades along with formula pricing and forward contracts.

Price Dynamics and Comparisons

Recall that negotiated pricing accounted for 46.1% of fed cattle procurement or marketing over the three-year period from April 2001 to April 2004. Formula pricing averaged 43.3%; forward contracting, 3.5%; and packer owned cattle, 7.1%. Knowing the extent of each of the marketing or procurement methods is important, but more important is comparing prices among those methods. This section discusses those comparisons.

Summary of Prices – Table 1 (page 6) summarizes prices for each of the procurement methods for the three-year period since MPR began. *Note that in this extension fact sheet, year 2001 refers to April 2001 to March 2002, 2002 refers to April 2002 to March 2003, and 2003 refers to April 2003 to March 2004.* All price comparisons are on a dressed weight basis. The five-state, weighted average price includes prices for all grades of fed cattle. The states comprise the major cattle feeding states of Texas-Oklahoma, Kansas, Nebraska, Colorado, and Iowa-So. Minnesota. The five-state weighted average is reported both for steers and heifers and both for live weight and dressed weight trades. It could be argued that the five-state, weighted average price is the most comprehensive and most representative of market conditions in the cash market, both for live weight and dressed weight trades. Here, the five-state, weighted average price is used as the base or standard for comparing prices reported by procurement methods.

Negotiated prices on an annual basis and for the three years together averaged just a few cents per hundredweight above the five-state weighted average price. Negotiated prices averaged as little as \$0.04/cwt. higher than the five-state average in 2002 to \$0.29/cwt. higher in 2001.

Formula prices averaged higher than other pricing methods or the five-state average in some years and lower in others. No consistent pattern was evident. For the three-year average, formula prices were \$1.43/cwt. higher than the average for forward contracts and \$0.07/cwt. higher than average negotiated prices.

Forward contract prices varied the most relative to the other pricing methods. They were higher than all other price series in 2001, then were lower than some in 2002 and 2003. In 2003, forward contract prices were significantly below

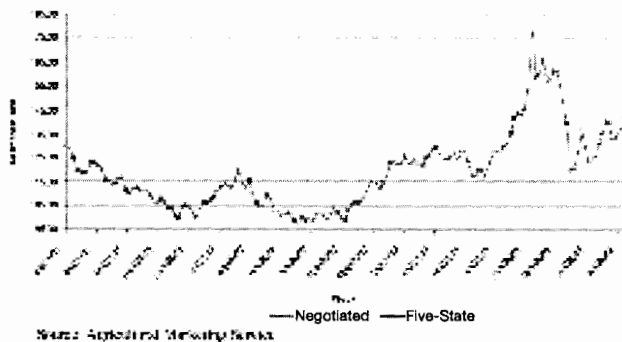
the other pricing alternatives, \$6.02/cwt. below negotiated prices and \$5.31/cwt. below formula prices. This large price difference is likely related to the rapid upward and downward movement in prices during 2003.

One of the major concerns with some producers is whether or not there are special "sweetheart" deals between packers and some feedlots. Given the annual average prices reported here, while sweetheart deals may exist, there is no significant advantage on average with formula prices relative to other procurement methods or the more broadly reported five-state, weighted average price. However, the averaging process may mask what is happening in reality. To know whether or not that is the case, transaction prices would be required, as opposed to the weekly average prices used here.

Weighted Average Prices vs. Negotiated Prices

– Figure 1 compares the weekly weighted average dressed steer prices vs. negotiated prices for the three years since MPR began. While it appears there is a single line connecting weekly prices over this period, in actuality, there are two lines. However, the two lines are nearly indistinguishable, thus indicating virtually no difference between the reported five-state weighted average price and the reported negotiated price each week. To some this may not be a surprise since negotiated prices comprise most of the weighted average price series. Still, it is important to know that when searching for a representative price for fed cattle, there appears to be little reason to select either the five-state weighted average price or the negotiated price.

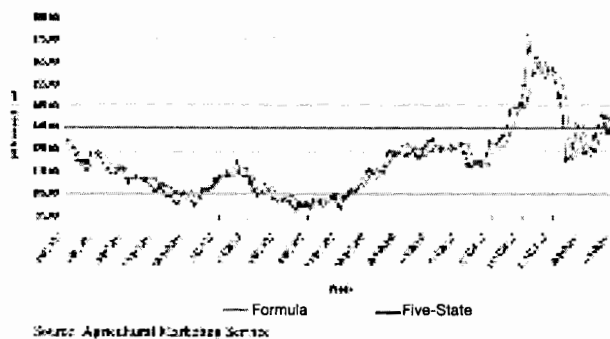
Figure 1. Weekly 5-state, weighted average dressed steer price vs. negotiated dressed steer price since mandatory price reporting, April 2001 to April 2004.



Weighted Average Prices vs. Formula Prices

– Again, one of the big concerns for many supporters of MPR was the presumed favorable relationship of formula prices relative to negotiated prices. Figure 2 compares the weighted average dressed steer price with formula prices. Unlike the previous comparison, here there is a noticeable difference, especially in some weeks. Do those who formula price, which is associated primarily with grid pricing, receive preferential prices? The answer appears to be yes, sometimes, and no, sometimes.

Figure 2. Weekly 5-state, weighted average dressed steer price vs. dressed steer formula price since mandatory price reporting, April 2001 to April 2004.



As discussed from data in Table 1, the price difference on average is just a few cents per hundredweight and favored formula prices two of the three years but negotiated prices the other year. Some explanation can be gleaned from Figure 2. Five-state weighted average prices (and negotiated prices) tend to be lower than formula prices on a declining market. Conversely, formula prices tend to trail the five-state weighted average prices or negotiated prices on a rising market. A regression model of the price differences confirmed this observation. The difference between negotiated prices and formula prices was negative and narrowed (thus favoring formula prices) when the market trend was downward and was positive and wider (thus favoring cash prices) when the market trend was upward.

Understanding how base prices in grids are discovered also adds to the understanding of the price differences noted here. Most base prices in grids are formula priced with the base price tied to last week's cash market, either a reported cash market price quote or the average cost of fed cattle at the packer's plant where the cattle will be slaughtered. Therefore, there should be a closer relationship between the five-state, weighted average price and last week's cash market price, than between this week's five-state, weighted average price and this week's formula price. One way to explore that is to lag the formula price one week so it matches up with last week's cash market price. Figure 3 shows that relationship. The two lines in Figure 3 appear to fit more closely together than in Figure 2. Thus, significant-appearing price differences in some weeks in Figure 2 are reduced when formula trades are matched more nearly with the cash market prices in those formulas.

Figure 3. Weekly 5-state, weighted average dressed steer price vs. dressed steer formula price lagged one week since mandatory price reporting, April 2001 to April 2004.

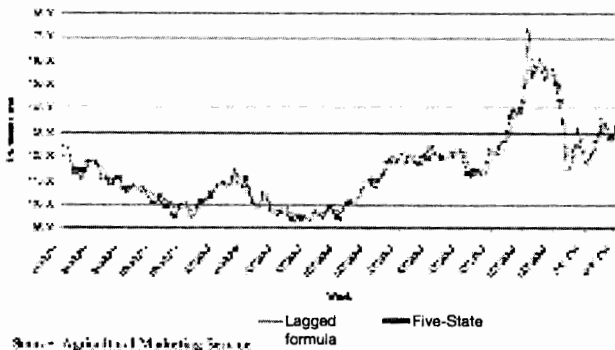
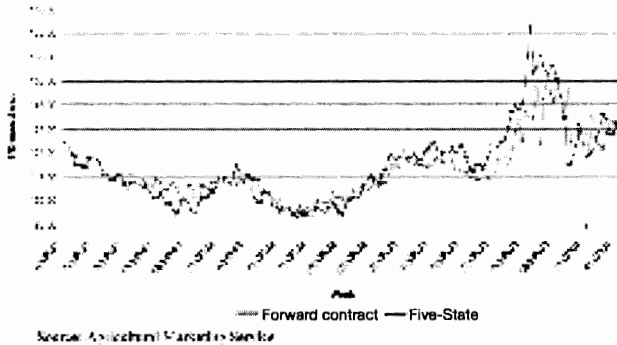


Figure 4. Weekly 5-state, weighted average dressed steer price vs. dressed forward contract steer price since mandatory price reporting, April 2001 to April 2004.

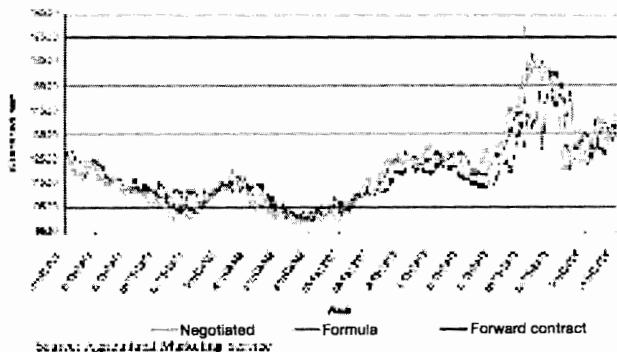


Weighted Average Prices vs. Forward Contract Prices – Figure 4 compares the weighted average dressed steer prices with forward contract prices. Forward contract prices deviate sharply from the weighted average prices in some weeks. This likely is related to what was happening in the futures market for any given week during this three-year period, market expectations, and related market conditions. Futures market price movements are not discussed here.

However, understanding forward contracts may provide some insight into why prices may deviate significantly in some weeks. Most forward contracts for fed cattle are basis contracts. Packers bid a futures market basis in the month fed cattle are expected to be marketed. Then anytime between the date cattle are contracted and before delivery, cattle feeders may pick the fed cattle price. Thus, cattle feeders watch the futures market and try to forecast when the live cattle contract price for the month just after the cattle will be slaughtered has peaked. As a result of this process and depending on futures market price behavior, the average forward contract price may or may not be close to the current weekly cash market price, here the five-state, weighted average price.

Comparison of Negotiated, Formula, and Forward Contract Prices – Comparing each of the price series for pricing methods to the broad, weighted average price is important to identify similarities and differences and to understand those differences. Figure 5 then compares the three pricing method series (negotiated, formula, and forward contract). Summary observations can be made regarding the comparison.

Figure 5. Weekly negotiated, formula, and forward contract dressed steer prices since mandatory price reporting, April 2001 to April 2004.



First, the three pricing method series based on mandatory price reports by packers track each other relatively closely in general. Thus, each is generally representative of broad market conditions (termed price determination), but not what might be affecting prices within and between weeks (termed price discovery). For reasons discussed above, less reliance might be placed on the forward contract price series as an indicator of current market conditions.

Second, no single pricing method is consistently higher or lower than any other. This seems especially important given the concerns of many cattlemen and others regarding captive supply prices vs. cash market prices. Neither of the two pricing methods that are typically associated with captive supplies are consistently above cash market prices. Each is highest at times and lowest at times.

There does appear to be differences associated with rising or declining prices that may be important in choosing one marketing method over another. However, the consistency of those price differences over varying market conditions is not explored further here.

Estimated Price Impacts of Captive Supplies

Information presented above on prices and in F-597 on volume traded by pricing method seem to confirm that MPR increased the information available on captive supplies and price relationships compared with the previous price reporting system. That data also allow estimating the price impacts from captive supplies. A brief summary of previous research results is presented, followed by impacts estimated with data since MPR.

Previous Captive Supply Research Findings – Briefly, here is the situation that captive supplies create and the crux of the issue for cattlemen and others. When buyers purchase fed cattle by captive supply methods, the supply of cattle that can be purchased in the cash market is effectively reduced by the volume already committed to specific packers. That alone, would likely raise prices for the remaining cattle because other buyers, those without captive supplies, need to bid aggressively for a smaller supply of fed cattle. However, it also means that buyers with captive supply cattle committed to their plants need not be as aggressive in the cash market because they already have a portion of their cattle requirements met. That, in turn, may cause cash prices to decline. This is the essence of the captive supply debate. Can packers use their captive supply purchases to bid lower and depress prices paid for fed cattle purchased in the cash market? Data collected by the Grain Inspection, Packers and Stockyards Administration (GIPSA) have enabled the most detailed examination of captive supplies to date. Results from a captive supply model with five years of monthly captive supply data (1989-93) for the U.S. suggested that larger plants use captive supplies strategically (Barkley and Schroeder). Captive supply usage by larger plants increased as cash prices increased but not for smaller plants. Captive supply usage increased as cash price variability increased, more so for larger plants than smaller plants. Captive supply usage also increased as plant utilization increased. Lastly, for larger plants, contracting and marketing agreements were substitutes for packer feeding. Therefore, in summary, larger plants used captive

supplies to increase plant utilization and to mitigate rising or more variable prices.

In one of the short-term impact approaches using transaction data for 1992-93 from packers nationwide, results indicated there was simultaneity in the *decision* to deliver forward contracted and marketing agreement cattle and the *decision* to purchase cash market cattle (Ward, Koontz, and Schroeder). The same simultaneity was not found for packer fed cattle. This suggests packers feed cattle for different reasons than they used contracts and marketing agreements. Packer feeding may have been motivated more by cattle feeding profit opportunities and maintaining a steady flow of cattle to the plant, and motivated less by using packer fed cattle strategically to reduce procurement costs via its influence on cash market prices. Use of captive supplies was associated with lower prices for fed cattle generally but the amounts were smaller than many cattlemen expected, ranging from \$0.01-\$0.41 per dressed hundredweight.

Since the GIPSA concentration study, economists have continued wrestling with the captive supply issue. At least three "theories" of captive supplies have been developed. While there are differences, all suggest captive supplies can be used strategically by packers.

GIPSA commissioned further empirical work with transaction data from the Texas High Plains for 1995-96. Findings were similar to those of Ward, Koontz, and Schroeder. Captive supplies were associated with a small negative decline in fed cattle prices (Schroeter and Azzam 1999). However, the authors proposed an economic argument indicating why this may occur, indicating that the negative relationship between captive supply volume and cash market prices may not be strategic in nature. In later work, Schroeter and Azzam (2004) argue the negative relationship stems from the timing of deliveries to packing plants from cattle feedlots. They found a negative relationship between volume of marketing agreement deliveries in one week and the expectation of a price change from the previous week.

Estimated Price Impacts with MPR Data – Several models were estimated at OSU with weekly data for the three-year period since the beginning of MPR. All models explained over 95% of the week-to-week variation in the five-state, weighted average, live weight fed steer price. Model results were consistent with previous research in some regards but differed somewhat in others.

Consistent with previous research, a small negative relationship was found between the volume of weekly formula priced trades and cash market prices. As formula priced volume increased, cash market prices declined slightly. This finding is consistent with the concerns expressed by many cattlemen regarding the impact of captive supplies on cash market prices. However, the magnitude was less than many cattlemen expect, similar to previous research.

No significant relationship was found between volume of forward contract cattle traded and cash market prices. Fewer fed cattle were marketed by forward contract than any other marketing method in the MPR data and the relationship between forward contract prices and other prices was not as strong as the relationship among other pricing methods.

This research also considered the relationship between the extent of negotiated pricing and cash market prices. A reverse relationship was found compared with the finding for

formula prices. A small but significant positive relationship was found between the volume of weekly negotiated trades and cash market prices. As more trades were negotiated, cash market prices increased. This, too, is consistent with those concerned about captive supplies and their support for returning to a higher percentage of negotiated transactions.

A surprising result was found for packer owned trades. The models consistently indicated a positive relationship between the volume of packer owned cattle delivered and cash market price. This is opposite what most cattlemen concerned about captive supplies would expect. Conceivably, the decision to deliver cattle from the packer's own inventory rests more with feedlot side of the business than with the packer procurement or processing side. More cattle may be delivered when cash market prices are high, thus showing better returns to the cattle feeding side of the business. Packers might also deliver more of their cattle when prices are high for a strategic reason, so as to swing supply-demand conditions more in their favor and lower future cash market prices.

The relationship between volume traded and past prices was explored further. During brief periods of price declines, the volume of formula trades increased. Opposite conditions affected deliveries of negotiated and packer owned deliveries. During brief periods of price increases, the volume of negotiated and packer owned deliveries increased.

Conclusions

Mandatory price reporting increased the amount of data and information available on various pricing methods and quantities traded for fed cattle. Comparisons are easier now than prior to MPR between prices paid by packers for fed cattle purchases by alternative methods, including methods that constitute captive supplies. Data also enable more regular and different analyses of market impacts from captive supplies and related questions than previously.

Preliminary analyses with weekly data for the first three years of MPR can be summarized as follows:

- Differences between formula prices, forward contract prices, and negotiated prices were generally small and varied from year to year.
- Differences between formula prices and negotiated prices were related to rising and declining prices. Formula prices were higher in downward trending markets and negotiated prices were higher in upward trending markets.
- Models estimated agreed with previous research that as the volume of formula priced trades increased, there was a small negative relationship with cash market fed cattle prices. Similarly, as the volume of negotiated trades and packer owned trades increased, there was a small positive relationship with cash market fed cattle prices.
- Brief periods of declining prices tended to stimulate formula trade volume. Conversely, brief periods of rising prices tended to stimulate negotiated trade and packer owned trade volume.

Further analysis is needed. However, clearly, MPR provides additional data with which to study the contentious

issue of captive supplies and their market impacts.

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Table 1. Three-Year Summary of Weekly Prices from Mandatory Price Reports by Marketing Method (\$/cwt.)

Marketing Method or Data Series	Year*	Summary Statistics			
		Average Deviation	Standard	Minimum	Maximum
Five-State Weighted Average Steer Price	2001	111.92	6.84	99.82	128.69
	2002	109.54	9.76	97.64	128.73
	2003	135.62	14.91	117.11	177.78
	2001-2003	119.03	16.11	97.64	177.78
Negotiated Dressed Steer Price	2001	112.21	6.80	100.10	129.00
	2002	109.58	9.75	97.64	128.71
	2003	135.72	14.96	117.15	178.03
	2001-2003	119.17	16.10	97.64	178.03
Formula Price Dressed Steers	2001	112.77	6.29	102.20	126.83
	2002	109.74	8.79	99.48	127.17
	2003	135.01	14.69	117.98	166.39
	2001-2003	119.24	15.42	99.48	166.39
Forward Contract Dressed Steers	2001	112.83	4.71	104.05	127.33
	2002	109.49	6.58	99.43	120.97
	2003	129.70	12.57	113.10	159.17
	2001-2003	117.81	12.75	99.43	159.17

* Year 2001 refers to April 2001 to March 2002; 2002 refers to April 2002 to March 2003; and 2003 refers to April 2003 to March 2004.

Source: Agricultural Marketing Service, U.S. Department of Agriculture

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