NEGOTIATED SALES FOR FED CATTLE & PRICE DISCOVERY

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Several task force members mentioned the loss of cash sales of fed cattle, price transparency, price discovery, and thinning cash markets as an industry concern. During discussion, two proposals were mentioned to address the concerns, both having the same general idea—to require a certain percentage of fed cattle sales to be negotiated cash sales. One proposal, offered by Nebraska Cattlemen, is to mandate that packers “purchase a least 50 percent of their weekly slaughter in the negotiated cash or negotiated grid market within specific delivery windows.” The other proposal, offered by the U.S. Cattlemen’s Association, is to “require a minimum of 30 percent of each packer processing plant’s weekly volume of beef slaughter to come as a result of purchases made on the open market . . . would be delivered to the packer not more than 14 days after the date on which the livestock are sold . . .” The U.S. Cattlemen says its proposal seeks to improve price discovery in the cattle marketplace. The Nebraska Cattlemen do not offer a specific goal behind its proposal, but one would presume it shares the same goal of price discovery.

This background paper reviews current data, research, and findings concerning the current state of negotiated markets and price discovery. The research papers reviewed include:

- Marketing Method Use in Trade of Fed Cattle: Causes and Consequences of Thinning Cash Markets and Potential Solutions

- Objective Measures of Price Discovery in Thinning Fed Cattle Markets – Final Executive Summary

- Thin Fed Cattle Markets: Policy Prescriptions – Executive Summary

- Feasibility Assessment of Reporting Negotiated Slaughter Cattle Purchases in Separate Delivery Window Categories
  Ted C. Schroeder, Lee L. Schulz, and Glynn T. Tonsor, prepared for the USDA-AMS, November 4, 2019

- Procurement Price Relationships for Fed Cattle and Hogs: Importance of Cash Market in Price Discovery
  Yoonsuk Lee, Clement Ward, B. Wade Brorsen, Department of Agricultural Economics, Oklahoma State University, 2012.

The paper contains two parts. The first is a brief summary (3 pages) of the findings and data from the research. The second part contains excerpts, data, and graphs from the studies cited found to be particularly relevant to the topic.

SUMMARY OF FINDINGS

Negotiated trade in the cattle marketplace has declined from around 55 percent of total cattle purchased to 25 percent since 2008 on a national basis. In contrast, formula purchases have increased from 35 percent to 60 percent.

Negotiated purchases in Nebraska on a monthly basis will generally range between 30-35% of total cattle traded as reported to the USDA-AMS. The graph below shows snapshots for 4 different time periods of the share
Nebraska’s total transactions accounted for by negotiated and negotiated grid transactions. On weekly basis, negotiated purchases in the state can fall to as low as 15%.

Nationally, 85% of negotiated purchases between 2014-2018 were for a delivery period of 0-14 days, and 15% were for 15-30 days delivery windows. Nebraska and Iowa account for 63% of the national 15-30 days negotiated purchase transactions (71% by cattle volume).

The website InvestingAnswers defines prices discovery as “the act of determining the proper price . . . by studying market supply and demand and other factors associated with transactions. . . proper price discovery also depends on the number, size, location, and competitiveness of the buyers and sellers, . . . The amount, timeliness, and reliability of market information and price reporting are also crucial.”

Dr. Koontz of Colorado State University describes price discovery as “the process of market participants gathering information on current and expected future supply and demand, formulating bids and offers, and incorporating new and changing economic information into prices.” American Farm Bureau policy states price discovery should accurately determine the value of livestock products.

There appear to be three trends regarding price discovery in cattle markets: 1) away from negotiated cash markets to futures markets for price discovery in certain regions; 2) a shift from transactions in the southern plains to those in the northern plains as sources for price discovery, most notably Nebraska and to some extent Iowa; and 3) the relevance of negotiated prices in determining prices for alternative marketing arrangements likely remains.

On the first trend, in examining data from 2002-2015, Koontz suggested cash fed cattle markets in 2014‐15 were doing half of the price discovery work that they did when mandatory price reporting was implemented in the early 2000s. His models show that as negotiated transactions in certain regions decline, price discovery for those regions is being taken up by the futures market.

Koontz found that price discovery in the national fed cattle market displays no problems, but problems appear at the regional level, particularly in the southern plains. It is in these markets where futures prices are becoming more prevalent for price discovery.

On the second trend, Schroeder et al. found negotiated purchases in Nebraska accounted for 37 percent of the total U.S. negotiated transactions between 2014-2018. This amounted to nearly 58,000 transactions and more than 9 million head of cattle. Negotiated sales in Texas accounted for 4.5 percent of negotiated sales; Oklahoma, less than 1 percent; and Kansas, 17 percent.
Koontz’s research indicates cattle markets in Nebraska are the thickest and do the bulk of the price discovery work. He concludes it has adequate transactions with little pricing errors. The pricing errors in Nebraska are below $0.50/cwt.

He states the same cannot be said for Texas. In Texas, the transactions are few enough to risk large pricing errors with persistent probability. And the quality of price discovery in Kansas is in between that of Texas and Nebraska, but with conditions much closer to Texas.

On the third trend, cash prices between 2001-2010 were found to be important in determining prices in alternative marketing arrangements. Lee et al, found negotiated cash prices and formula agreement prices track a common average value, which is to be expected since formula agreements are commonly tied to negotiated prices. The authors also found a linkage between cash prices and forward contract prices. And, their analysis found there is a causal link between negotiated prices and formula prices. One would assume these linkages remain today.

When are cash markets too thin and unable to adequately perform their price discovery function? Koontz suggests markets become too thin when negotiated transactions fall below 5-10 percent of total transactions although it depends on the market and approach taken to estimate the needed transactions.

One approach suggests Nebraska has enough transactions for price discovery. An alternative approach suggests Nebraska needs cash trade between 17,000 to 35,000 head per week depending on the robustness of the price discovery goal. Average weekly trades in January 2019, December 2019, and January 2020 fell within this range. Weekly trade for the week ending April 20 did not.

**IN SUMMARY:**

- Research suggests price discovery occurs when cash transaction make up 5-10 percent of transactions.
- Nebraska cash transactions are well above this threshold, while other regions of the country are not. As such, it appears price discovery is more robust in Nebraska relative to other regions of the country with the pricing error less than $.50/cwt.
- It would appear the 30 percent cash transaction threshold would not materially impact Nebraska.
- The 50 percent threshold for negotiated and negotiated bid threshold would impact Nebraska and require more transactions to be priced either through negotiated or negotiated grids. The snapshot above shows these kinds of transactions account for between 29-43 percent of transactions in Nebraska.
- A 14-day delivery window would impact Nebraska producers more so than other parts of the nation. Although transactions with the 15-30 day delivery window only make up 15 percent of total negotiated transactions, two-thirds of the cash transactions within the 15-30 day delivery window occur in Nebraska and Iowa.
Second, econometric modeling of price dynamics in the five regional fed cattle markets, along with boxed beef and live cattle futures, find reductions in price discovery in regions with less cash trade. If the volume of cash trade in a region falls to 5-10% of total volume then that region contributes little to price discovery. That was the case of the Texas-Oklahoma-New Mexico region during 2014.

In short, cash markets are disorganized and have large costs of use. Cash markets are too disorganized for producers and processors with any focus on supply chain management. There are strong incentives to not use the cash market. However, there remains strong interest in maintaining the cash market and in the price information.

Formula trades do no price discovery and make use of the information provided, and resources expended elsewhere, on prices discovered by others. Formula trades use both base prices and premiums and discounts discovered through other means.

It is likely that the substance of price discovery with the U.S. cattle feeding regions has shifted away from the southern plains to Nebraska.

The arrangement developed so that the cattle feeding enterprise could implement supply chain management. The packer usually had a similar goal in terms of plant utilization, slaughter and fabrication costs, and meat quality. Frequently, the long-term arrangements were to develop supplies of particular production methods and develop a path to market consistent supplies of those products. In addition, formula cattle feeding enterprises have conducted extensive internal cost-cutting exercises.

Use of formulas allowed the cattle feeding industry to supply-chain manage. Animal and meat quality was increased and production costs were reduced. Further, it was innovated by the cattle feeding industry.

Interviews find one impetus behind the increased use of formulas being driven by the feeding industry's cost cutting exercises. The use of formulas allows operations to increase quality and value of sales and decrease costs of feeding.

There are also risks associated with participating in the cash market. The main risk is that the cattle will not be marketed in the most optimal week or in the predicted week. Use of the cash market results in the risk that negotiations will fail and pen marketing will be delayed.

Formula operations communicated a necessity to move away from cash market use. Participating in the cash market disrupted operations. Cash market information was often important but participating in that market was a detriment to the business and the cash market information value – discussed later – was substantially less than the value of the formula. No formula operation expressed any interest in returning to the cash market or in marketing any animals through cash markets. They viewed this as at least a $25 per head cost. The cash market had value in terms of price information but not in terms of opportunity.

Within cash operations interviewed, individuals communicated a skill set, interest, and a strong perceived need for continuing to participate in the cash market. These business models, the individuals that create them and are attracted to them, are different from formula operations. Cash operations believed the work they did negotiating price had value – further, these operations expressed dissatisfaction with doing the price discovery work that the formulas then used. They clearly understood they were the residual market, there were fewer in this portion of the market doing the work, and were dissatisfied.

There were marked differences between businesses that use the cash market and those that used alternatives. Cash market traders wanted to see 30-50% of trade in a regional market as cash trade. Formula operations were less concerned about thinning cash trade (10% was more than acceptable) as long as the resulting prices in the thin region mirrored prices in other regions. Forward contracting operations viewed themselves as
not contributing to the thin markets problem. Clearly with the AMA operations, the focus of concern is on information revealed by price and not the price discovery process.

All prescriptions were not acceptable though. There was no interest in government intervention and regulation. And little interest in developing new information sources. There were also no technical fixes being used. Marketing fed cattle is a technology with different short-run and long-run costs and different abilities to adjust or substitute. Formulas and forward contracts are too valuable relative to the value of a thickly traded cash market. For those that use that business model, the individual economic incentive is to use formulas and forward contracts more and use the cash market less. The cash market has value – in terms of opportunities and information – but that value is small. But the value of the cash market is not zero.

Using traditional pricing errors and probabilities, the Texas-OK-NM regional market became too thin during 2014. The negotiated cash trade fell below 4% in early 2014 and has had weeks of zero cash trade. As important as the region is in cattle feeding, since 2014 it negotiates almost no cash trade.

Kansas is similar but not as pronounced as the Texas region (Figure 6). The negotiated cash trade in Kansas became too thin in mid-2014. There remains small cash trade but, unlike Texas, there are cash trades in all weeks. Here, though the too-thin result emerges with a cash trade less than 20% of the total trade. And the specific amount is not transparent as it is not driven by a hypothesis test. It appears to be 10-15%.

The thickest market is reported in Figure 7 and that is Nebraska. Cash trade in Nebraska varies between 15-35%. It is trending towards less cash market use but the trend is not as pronounced as the Texas region and does not start with very low cash trade like Colorado. The cash trade in Nebraska through much of 2014 appears to be double or triple the volume that is needed for price discovery – within the parameters assumed. Finally, Iowa is similar to Nebraska. That region has the least observable trend away from cash. However, the total volume in that market is small.

Regardless, it is Nebraska that is the thickest negotiated cash fed cattle market and likely does the majority of price discovery work in fed cattle markets.

So how thin is too thin? It depends on the market and the measures used. Texas appears too thin at a cash trade below 5%. Kansas requires a higher volume and may be impacted by thinning cash trade in Texas. Regardless, 2014 was a watershed year for the southern plains and the reduction in price discovery. And it is likely that Kansas continues to follow the trend.

Nebraska by contrast does not have the same problem. It has two to three times the needed negotiated cash transactions. Making a recommendation to the cattle industry is not a transparent exercise but based on these results less than 5% cash trade appears to be likely too thin. Establishing a cash trade greater than 5% would be needed. To be confident that cash trade contributes to thick price discovery then a cash trade greater than 10% is likely needed.

Finally, the pricing errors in the thickest market, Nebraska, are both below $0.50/cwt. This $0.50/cwt pricing error suggests solid price discovery in Nebraska.

In short, Nebraska is the thickest market and has adequate transactions such that there are little pricing errors with small persistence given the underlying variability market price. However, a similar statement cannot be made for the Texas region. In that region, the transactions are few enough to risk large pricing errors with persistent probability. And quality of price discovery in Kansas is in between that of Texas and Nebraska but with conditions much more close to Texas. Further, if the industry wishes to make recommendations about how much cash trade is needed then 5% appears to be a reasonable minimum and 10% made be needed.
Cash fed cattle markets have thinned: there are a smaller number of transactions and volume of animals traded in the negotiated cash market. By definition, there is more use of alternatives to the cash market and for fed cattle these alternatives are formulas and forward contracts. As a consequence, there is less price discovery work being performed in cash fed cattle markets. So, how thin is too thin? How small can the cash trade become before there is an impact on the quality of price discovery performed in markets for fed cattle? (This is the third of three executive summaries from the Thin Fed Cattle Markets project.)

To measure price discovery, we first have to define objectively what price discovery is. Price discovery is the process of market participants gathering information on current and expected future supply and demand, formulating bids and offers, and incorporating new and changing economic information into prices. Price discovery is work. It is the work of market participants in discovering how changing market conditions and anticipated changing market conditions impact price. Thus, price discovery is revealed by price changes. Price discovery is measured through several related methods. Different markets for fed cattle will reveal changes in underlying market fundamentals or market psychology first. The market that is first impacted will lead changes in other market prices.

Fed cattle prices were examined since the institution of mandatory price reporting until current: 2002-2015. The five USDA AMS regional prices were examined: Texas-OK-NM, Kansas, Colorado, Nebraska, and Iowa. The 5-market weighted average was also used separately. Price discovery in regional and national fed cattle markets is influenced by the live cattle futures market and downstream beef valuation.

Fed cattle, futures and beef values all move together. There are strong equilibrium relationships. Knowing any one price provides strong knowledge about all of the other prices. The results also imply conclusively that there is one underlying common stochastic trend in the system of seven prices. There is one underlying fed cattle and beef price. Further, there is clear evidence of two regional market areas: southern plain and northern plains. Texas-OK-NM and Kansas AMS regions are the southern market pair and Iowa and Nebraska are the northern market pair. Colorado is not a separate market but is also less clearly tied to either region. Within the southern region, Texas-OK-NM is the strong market and within the northern region Iowa is the strong market.

Kansas is a weak market for price discovery in the southern region and Nebraska is surprising weak given its substantial cash volume. Strength and weakness is measured by if an individual market leads other markets in prices changes, the strength of the price leadership, and if an individual market has a large weight in determining the underlying common trend. Strong markets perform price discovery and weak markets contribute less if at all.

The sampling error approach suggests that only Texas and Colorado are too thin. Texas became too thin in 2014 and Colorado in 2008-10. Nebraska is the thickest market and it has three times the number of required transactions for a market being too thin. Iowa and Kansas have two to three times the number of needed transactions. Similarly, the pricing error has spiked in the recent two years. Given the number of transactions and the price volatility then the uncertainty about the underlying equilibrium price has been $1.50-3.00/cwt. In the too-thin markets. The pricing error is $0.50-1.00/cwt in the thicker markets. This uncertainty is not a bias because prices may be too high – as in late-2014 – or too low – as in late-2015. It is uncertainty due to the small number of transactions. (Similar spikes were seen during the 2003-04 time period where BSE was found in North America and the ultimate market impact was unknown.)

Texas, Kansas, and Nebraska contribute most to the underlying common trend. In this context then these markets do the most price discovery. Iowa follows closely but also has the periodic largest departures from the common trend. These are the results where Nebraska shows price discovery importance and where Texas maintains importance during declining cash volumes.
Thus, even with substantial declines in cash market trade in important regional markets the resulting prices well represent what is the fed cattle market. These historically important markets determine the market trend. However, these historically important markets are doing less information flow price discovery work. That has transferred to the live cattle futures market. Cash fed cattle markets in 2014-15 are doing half of the price discovery work that they did when mandatory price reporting was implemented. And some important markets are doing none. The southern plains markets contribute little price discovery. Northern plains markets have taken over that role. But the northern plains continue to do the work that they have always done. They are not doing more work. The more work has transferred to the futures market. What’s left is more integrated across markets and markets follow the common trend. But what’s left is doing less price discovery work in that what’s left of cash markets do not lead price changes – rather they largely follow price in the futures market.

As cash markets thins then the futures market is the market where price discovery is performed. These results persist with the statistical models that use the 5 separate regional market prices and the 5-market average. Price discovery in the regional cash fed cattle markets is being reduced and is being replaced by price discovery in the live cattle futures contract market.

So, how thin is too thin? It depends on the market and approach.

The sampling error approach communicates that Nebraska, Iowa, and Kansas have substantially adequate volume and that Texas and Colorado both require 5,000-7,000 head per week.

The results from the common trend approach are too variable to suggest needed volumes.

The information flow approach suggests that there are strong and weak markets. Any cash trade in Texas-OK-NM contributes to price discovery. However, a significant contribution to price discovery requires 7,000 head per week. At this level of cash trade then historically TX-OK-NM has contributed to price discovery. Kansas requires 14,000 head per week. Nebraska needs to trade requires 17,000-26,000 head per week as it is one of the weaker markets. More robust price discovery requires: Texas-OK-NM 23,000-25,000 head traded per week, Kansas 35,000-40,000 head per week, Colorado 8,000-12,000 head per week, Nebraska 38,000 head per week and Iowa 13,000-17,000 head per week. These are cash volumes that are historically consistent with strong price discovery in the USDA AMS fed cattle regional markets.

Price discovery in the national fed cattle market displays no problems. But at the regional market level there appear to be issues in the southern plains. Further, price discovery within fed cattle markets relies more on the futures market and less on regional fed cattle markets.
The 2008 LMR reauthorization modified terms of trade for negotiated transactions for steers and heifers. Prior to this time, negotiated transactions referred to cattle scheduled for delivery not later than 14 days after the purchase date. Cattle scheduled for delivery beyond 14 days were considered forward contracts. Beginning with the 2008 reauthorization, a revised category for negotiated purchases of cattle scheduled for delivery more than 14 days but fewer than 30 days was added to negotiated transactions. As such, two negotiated purchase categories, 0-14 and 15-30 day delivery windows, for each dressed and live slaughter steers and heifers could conceivably be reported by AMS.

A concern with grouping negotiated transactions into a 0-30 day delivery window is when cattle prices are forward trending, combining transactions across the 30-day delivery window could result in averaging out and masking the market trend. This could result in reported negotiated prices being greater for nearby delivery trades compared to more distant deliveries during a downtrend and vice-versa during an uptrend in the market which would not be discernable in reported negotiated transactions that combine 0-14 and 15-30 day deliveries into a single weighted-average price quote. Industry participants have keen interest in assessment of whether negotiated transactions could be separated into 0-14 and 15-30 day delivery windows.

Negotiated trade has declined from around 55% of cattle purchases down to 25% (Figure 1) with some regions such as TX/OK/NM declining even more, challenging individual state or multi-state negotiated price reporting consistency. Formula purchases increased from about 35% to more than 60% of slaughter cattle purchases since 2008.

Figure 1. Ways Domestic Fed Cattle are Purchased and Priced, Weekly, 2005- August 2019

Source: USDA, AMS
Also noteworthy in Table 1, purchases within the 0-14 day delivery window are much more common than the 15-30 day window. Nationally, 85% of domestic negotiated purchases over the 2014-2018 period were 0-14 day and 15% were 15-30 day delivery windows. Furthermore, in some prominent cattle feeding states, the 15-30 day delivery purchases represent tiny, if any, trade volume. For example, only 3% of negotiated transactions in TX and in KS were 15-30 day delivery window over the 5-year horizon. NE and IA represent the largest majority of 15-30 day delivery window purchases with 63% of the entire national 15-30 day negotiated purchase transactions (71% by cattle volume) originating in just these two states over the 2014-18 period.

![Figure 4. Shares of 0-30 Day Negotiated Purchase Volume, 2014-2018](image-url)
In 2014 the 0-14 day transactions were at about a $1/cwt premium, the premium was the highest in 2016 at $1.43/cwt and it was $1.26/cwt in 2018. Recalling aggregate 5-Area market price trends summarized in Figure 2 we might have expected 15-30 day to be at a premium to 0-14 day in 2014 since the market trended upward during most of that year. In contrast, the market trended downward quite rapidly in both 2015 and 2016 suggesting the largest premiums for 0-14 day deliveries during that time. The premium for 0-14 was indeed larger during 2015 and 2016 than other years, but 0-14 still had a premium in 2014, though it was the smallest of the five years.