Factors Affecting Feeder Cattle Prices in Kansas and Missouri

November 2009 (revised March 2010)

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Introduction

In the current economic environment it is critical that cattle producers make management decisions based on the best information possible. Accordingly, market participants are wary of relying upon dated pricing information when making management and marketing decisions. Furthermore, it is important that producers understand the link between pricing and genetic, management, and marketing decisions as this can increase an operations sustainability and profitability. Cow-calf producers and cattle feeders have long been interested in the impact that various physical and market characteristics have on feeder cattle and calf prices. A number of previous studies have reported the significant relationships that exist between feeder cattle prices and the physical and market characteristics associated with the cattle (Bailey and Peterson, 1991; Faminow and Gum, 1986; Lambert et al., 1989; Mintert et al., 1988; Sartwelle et al., 1996a,b; Schroeder et al., 1988; Ward et al., 2005). While results have varied somewhat, past research has generally shown that weight, lot size, health, condition, fill, muscling, frame size, breed, time of sale, and horn status significantly affect feeder cattle auction prices.

Significant premiums and discounts have been shown to be associated with particular feeder cattle physical characteristics indicating producers' management decisions will impact the price they receive. However, these premiums and discounts are not constant over time. For example, King and Seeger (2004) show that premiums associated with VAC 45 preconditioning programs increased steadily from 2000 to 2004. Similarly, Sartwelle et al. (1996a) showed how the premiums and discounts on a number of factors changed from 1986/87 to 1993. As one example, in 1986/87 Hereford calves received a premium compared to Angus calves, however, in 1993 there was no statistical difference. A more recent study found that black hided calves have brought premiums relative to non-black calves (Bulut and Lawrence, 2007). Thus, while it is important for producers to recognize those factors that impact feeder calf prices, they need to be cognizant of the fact that the market is dynamic such that the relative premiums and discounts change over time.

The purpose of this study was to gain knowledge of the current link between market pricing and genetic, management, and marketing decisions. Specifically, findings from this

research will provide updated information regarding how the myriad of industry changes since the 1980s and 1990s have impacted the characteristics affecting feeder cattle and calf prices.

Data and Method of Analysis

The study was designed to be similar to that of previous studies conducted by Kansas State University researchers (Lambert et al., 1989; Mintert et al, 1988; Sartwelle et al., 1996a,b; Schroeder et al., 1988). Transaction-level feeder cattle market data were collected from feeder cattle auctions in Dodge City, Kansas (Winter Livestock Auction) and Carthage, Missouri (Joplin Regional Stockyards) during November and December 2008 and March and April 2009 by trained evaluators. The data represent approximately four months of historical cash price information. Data collected totaled individual transactions (i.e., sales) from approximately 8,200 feeder cattle lots encompassing 84,319 head. Data recorded for each transaction included lot size, sex, color, breed, condition, fill, muscle, frame size, weight uniformity, freshness, presence of horns, time of sale, weight, and price. In addition to details of individual transactions, time series of feeder cattle and corn futures prices were collected to proxy market conditions as they account for general changes in the general price level of feeder cattle and corn during the data collection period.

Summary statistics of select variables are reported in table 1. The average price across the 8,168 lots was $90.64/cwt and ranged from $60.00 to $139.00. Feeder cattle futures prices on the days of the sales averaged $93.23/cwt and ranged from $86.55 to $100.50. Corn futures prices on the days of the sale averaged $3.66/bu and ranged from$3.14 to $4.03. Almost half of the lots (48%) were steers, with 42% being heifers, and 10% being bulls. The average weight per head across the lots was 584 pounds and ranged from 300 to 900 (weights outside of this range were excluded from the analysis). Figure 1 shows a distribution of average weight per head across all lots. The average lot size was 10.3 head and ranged from 1 head to 287 head.

A hedonic pricing model similar to what previous researchers have used was applied to estimate the impact various physical characteristics and market factors have on feeder cattle prices. The underlying assumption in the development of the hedonic pricing model is that feeder cattle lots can be distinguished by their physical characteristics. Thereby, demand for the different characteristics associated with a particular lot of cattle can be derived from the price cattle buyers are willing to pay for the lot. One slight difference in the model estimation approach was that all lots were analyzed in a single model. Previous research (Sartwelle et al., 1996a,b; Schroeder et al., 1988) estimated models for calves (300-600 pounds) separately from feeder cattle (600-900 pounds). Given the average weight was 584 lbs/head and the majority of lots were centered around that weight (see figure 1), it was determined not to separate the data into two weight classes for model estimation. Additionally, these previous studies estimated models for heifers and steers separately. Also, because bull sales represent 10% of the sale lots, bulls were included in the model. This allows for additional analyses not available from previous studies.

Results and Discussion

Breed, muscling, and frame size are important feeder cattle characteristics influenced through genetic selection. Pricing results for genetically influenced factors are reported in table 2. Cattle buyers paid the greatest premium for Angus ($3.10) and Angus × Hereford crossbred calves ($2.72) compared to the base breed (Hereford influenced) calves. The greatest discounts were applied to dairy (-$12.22) and longhorn (-$10.86) influenced calves. The large discounts for dairy and longhorn is consistent with the earlier Kansas study (Sartwelle et al., 1996a,b), however, the premium for Angus is a new result. When compared with the base breed Hereford, price changes among the remaining breed categories were relatively small. A significant premium was paid to black ($2.49), white ($1.01), and mixed hide colors ($1.89) when compared to red colored calves. Because the premiums and discounts are additive, this implies a black Angus calf would bring a $5.59 per cwt premium ($3.10 + $2.49) relative to the base animal (red Hereford). Heavy ($6.62) and extremely heavy ($5.25) muscled cattle brought significant premiums when compared to average muscled calves. Feeder cattle buyers likely prefer heavily muscled calves as they are expected to produce desirable carcasses. Buyers discounted calves with small frames (-$5.98) and gave a modest premium ($0.75) to large framed calves. Increased concern about growth patterns and finish weights apparently contributed to larger discounts for calves that are not expected to match cattle feeding and meat processing specifications.

On-farm management of weight, health, condition, and horn presence significantly affect feeder cattle prices. Figure 2 shows the model-estimated price for steers, heifers, and bulls at varying weights (black, polled, large frame, exotic cross calf sold in the fall in Joplin in a lot size of 10 head, average fill and muscling, and moderate condition). As expected, steers bring the highest prices regardless of weight. At low weights, bull prices are discounted between $5-$6/cwt relative to steer prices, but this discount increases considerably as weight increases. On the other hand, heifer prices are discounted considerably from steer prices at low weights, but this discount narrows at heavier weights. Figures 3 and 4 show the discounts attributed to additional weight for steers, heifers, and bulls in the fall and spring, respectively (i.e., price slides). Similar to what has been reported earlier (e.g., Dhuyvetter and Schroeder, 2000) and as would be expected, prices per hundredweight decreases as cattle get heavier, but the price-weight slide varies by sex and season. The discount on heifers relative to steers was larger in the spring than the fall and also slightly larger than previous studies. For example, at 550 pounds, model-estimated heifer prices were $10.06/cwt less than steers in the fall and $11.16/cwt lower in the spring. Discounts were lower at higher prices -- $8.32 and $9.95 per cwt for fall and spring, respectively, for 650 pound calves. The bull discounts, relative to steers, were slightly less in the spring compared to the fall. For example, model-estimated prices are $5.91/cwt lower for bulls than steers in the fall compared to $5.19/cwt lower in the spring for 550 pound calves. At heavier weights, the discount for bulls increases -- $7.06 and $5.73 per cwt for fall and spring, respectively, for 650 pound bulls and steers. Differences in feeder cattle prices across weights are likely attributed to the relationship of feeding performance and profitability of feeding

programs. Expected fed cattle prices, feeder cattle prices, corn prices, interest rates, and feeding performance all affect cattle feeding profitability. Because feeder cattle prices were explicitly accounted for in the model, the large weight discounts can be attributed to differing expectations about anticipated feeding performance, interest rates, and fed cattle prices. Corn prices were not included in the final models as they were not statistically significant.

The effect of other management factors on feeder cattle prices are shown in table 2. Buyers discounted calves that appeared to be non-healthy (-$6.31), had horns (-$2.18), or that were in too thin or too fat condition. It is evident that buyers prefer healthy calves as unhealthy calves increase the possibility of death loss and poor feeding performance. Moderately condition calves were preferred as they show the ability to convert feed to gain. Discounts for horned cattle are likely attributed to increased injury in confinement and increased handling costs.

Marketing factors that affected pricing were weight uniformity, lot size, gut fill, sale location, and time of sale (table 4). Weight uniformity significantly impacted feeder cattle prices as non-uniform lots of cattle were discounted $2.11/cwt. Although non-uniform lots received discounts, the relationship between weight uniformity and lot size needs to be considered. Figure 4 shows the price paid for calves based on lot size. As lot size increased the price per cwt increased. Prices paid for calves were at their highest for lot sizes approaching truck-load sizes. As lot sizes exceeded truck-load sizes, prices leveled off and even decreased, likely because there were fewer buyers bidding on these very large lot sizes. Feeder cattle buyers prefer to purchase larger lot sizes as the incidence of health problem decreases with non-mixed cattle, convenience of large purchases, and less transportation costs. Discounts were applied to very full (-$4.02) and full (-$0.72) cattle, as compared to average fill cattle, because cattle with significant amounts of temporary water or forage weight are undesirable. Although the largest premiums were realized for cattle sold in the third quarter of the sale relative to the first quarter of the sale, time of sale may or may not be easily controllable by producers.

Implications

Results should be of interest to a wide variety of industry stakeholders including, cow-calf operators, cattle feeders, and agribusiness firms that service the cattle sector. Although cattle producers cannot affect the forces that drive the cattle market, they can control the factors that affect the premium and discounts that their calves can potentially obtain. Producers should market healthy, dehorned cattle, ideally marketed in large and uniform lots. Producers should also shy away from selling cattle that are in extreme thin or fat, and/or extremely gant or full to obtain the greatest value for their calves. Given the data for this study were collected in Kansas and Missouri, the results are directly applicable to the cattle feeding industry in these two states. However, to the extent that cattle operations are similar throughout much of the Midwest and High Plains regions, producers in these regions can also determine what is important to buyers and use this information as a guide in making genetic, management, and marketing decisions.

To help producers incorporate the results of this research into their decision-making process, an Excel spreadsheet decision tool was developed that allows producers to examine how

changing characteristics of their cattle impacts price. This Excel spreadsheet based tool called *K-State Feeder Cattle Price Analyzer* is available at www.agmanager.info/livestock/budgets/production/. Overall, this research enabled effective market information gathering and allowed for dissemination of valuable information to industry stakeholders, which in turn may improve feeder calf value and total returns to producers.

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Table 1. Summary statistics for select variables.*

Variable	Mean	Std Dev	Minimum	Maximum
Price, $/cwt	90.64	11.92	60.00	139.00
FC futures, $/cwt	93.23	3.77	86.55	100.50
CN future, $/bu	3.66	0.27	3.14	4.03
Steer	0.48	0.50	0	1
Heifer	0.42	0.49	0	1
Bull	0.10	0.30	0	1
Weight	584.3	137.5	300	900
LotSize	10.3	15.7	1	287
Condition	2.90	0.47	1	5
Fill	3.25	0.56	1	9
Muscle	2.97	0.24	1	4
Frame	2.59	0.49	1	3

* total of 8,168 observations

Table 2. Genetic factors effect of premiums and discounts of feeder cattle.

Characteristic	% of Pens	Price Change ($/cwt)
Breed		
Angus	21.9	3.10*
Hereford	1.6	Base
Angus/Herford cross	6.6	2.73*
Other English crosses	7.3	0.66
Exotic crosses	50.9	1.78*
Longhorn	0.7	-10.86*
Brahman	3.0	-0.76
Dairy	0.6	-12.22*
Mixed breed	7.2	-0.82
Color		
Black	40.6	2.49*
Red	12.8	Base
White	10.2	1.01*
Mixed color	36.2	1.99*
Muscling		
Light muscling	0.02	5.03
Average muscling	4.5	Base
Heavy muscling	94.3	6.62*
Extremely heavy muscling	1.2	5.29*
Frame Size		
Small	0.04	-5.98*
Medium	41.1	Base
Large	58.9	0.75*

* indicates statistical significance of difference from base at $P < 0.10$.

Table 3. Management factors effect of premiums and discounts of feeder cattle.

Characteristic	% of Pens	Price Change ($/cwt)
Health		
Healthy lot	99.7	Base
Non Healthy lot	0.3	-6.31*
Horns		
No horns	90.9	Base
Mixed horns	7.6	-0.70*
Horns	1.4	-2.18*
Condition		
Very thin	0.1	-10.83*
Thin	16.4	-1.23*
Moderate	77.2	Base
Fat	6.4	-0.86*
Very fat	0.04	-4.87

* indicates statistical significance of difference from base at $P < 0.10$.

Table 4. Marketing factors effect of premiums and discounts of feeder cattle.

Characteristic	% of Pens	Price Change ($/cwt)
Weight Uniformity		
Uniform lot	98.8	Base
Nonuniform lot	1.2	-2.11*
Fill		
Very gant	0.1	-3.60
Gant	5.8	-0.99*
Average fill	63.6	Base
Full	30.3	-0.72*
Very full	0.2	-4.02*
Market Location		
Joplin	82.1	-5.15*
Dodge City	17.9	Base
Time of Sale		
1st quarter	24.7	Base
2nd quarter	24.9	1.00*
3rd quarter	25.3	2.03*
4th quarter	25.1	0.62*

* indicates statistical significance of difference from base at $P < 0.10$.

Figure 1. Distribution of average weight per head across 8,168 lots

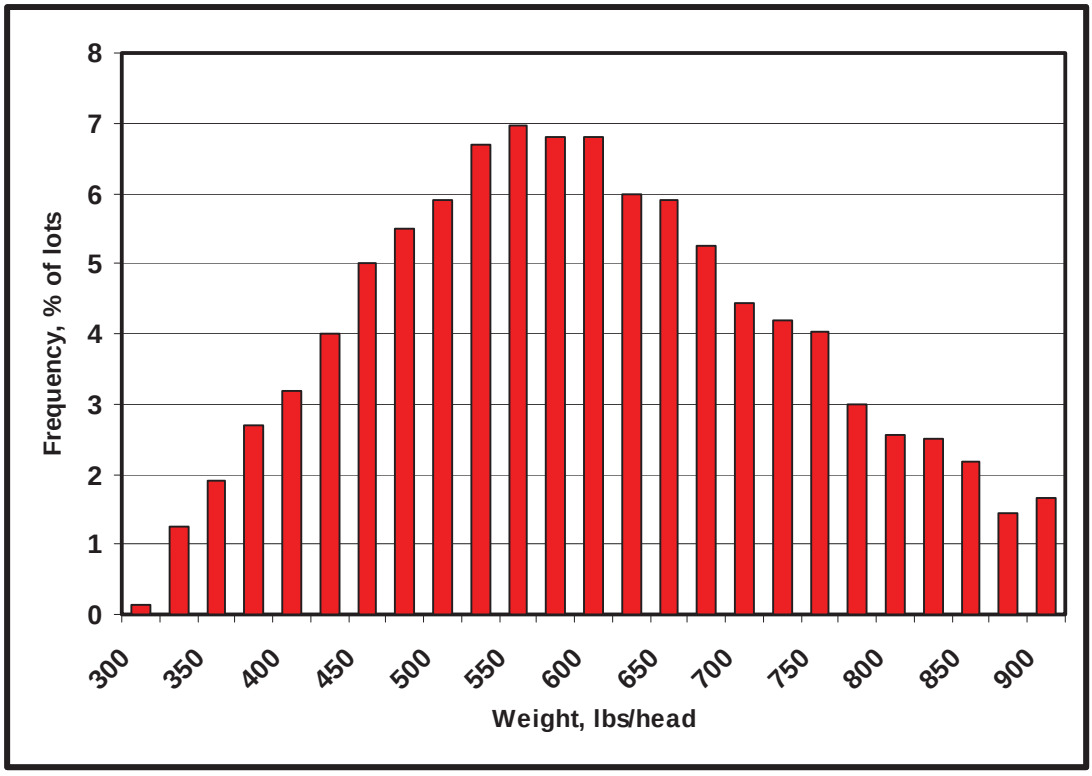

Figure 2. Effect of weight and sex on fall feeder cattle price

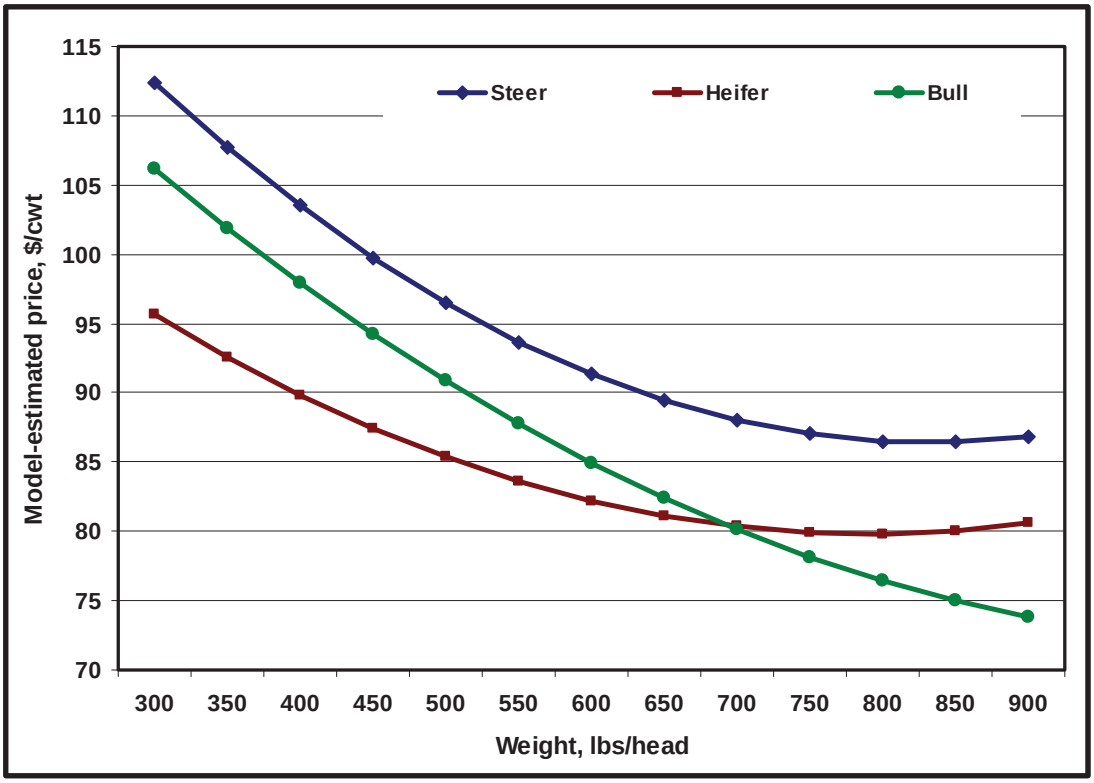

Figure 3. Effect of sex on fall feeder cattle price slide

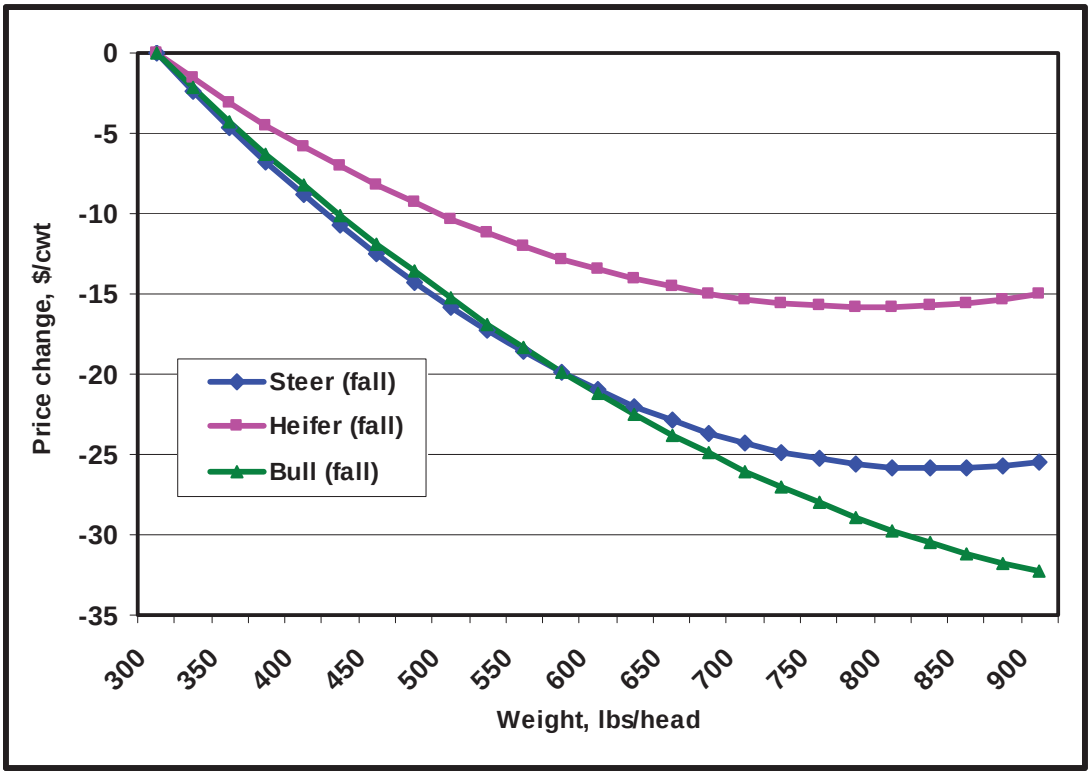

Figure 4. Effect of sex on spring feeder cattle price slide

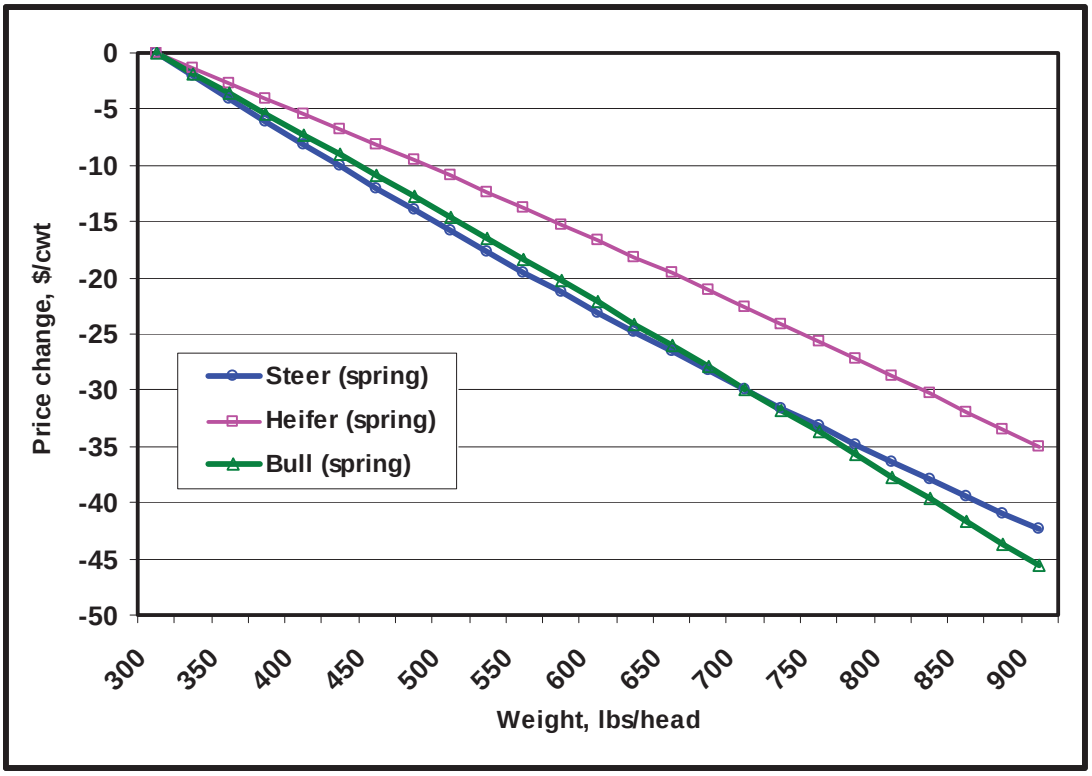

Figure 5. Effect of lot size on feeder cattle price