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Value Indicators in Feeder Cattle: An Analysis of Multi-State Auction Data

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Abstract

Data from feeder cattle auctions across multiple states were analyzed in a hedonic regression to estimate the value of factors affecting the auction price of sale lots. The data set included over 275,000 head of cattle in more than 18,000 sale lots from 92 sales in 21 locations across seven states. Results quantify the value of sale factors, management factors, animal characteristics, and location on the auction price of feeder cattle.

Introduction

Feeder cattle, collectively and at any one point in time, represent a heterogeneous set of animals that vary widely in size, age, gender, quality, genetics, condition, and management. Moreover, regional variation in cattle production systems, cattle types and cattle industry culture add to the national diversity across feeder cattle markets. Increasingly, there is demand for additional information on the range of factors that affect the value of feeder cattle.

The economic concept of the “law of one price” holds that price differences for a particular product are explained by adjusting for time, place, and form. In the case of feeder cattle, observed price differences for a particular lot of cattle are due to individual characteristics of the animals and location differences, as well as the broad supply and demand conditions reflected in overall market values at any point in time.

Hedonic models are commonly used to model pricing differences in markets where the product can be viewed as differentiated in that buyers have choices related to specific characteristics (Ladd and Martin, 1976). Examples include real estate, rental housing, and cars. Hedonic modeling has been used frequently to analyze the marginal price impact of varying lot characteristics, physical characteristics, and calf management practices on lot prices for feeder cattle. Selected examples include Bulut and Lawrence (2007), Coatney, Menkhaus, and Schmitz (1996), Schroeder et al. (1988), Williams et al. (2014), Williams et al. (2012), and Zimmerman et al. (2012). The basic assumption of hedonic models is that buyers choose among goods with varying attributes and place values on the individual characteristics of a good based on the perceived utility or benefit that they gain from each attribute (Lancaster, 1966; Rosen, 1974). The overall price of a good then is the sum of values that the buyer places on each of the good’s individual characteristics.

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This research has two primary objectives:

- 1) To collect feeder cattle auction data in multiple states/sales including as many cattle characteristics as possible to permit analysis that would identify factors affecting the value of different lots of cattle.
- 2) To quantify the individual impact of various factors that affect the value of feeder cattle using multi-variate econometric analysis.

Data Collection

The basic data collection protocol consisted of capturing the details of the sale for a particular lot of animals. Information on lot characteristics, physical cattle characteristics, and calf management practices were recorded for each lot. Lot characteristics include number of head in the lot, average weight, sex, and uniformity. Calf management characteristics include weaning status, days weaned, vaccination status, health status and program certifications. Physical cattle characteristics include hide color/breed, muscling, frame, fill, flesh, Brahman influence, and horns. Additional data collected include sale time, date, age and source verification, seller-announced, and any announced or written management comments. In general, the project attempted to capture the full range of information that buyers have available to them when assessing the value of a particular lot of feeder cattle. This includes visual characteristics of the sale lot, announcements and verbal descriptions provided and, sometimes, written sale information. This set of information, combined with the details of the sale transaction, represents the data that can be analyzed to determine the impact of various factors on the value of a given lot of cattle.

Data were collected from October 2021-April 2022 across seven states for a total of 92 individual sales at 21 locations (Tables 1 and 2). States included Kansas, Kentucky, Nebraska, Missouri, Oklahoma, South Dakota, and Wyoming. In total, our analysis includes 275,335 head of feeder cattle in 18,038 sale lots. The value of cattle considered was over \$291 million. Data of sales were collected in person by extension personnel and contractors in each of the states. Locations in Oklahoma and South Dakota account for 60% of the lots, but 75% of the cattle.

Data Summary

Average lot size is one indicator of regional differences, both across states and within states. Table 2 indicates that the average lot size was highest in South Dakota at 25.6 head, followed by Nebraska (20.6), Wyoming (15.5) and Oklahoma (13.1). Kansas (8.8), Missouri (6.2) and Kentucky (4.3) all have average lots sizes under 10 head, with Kentucky reporting the smallest average lot size.

Physical Characteristics

Steers made up 55.3 percent of our total head and 48.2 percent of sale lots, with an average lot size of 17.5 head. Heifers accounted for 42.7 percent of total head and 45.2 percent of sale lots, with an average lot size of 14.4 head. Two percent of total sale lots were bulls/mixed lots. Nearly 48% of steer lots and 47% of heifer lots were sold at average weights between 500 and 700 pounds. Mixed #1–2 muscled lots represented approximately 63% of total lots as did medium/large-framed lots.

The distribution of hide color and/or breed designation is reported in Table 3. Not surprisingly, black-hided cattle dominate the data, with 60% of cattle in lots recorded as black hided and another 15% in lots recorded as predominantly black (most animals in the lot black-hided). This is followed by nearly 9% designated at mixed high-quality lots. These are typically lots with no predominant hide color, but cattle of good quality. Red or predominantly red lots make up 7.8% of lots, followed by white/gray-hided lots of cattle at 6.3%. Animals with Hereford markings represented less than 1% of lots. Just under 1% of lots showed Brahman influence with another 1% of lots showing minimal Brahman influence.

Management Characteristics

Management characteristics are those attributes of the cattle directly influenced by producers through cattle management between birth and sale. Nearly 64% of cattle were marketed as weaned cattle, implying they had been separated from the dams for a minimum of 30 days before marketing. Vaccination information was collected in two forms: (1) vaccinated cattle were those reported as having more than one dose of respiratory complex vaccinations and (2) limited vaccination cattle were reported as having had one dose of respiratory complex vaccinations. Cattle considered fully vaccinated comprise 54.1% of the lots and limited vaccination cattle comprise another 8.4%, for a total of 62.5% of lots having received at least one round of respiratory vaccinations prior to sale. Approximately 46% of lots were both weaned and vaccinated prior to marketing. Nearly 6% of lots were marketed as Natural (5.4%) or Non-Hormone Treated Cattle (NHTC) (0.5%). Two calf health protocol certification programs were the Oklahoma Quality Beef Network (OQBN) with 1.1 percent of the lots and the Integrity Beef program with 0.5 percent of total lots. A very small number of sale specific certification programs were noted in the data as well. Finally, horns or minimal horns (few animals in the lot with horns) were documented in 3.3% of lots.

Empirical Model

Conceptually, the hedonic model used for this analysis is:

$$1) P_{it} = f(M_t, C_{ji}),$$

where P_{it} is the price of the lot i of cattle in time t ; M_t is the cattle market level in time t ; and C_{ji} is the set of j characteristics that differentiate each lot of cattle, i , including sale locations.

Because the data were collected over several months, adjusting prices for changes in general market conditions is necessary. Average prices represent the broader supply and demand forces of price determination. However, feeder cattle vary widely around this average according to lot-specific animal, management and location characteristics. The objective of a hedonic model is to explain the value of these unique characteristics regardless of the underlying market level. The CME Feeder Cattle Index was used as a reference market for underlying market values each week. Thus, the price of a lot of feeder cattle in any given week (equation 1) would reflect the underlying market level M_t (as indicated by the CME Feeder Cattle Index) along with the unique set of sale characteristics and the sale location.

However, cattle prices and the CME Index value are highly correlated, resulting in a regression model with a high degree of multicollinearity when the CME Index is included as a

separate independent variable. The usual solution for this is to use a first-difference specification, where the dependent variable is the difference between the lot price and the CME Index value. The resulting value is called a basis, as it is the difference between two prices, and is specified as:

$$2) \text{Basis}_{it} = P_{it} - \text{CME Index}_t.$$

By subtracting out the underlying market value, the regression model focuses on the remaining differences in value due to the lot characteristics and location. Using this basis specification, changes in cattle market conditions at different times are removed from the model, while retaining the focus on the impact of individual sale characteristics and location differences.

The hedonic model to be estimated is:

$$3) \text{Basis}_i = \beta_0 + \beta_1 \text{Ln}(\text{head}_i) + \beta_2 \left(\frac{\text{avgwt}}{100} \right)_i + \beta_3 \left(\frac{\text{avgwt}}{100} \right)_i^2 + \sum_{j=1}^3 \beta_{3+j} \text{Gender}_{ij} + \beta_7 \text{Wean}_i \\ + \beta_8 \text{Vaxx}_i + \beta_9 \text{Health}_i + \sum_{j=1}^{10} \beta_{9+j} \text{Hidecolor}_{ij} + \sum_{j=1}^2 \beta_{19+j} \text{Horn}_i \\ + \sum_{j=1}^3 \beta_{21+j} \text{Condition}_{ij} + \sum_{j=1}^5 \beta_{24+j} \text{Muscling}_{ij} + \sum_{j=1}^4 \beta_{29+j} \text{Frame}_{ij} \\ + \sum_{j=1}^3 \beta_{33+j} \text{Fill}_{ij} + \beta_{37} \text{Uniform}_i + \sum_{j=1}^7 \beta_{37+j} \text{Certification}_{ij} \\ + \sum_{j=1}^2 \beta_{44+j} \text{Brahman}_i + \beta_{47} \text{Natural}_i + \beta_{48} \text{Cripple}_i + \beta_{49} \text{Badeye}_i \\ + \sum_{j=1}^{21} \beta_{49+j} \text{Location}_{ij} + \sum_{j=1}^5 \beta_{70+j} \text{Month}_{ij} + \mu_i + e_i$$

where $i = 1, \dots, 18,038$ denotes each sale lot and includes the following variables;

- *head* is the number of animals in lot i ;
- *avgwt* is the average weight of the animals in lot i ;
- *gender* _{i_1} equals 1 if heifers; *gender* _{i_2} equals 1 if the lot is bulls or mixed gender; *gender* _{i_3} equals 1 if the lot is replacement heifers (steers are base);
- *wean* _{i} equals 1 if the lot is weaned;
- *vac* _{i} equals 1 if the lot is vaccinated;
- *health* _{i} equals 1 if there are unhealthy animals in the lot;
- *hidecolor* _{ij} are dummy variables for hide colors (black is base color);

- $horn_i$ equals 1 if horns are present in the lot;
- $condition_{ij}$ are condition (fleshiness) scores (average flesh is base);
- $muscling_{ij}$ are dummy variables for muscle score (mixed 1&2 is base);
- $frame_{ij}$ are dummy variables for frame size (medium framed is base);
- $fill_{ij}$ are dummy variables for amount of fill (average fill is base);
- $uniform_i$ equals 1 if the lot is not uniform;
- $certification_i$ equals 1 for third-party verification of vaccination and weaning;
- $Brahman_i$ equals 1 if Brahman influence is visible in the lot;
- $natural_i$ equals 1 if the lot is designated as natural;
- $cripple_i$ equals 1 if the lot includes crippled animals;
- $badeye_i$ equals 1 if the lot includes animals with bad eyes;
- $location_{ij}$ is composed of dummy variables for sale location (OKC is base);
- $month_{ij}$ is comprised of dummy variables for the month the sale occurred (October is base); and
- e_i are error terms for each observation.
- Sale lots from certified programs such as OQBN, Integrity Beef and NHTC were also identified by dummy variables.

Note that the *vaxx* variable combines vaccinated cattle and limited vaccinated cattle into one category for estimation. The *gender* variable splits heifers designated as replacement heifers into a separate gender variable. The *horns* variable splits lots with horns present into horned lots (20% or more have horns) and minimal horns (some horns but less than 20% of animals) and *Brahman* splits lots with more than 20% of animals and less than 20% of animals (minimal) with brahman influence.

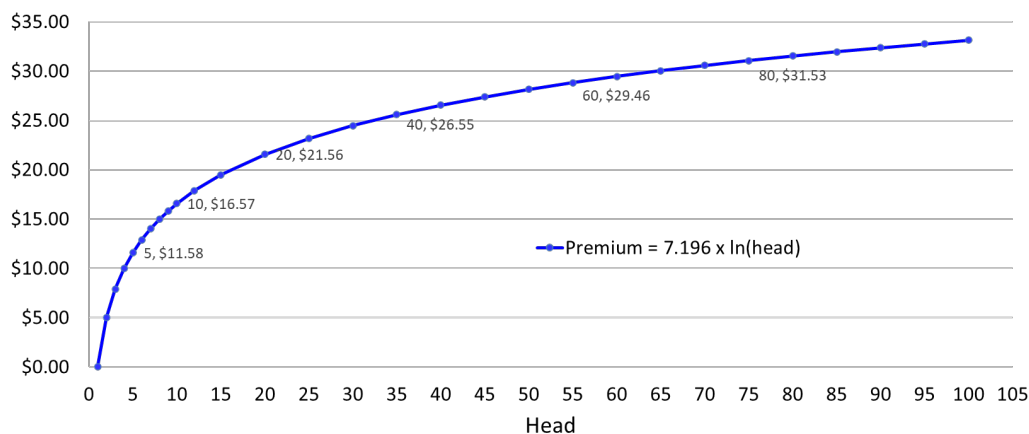
Lot size was modeled as a natural logarithm, and average weight was divided by 100. Basis was calculated using the weekly CME Feeder Cattle Index retrieved from the LMIC. The regression was estimated using the Mixed procedure in STATA 15 with the variance for each sale and each lot being held as a random effect.

Results

Results from the hedonic model analysis are presented in Tables 4, 5, 6, 7, and 8. Coefficient estimates and t-values are provided for each variable and results are interpreted as the impact in \$/cwt. on the price of a lot and are additive across individual effects. Table 4 reports the estimates for general sale characteristics, including lot size and average weight. Figure 1 illustrates market premiums for lot size as depicted in the data set, based on a logarithmic specification. Lot size premiums for feeder cattle are routinely observed to be nonlinear with

larger marginal premiums as lots move from 1 up to 10 head and decreasing marginal premiums thereafter.³

Figure 1. Lot Size Premium
\$/cwt.



Differences in price premiums are quite pronounced for lots less than 10 head. For example, a lot of 5 head has a premium of \$11.58/cwt compared to a single animal lot. For larger lots, the marginal increase in price decreases significantly for additional cattle. For example, a 40 head lot receives an average premium of \$4.99/cwt. compared to a 20 head lot and a lot of 60 animals receives a premium of \$2.91/cwt. over a 40 head lot.

Feeder cattle price per hundredweight (\$/cwt.) decreases as animal weight increases. This price decrease is not linear but decreases at a decreasing rate as weight increases. In fact, heavy weight feeder cattle may show little price decrease as weight increases. This price decrease, frequently referred to as the price slide or price rollback, varies seasonally and with different market conditions, including feed costs (Peel and Riley, 2018). The model estimates show that price decreases on average in a nearly linear fashion by \$14.62/cwt for each one hundred pounds of weight. The quadratic term is small but will slow the decrease in price by weight by 0.416 times weight squared. This quadratic term would offset the linear decrease at a weight well above the feeder cattle weight range.

Value of Animal Characteristics

Table 5 includes model estimates for the value of various animal characteristics. Compared to steers, heifer price is lower by an average of \$18.70/cwt. Bulls/mixed lots are lower in price by \$7.39/cwt. Although producers cannot generally control the production of steers versus heifers (sexed semen being an exception), marketing bulls rather than steers is a management choice. At the average weight of 596 pounds, this analysis indicates that bulls bring an average of \$44.06/head less than steers. Some heifers are specifically identified as replacement heifers in sales. The price of replacement heifers is \$20.09/cwt. less than steers and is a bigger discount than the heifer average. However, a check of the data confirmed that replacement heifers are all

³ The pattern of lot size premiums will depend on the nonlinear functional form utilized in the analysis. Lot size is sometimes estimated as a quadratic function, which implies a peak lot size premium with declining premiums beyond the peak. The logarithmic function is chosen here because it captures the initial increases in premiums faster and is asymptotic, with no maximum value.

among the heaviest heifers by weight and the price reflects the heavier weight (compared to average steer weight). All gender variables are highly significant statistically.

All lots were identified by hide color or breed characteristics if possible. The majority of lots were black-hided (60%) with another 15 percent predominantly black-hided. All of the estimated differences due to hide-color/breed were statistically significant. Compared to black-hided lots, the predominantly black-hided lots had the smallest discount of \$1.93/cwt. (Table 5). Red-hided, white/gray-hided, and mixed high-quality lots all had discounts between \$5–\$6/cwt relative to black-hided lots. Animals with distinctive Hereford markings received a discount of \$9.93/cwt. compared to black-hided animals. Lots identified as dairy or longhorn breeding, mixed low quality or beef-dairy crossbred animals received discounts ranging from \$28.62–\$32.52/cwt. Regardless of hide color, animals exhibiting Brahman breeding were identified and received an additional discount of \$8.94/cwt.—while lots with a few animals showing Brahman breeding (Minimal Brahman) received an additional discount of \$6.17/cwt. compared to cattle exhibiting no Brahman influence. These discounts are in addition to any discount related to the lot's specific hide color or breed notation.

Using lots with mixed #1–#2 muscling as a base, lots that were all #1 muscling received a premium of \$2.91/cwt. In comparison, lots of #2 muscling received a slight discount of \$0.63/cwt.—while lots with #2–#3 muscling were discounted \$6.06/cwt. However, the estimates for #2 and #2–#3 muscling were not statistically different from #1–#2 muscled lots. Lots with #3 muscling received a statistically significant discount of \$24.31/cwt.

Compared to medium-framed animals, lots of large-framed animals received a statistically significant discount of \$2.67/cwt. Mixed medium/large frame and small framed animals received similar discounts of \$1.41–\$1.51/cwt. However, these discounts were not statistically different from the medium-framed animals.

Value of Management Characteristics

Management decisions have a significant impact on the value of feeder cattle. The decision to market feeder cattle as bulls rather than steers was discussed in the previous section (see Table 5). Table 6 presents the value of a variety of other management decisions affecting feeder cattle. Weaned calves (30 days or more) bring a premium of \$4.48/cwt compared to unweaned calves. Vaccinated calves receive a premium of \$1.97/cwt. over unvaccinated calves. Removing horns or using polled genetics increases feeder cattle value over horned cattle. Cattle with horns receive a discount of \$8.47/cwt. compared to no horns. Lots that included only a few horned animals (less than 20%) received a slightly smaller discount of \$6.20/cwt.

Animals marketed with excessive flesh were discounted \$4.02/cwt. compared to animals of average flesh. Animals described as thin flesh received a slight but statistically insignificant premium compared to average fleshed animals. Animals described as full (tanked) received a discount of \$15.15/cwt. compared to animals with average fill. Likewise, animals described as gaunt received a similar discount of \$16.30/cwt. Note that animal fill is sometimes under control of the producer but may also be the result of auction facility management.

Producers may participate in a wide variety of certification programs. In this analysis, sufficient data for three programs permitted evaluation of program certification value independently, including the Oklahoma Quality Beef Network (OQBN), the Integrity Beef program, and Non-Hormone Treated Cattle (NHTC). A small number of other program cattle (usually associated with specific auctions) were included in the data, but numbers were insufficient to analyze individually. The value of OQBN certification was \$4.52/cwt. while the

Integrity Beef certification had a premium of \$10.39/cwt. NHTC had a positive value of \$1.20/cwt., but the estimated parameter is not statistically significant. Note that numbers of NHTC cattle were minimal in the data but the estimated parameter is included here because of the national scope of the program.

Programs such as OQBN and Integrity Beef encompass preconditioning protocols such as weaning and vaccination, along with castration and dehorning. Integrity Beef includes additional requirements for genetics, likely influencing the magnitude of the premium. The total value of these programs is the sum of these management practices and the certification. For example, the value of OQBN would be a total of certification, weaning and vaccination implying that the total value-added for a 550-pound steer would be \$10.97/cwt. ($\$4.52 + \$1.97 + \4.48). This is consistent with observed premiums for OQBN cattle in Oklahoma, where the 5-year average OQBN premium over nonpreconditioned cattle for 5 weight steers was \$12.59/cwt for 2018–2022 (Raper and Peel, 2023). A significant number of cattle were marketed as natural (977 lots with 24,233 head). However, natural definitions vary widely and are not consistent. The estimated parameter on natural cattle is slightly negative at $-\$0.88/\text{cwt}$. but is not statistically different from zero.

Cattle identified visually as obviously unhealthy received discounts of \$38.25/cwt (Table 7). Cattle specifically identified as crippled received a discount of \$49.90/cwt. while cattle with bad eyes were discounted \$20.46/cwt.

Location

Feeder cattle prices at any point time vary considerably in different regions of the country (Highfill and Peel, 2015). The hedonic model used in this analysis included binary variables to account for different sale locations. Table 8 presents the estimated parameters for each sale location compared to the base market at OKC National. The signs and significance of the location variables generally confirm previously identified regional differences in feeder cattle prices. Variables that are statistically insignificant cannot be said to have prices different from OKC National.

Consistent with previous research, the highest average prices and largest premiums to the base market are noted in Nebraska and Wyoming with statistically significant premiums of \$11.07/cwt. for Valentine (Nebraska), \$9.47/cwt. for Ogallala (Nebraska) and \$10.24/cwt. in Torrington (Wyoming). By contrast, Kentucky auctions showed statistically significant discounts to the base market of OKC National. Estimates for the four Kentucky markets are $-\$19.09/\text{cwt}$. for Springfield; $-\$12.75/\text{cwt}$. in Campbellsville; $-\$9.22/\text{cwt}$. in Stanford; and $-\$7.56/\text{cwt}$. for Richmond.

South Dakota auctions showed a mixed set of discounts and premiums, generally not significantly different from the base market. This includes premiums of \$4.01/cwt. in Faith; \$3.62/cwt. in Philip and discounts of $-\$1.80$ for Mitchell and $-\$0.57$ for Pierre. The discount of \$5.16/cwt for Hub City was statistically different from the base market at OKC National.

Within Oklahoma, OKC West (El Reno) has a premium of \$2.05/cwt while Woodward posts a slight premium of \$0.58/cwt. However, neither of these estimates are statistically significant. Prices at McAlester, OK are significantly less than OKC National by \$5.58/cwt. The auction at Salina, KS posted a \$4.02/cwt. premium to the base market that was marginally significant.

Discussion

This study is believed to be the most comprehensive feeder cattle auction study to date for several reasons. First, the study covers a wide range of geographical locations and includes a very large number of observations. The large data set provides additional statistical power to detect and quantify the impact of a wide range of cattle characteristics in the hedonic model. Additionally, the study includes a comprehensive set of sale characteristics to capture buyer knowledge and explain value differences across sale lots. The data set includes a wide range of cattle weights and prices (Table 1) and includes bulls as well as cattle that are crippled or unhealthy and cattle outside the most common range of market weights. While these atypical lots make up a very small percentage of the total data set, they do add richness to the range of values included in the model.

This study quantifies the wide range of feeder cattle values and the management and production factors that influence the price of specific lots of cattle. Consider, for example, the price differences of the following two 500-pound male animals, one black-hided and one Tiger Striped. The results of this study provide the following estimates of value differences between the two animals:

<u>Animal A (base)</u>	<u>Animal B</u>	<u>Discount (\$/cwt.)</u>
500 pounds	500 pounds	
Black	Hereford	-\$9.93
No Brahman	Brahman	-\$8.94
Steer	Bull	-\$7.39
Medium Frame	Large Frame	-\$2.67
#1 Muscle	#2 Muscle	-\$0.63
Weaned	Not Weaned	-\$4.48
Vaccinated	No Vacc.	-\$1.97
Polled	Horns	-\$8.47
	<i>Total</i>	-\$44.48/cwt.

In this example, the total discount for Animal B is \$44.48/cwt. or a total value of \$222.40/head less than Animal A. This, rather extreme example, illustrates the value of this research as the estimates demonstrates how producer management and production choices influence feeder cattle value. In this example, management decisions to wean, vaccinate, castrate and dehorn animal B would add back \$29.70/cwt. or \$148.50/head in value to Animal B. These are dollars left on the table by a producer failing to take advantage of opportunities to add value to calves prior to marketing. There are, of course, costs associated with these practices, but numerous studies have shown the positive return to these value-added practices. The animal breeding impacts in this example reflect longer term production considerations that the producer may or may not be willing/able to change and must be balanced against the production environment and cost of production of the operation. The results of this study helps all producers understand how the production and management choices they make impact the value of the feeder cattle they produce and market.

Summary

This study analyzes factors affecting the value of feeder cattle with what is likely the most comprehensive feeder cattle auction data set available. Information on numerous additional

factors beyond current public market reporting is contained in the data. The analysis provides estimates of the contributions of a variety of sale, animal and management characteristics that contribute to the value of a lot of feeder cattle which are not typically captured in market reports. This research highlights the potential for producers to better understand and enhance the value of feeder cattle through changes in management and marketing. Additionally, the analysis confirms regional differences in feeder cattle value based on geographic location.

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Table 1. General Data Summary

	Total	Average	Range (Min-Max)
Sales	92		
Head	275,335		
Sale Lots	18,038	15.3 head	1 – 453
Weight (lbs.)		596	149 – 1422
Price (\$/cwt.)		\$156.82	\$5.00 - \$308.18
Value of Sales	\$291,710,731.01	Lot: \$16,172 Head: \$919	

Table 2. State Sale Summaries

State (Number of Locations, Sales)	Total Lots	Total Head	Ave. Lot Size (Head)
Kansas (1,1)	230	2,019	8.8
Kentucky (4,7)	1891	8,090	4.3
Nebraska (2,6)	997	20,529	20.6
Missouri (4,11)	2,751	16,948	6.2
Oklahoma (4,31)	5,411	70,957	13.1
South Dakota (5,28)	5,426	136,150	25.6
Wyoming (1,8)	1,332	20,642	15.5

Table 3. Hide Color/Breed*

Color/Breed	Head	% of Total
Black	165,845	60.0
Predominantly Black	41,310	15.0
Red	10,499	3.8
Predominantly Red	11,030	4.0
Hereford	2,658	0.1
White/Gray	17,429	6.3
Dairy/Longhorn	546	0.2
Mixed High Quality	24,131	8.8
Brahman Influence	2,559	0.9
Minimal Brahman Influence	2,765	1.0

*Black/Red includes cattle mostly black/red-hided (includes baldies, etc.); Predominantly Black/Red refers to sale lots of mixed color animals that are predominantly black/red.

Table 4. Model Estimates: General Sale Characteristics

Variable	Estimate	t-value
Log lot size (head)	7.196***	23.03
Avg. weight (cwt.)	-14.62***	-13.46
Avg. weight ² (cwt.)	.416***	4.86

Table 5. Model Estimates: Animal Characteristics

Comparison Base	Variable	Estimate	t-value
Steers			
	Heifers	-18.698***	-38.43
	Bulls	-7.392***	-8.58
	Rep. Heifers	-20.094***	-9.59
Black-hided			
	Black mixed	-1.93***	-3.84
	Red	-5.252***	-6.43
	Red mixed	-2.945***	-4.34
	Hereford	-9.932***	-7.62
	White/Gray	-5.152***	-6.53
	Dairy/Longhorn	-32.521***	-7.03
	Mixed Low Quality	-28.057***	-6.28
	Mixed High Quality	-5.597***	-7.75
	Beef-Dairy Cross	-29.618***	-4.43
	Brahman Influence	-8.935***	-3.86
	Minimal Brahman	-6.165***	-6.38
#1-2 Muscling			
	# 1	2.91**	1.97
	#2	-0.631	-0.61
	#2-3	-6.061	-1.63
	#3	-24.31***	-9.51
Medium Frame			
	Large	-2.669***	-2.58
	Medium/Large	-1.406	-1.49
	Small	-1.514	-0.25

Table 6. Model Results: Management Characteristics

Comparison Base	Variable	Estimate	t-value
Unweaned			
	Weaned	4.475***	6.89
Unvaccinated			
	Vaccinated	1.966***	3.40
No Horns			
	Horns	-8.465***	-5.42
	Minimal Horns	-6.198***	-4.68
Average Flesh			
	Thin	.466	0.30
	Fleshy	-4.024***	-2.94
Average Fill			
	Full	-15.153***	-4.99
	Gaunt	-16.295**	-2.27
Not Certified			
	OQBN	4.524***	2.94
	Integrity Beef	10.39***	6.45
	NHTC	1.204	0.85
Conventional			
	Natural	-.884	-0.91

Table 7. Model Results: Animal Health

Comparison Base	Variable	Estimate	t-value
Healthy			
	Unhealthy	-38.248***	-6.19
	Crippled	-43.903***	-5.95
	Bad Eye	-20.458***	-6.34

Table 8. Model Results: Location Impacts

Comparison Base	State	Sale	Estimate	t-value
OKC National				
	Oklahoma	OKC West	2.045	0.82
		McAlester	-5.581**	-2.47
		Woodward	.581	0.31
	Kansas	Salina	4.016*	1.71
	Kentucky	Springfield	-19.088***	-19.62
		Campbellsville	-12.745***	-5.63
		Stanford	-9.218***	-2.83
		Richmond	-7.562**	-2.30
	Missouri	F&T Livestock	-1.583	-0.56
		Joplin	0.66	0.23
		EMCC	1.371	0.63
		Kingsville	4.546**	2.03
	Nebraska	Ogallala	9.474***	4.15
		Valentine	11.071***	4.66
	South Dakota	Faith	4.012	1.52
		Ft. Pierre	-0.569	-0.24
		Hub City	-5.157**	-2.40
		Mitchell	-1.799	-0.94
		Philip	3.616	1.19
	Wyoming	Torrington	10.236***	5.06