An Analysis of the Influence of Buyer Concentration at Feeder Cattle Auctions

by

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Abstract

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The influence of buyer concentration on feeder cattle prices at two large cash auctions was investigated. Buyer concentration increased slightly for steers weighing over 600 lbs. at one of the auctions between 1987 and 1989 and was estimated to have depressed prices an average of $0.13/cwt. Overall prices at the other auction were depressed by an average of $0.46/cwt. between 1987 and 1989 due to increasing concentration.

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Introduction

Most past research on market structure in the cattle industry has used data aggregated over both time and space (e.g. Quail et al.). Further, little past work of any kind is available on market structure for feeder cattle. Little is known about buyer concentration levels in individual feeder cattle auctions, how concentration has changed over time, and the relationship between concentration and prices in these auctions. Recent consolidations in meat packing and an increase in the number of large feedlots (Purcell) may cause buyers in local markets to become larger and fewer in number.[1] The study of buyer concentration at individual feeder cattle auctions provides much different information than that provided by the more traditional aggregate studies, but is no less important. This study reports the concentration of feeder cattle buyers participating in two large cash auctions between 1987-89 inclusive and also examines the influence of buyer concentration on prices at the two auctions.

Some producers selling cattle at local auction markets have long suspected that high concentration among local buyers has contributed to market power. If concentration is a concern in large cash markets for feeder cattle, then it is likely a concern in smaller markets. Auction operators need to know if concentration levels have changed over time since, if a problem exists because of concentration levels, they may be able to take actions to reduce buyer concentration.[2]

Other studies have tested the influence on price of the number of buyers bidding for agricultural commodities in auctions (Sporleder and Colling; Meyer). However, none of these studies has analyzed the impact on price of the relative concentration of buyers participating at auctions. Buyer concentration in feeder cattle auctions has received little attention because of a lack of reliable data. The data sets used here are two of the few available that provide accurate information about buyer concentration in feeder cattle auctions, not only in a traditional feeder cattle auction, but also in a video auction using anonymous bidding.

The goals of this research are to determine levels of buyer concentration in two large feeder cattle auctions, to determine if the level of concentration in these two auctions changed significantly during the study period, and to estimate the impact of buyer concentration on price in feeder cattle auctions.

The two auctions selected for this analysis represented the largest traditional regional auction in the United States (Oklahoma City National Stockyards)[3] and the largest satellite video auction (Superior Livestock Auction in Brush, Colorado). Reporting concentration in two different types of auctions added another dimension to the analysis since the number of buyers, areas served, and bidding methods for the two auctions were different.

Auction Theory and the Structure of Feeder Cattle Markets

The economics literature contains numerous studies dealing with the theoretical underpinnings of the design and operation of auctions. Much of this work has compared the theoretical expected revenues for different types of auctions, such as English, Dutch, first-price, and second-price auctions (McFee and McMillan; Milgrom and Weber). While

auctions are a major pricing method for a large number of different items (e.g., U. S. Treasury bills, paintings, mineral rights, and livestock) relatively few empirical studies of buyer and seller behavior at auctions have been completed compared to theoretical ones (McFee and McMillan).

Much of the auction literature assumes an "independent private values model" or, that all bidders in an auction know the value of the object being auctioned to them but are unaware of the value of the item to the other bidders. Bidders are also assumed to behave competitively (Milgrom and Weber).

The entrance of additional competitors in a market is expected to increase the level of competition and, subsequently, increase prices offered by buyers (Smith). Theoretical bidding models suggest auction prices are directly related to the number of bidders participating (Gilley and Karels; Kuhlman and Johnson).

Many of the empirical auction studies that have been completed, including studies dealing with agricultural commodities, suggest prices do increase as the number of buyers participating in an auction increases (e.g., Meyer; Kuhlman and Johnson).[4] However, none of these studies determined if the level of competition decreases as buyer concentration increases in an auction. In other words, prices may be affected not only by how many buyers are bidding but also by which buyers are bidding and the relative volumes they are purchasing. This is consistent with Meyer's results which found that individual rice mills reacted differently (paid different premiums for rice) as the number of bidders in a rice auction increased.

There is reason to suspect that buyers have become fewer and larger in local and regional feeder cattle markets during the past few years. The number of feedlots with over

1,000 head capacity in the 13 major feeding states defined by USDA has declined by almost 20 percent since 1981, while feedlots in the same 13 states with over 32,000 head capacities have increased by about 8 percent during the same time period. As the number of feedlots decreases, the number of potential buyers of feeder cattle may also decrease.[5] Studies have been completed analyzing the impact of increasing buyer concentration on prices and efficiency in slaughter cattle markets (e.g., Ward 1982). However, this is the first study that examines the influence of buyer concentration on prices in local or regional feeder cattle auctions.

Methods

Measure of Market Concentration

Buyer concentration in a particular auction can be measured by several methods. Two methods to measure buyer concentration in feeder cattle auctions are reported in this study. The first method, the four-firm concentration ratio (CR_4), is a partial index of concentration that indicates the market share for the four largest firms (Koch). The CR_4 is one of the most commonly used measures of concentration (Marion et al.; and Ward 1990). The CR_4 requires only knowledge of the size of the total market and the market shares of the four largest firms and not market shares for all firms participating in the market.

The CR_4 is the most popular method for measuring concentration due to the limited information needed to calculate the measure and because some information is available to interpret the level of market power based on the CR_4. For example, studies with aggregate data suggest buyer market power exists when the CR_4 lies between 40 percent and 65 percent (e.g., Bain; Rhoades; Scherer). The CR_4 measures are included for ease of

comparison to past studies. However, the information in this study allows calculation of a more accurate measure of concentration.

A summary index, the Herfindahl Index (HI),[6] is also reported for buyer concentration in these two auctions that measures the relative concentration of all firms in a market rather than only a portion of them (Koch, pg. 177). The HI is

$$(1) \qquad HI = \sum_{i=1}^{N} (MS_i^2)$$

where N is the total number of firms in the market, and MS_i is the market share of the i^{th} firm. The Herfindahl Index gives a measure of the dispersion and size of firms in a market, and its value ranges between zero (atomistic competition) and one (monopsony).

Measures of buyer concentration (CR_4 and HI) were calculated for the video auction for each sale for four categories: steers and heifers weighing 600 lbs. or less and steers and heifers weighing more than 600 lbs. Aggregate measures were calculated for the traditional auction by month since sex and weight information were not available for each sale for steers and heifers. These categories (weight and sex) were natural breaks since most cattle weighing over 600 lbs. that are purchased at auctions go directly to feedlots (USDA; AMS; Dodge City). Separate concentration measures for steers and heifers were calculated since the demand for heifers is more elastic than steers (Schroeder et al.) and the market for heifers is thinner than for steers.

Price Model and Test for the Influence of Buyer Concentration on Prices

While market power can be tested at the industry level, the impact of concentration on prices for individual lots of cattle in specific markets, such as auctions, is more specific

information. For example, the impact of buyer concentration may vary according to weight and sex categories of the cattle since buyers in each category may differ.

Tests for oligopsonistic pricing in fed cattle markets have been performed at the industry level (e.g., Schroeter) and for individual market locations and areas (e.g., Menkhaus et al.; Ward 1982). However, little research is available for testing effects of high buyer concentration on prices in feeder cattle markets.

Estimating the influence of buyer concentration on prices for individual cattle lots also helps remove the effects of variations in quality characteristics such as breeds, frame size, flesh condition, etc. That is, particular cattle types or characteristics such as light flesh may dominate an auction during a drought. The following discussion presents a model to account for the impact of quality characteristics and buyer concentration on price.

Prices for individual lots of feeder cattle are a function of lot characteristics and market conditions (Schroeder et al.; Faminow and Gum; and others). A simple hedonic model for feeder cattle could be written as

$$(2) \qquad P_i = a + \sum_{k=1}^{K} b_k LC_{ik} + \sum_{j=1}^{J} c_j MC_{ij} + e_i$$

where P_i is the price paid for the i^{th} lot of cattle for $i = 1, 2, 3, \ldots, I$, where I is the number of lots sold in a particular market; LC_{ik} is the k^{th} lot characteristic; MC_{ij} is the j^{th} market condition; e is the error term; and a is the intercept, while the b's and c's are parameters.

Since this is one of the rare instances when the volume of all buyers is known, the HI was used in the regression analysis to test the impact of buyer concentration on price, and the Herfindahl Index, which measures the dispersion among the volumes of all buyers, may be the most appropriate measure of concentration.

Adding the concentration measures to the model specified by equation (2), the model becomes

$$(3) \qquad P_i = a + \sum_{k=1}^{K} b_k LC_{ik} + \sum_{j=1}^{J} c_j MC_{ij} + d_i HI_i + e_i$$

where HI is the appropriate Herfindahl Index for the sex and weight category for lot i, and "d" is the parameter estimate.

Table 1 presents the independent variables used to estimate the parameters of equation (3). The parameter estimates were calculated using ordinary least squares (OLS), and the estimate for "d" is used to determine if buyer market power exists in the two feeder cattle auctions. Equation (3) was estimated using each of the four weight and sex categories as well as using the pooled data.

Data

Superior Livestock Auction (SLA) of Brush, Colorado provided price and buyer information for cattle sold between January 1987 and December 1989. SLA held 14 video sales during each of the three years, 1987, 1988, and 1989. Sales were usually held once per month except during the fall when more than one auction per month often took place. Buyer and price information were available for all SLA sales except the sale held December 9, 1989. This sale was excluded because the buyer information was for delivered lots and a significant number of deliveries for that sale had not occurred when these data were obtained.

Lot characteristics were obtained from SLA's sales catalogues for the same time period. Mileage was calculated between the location of the cattle at the time of SLA's sale and the destination specified by the buyer after sale to account for price differentials due

to buyer transportation costs since all cattle sold through SLA are delivered FOB at the ranch or a nearby scale. Average distances for lots shipped from each state were calculated and used for lots shipped from a particular state but for which the destination was unknown.

SLA also provided information regarding the types of buyers participating at their auctions during the 1987-89 period. Buyers were identified by type and, in the case of feedlots, by size. Buyer categories included small feedlots (fewer than 3,000 head capacity), medium-sized feedlots (between 3,000 and 10,000 head capacity), large feedlots (over 10,000 head capacity), order buyers, ranchers, farmers, wheat farmers who run cattle, investors with cattle interests, and stocker operators. A category identified as "unknown" was used for buyers which could not be identified by buyer type by SLA personnel.

Data obtained from the OKC feeder cattle auction included the total volume for buyers in a given month, between January 1988 and July 1989 inclusive. The OKC data included all lots of cattle sold at the auction during that time period. Buyers were only identified by rank order of volume for a given month and no buyer type was provided. Since limited information was available from OKC, the regression analysis specified in equation (3) used only the market condition measures (future prices and seasonality) and the HI as independent variables. Average monthly prices at OKC were weighted by the volume of steers and heifers sold during each week of the month as reported by USDA (USDA; AMS). Futures prices for the OKC price model were the simple average of all futures price quotes for the nearby contract for the corresponding month.

Concentration measures were calculated by month for the OKC data and by sale for the SLA data. Annual average concentration levels were calculated for each market. Since only seven months of data were available from OKC for 1989, an average for the first seven

months of each year is calculated to examine trends at OKC and to facilitate comparisons for more than one year with the SLA.

Results

Seasonality in Concentration

Concentration is seasonal at both auctions. Concentration levels are large in the first six months of the year (between 50%-65% at OKC and 40%-55% at SLA). This phenomenon mirrors the seasonality of cattle placed on feed during the study period (USDA; NASS). With fewer and larger feedlots buying feeder cattle this implies that large buyers (feedlots) and order buyers purchase larger volumes during the first half of the year. Placements are usually lowest during August-October (sales 8-12 for SLA) indicating less participation by feedlots in the market during that part of the year and, subsequently, lower concentration levels.

Oklahoma City had its highest volume during the springs of 1988 and 1989, while SLA's volume was highest in the fall (September and October). Consequently, SLA sells proportionately more calves than OKC (i.e., under 600 lbs.), which may help to explain SLA's slightly smaller concentration measures since the SLA probably is not as dominated by feedlot buyers. Some of the lowest sales volumes at SLA were for their November auction (sale 13). This is also when SLA's concentration measures were highest. This may indicate that a relatively small number of buyers are participating in these sales when volume is small, which increases concentration.

Concentration by Year

Table 2 reports the average values for the overall CR_4's and HI's and also by weight and sex at OKC and SLA. The annual CR_4's at both auctions show only a slight increase

in concentration for steers and heifers during the three-year period. However, some upward trend in concentration during the first seven months of each year did occur. The CR_4 for steers and heifers combined was about 1.3 percent higher at SLA in 1987 than in 1989 for the 12-month average but were about 5.6 percent higher during the first seven months of 1989 than the first seven months of 1987.

The CR_4's for OKC were larger than SLA's in all cases. But, the figures in Table 2 can only be compared between markets with caution. The CR_4 for OKC was about 4 percent larger for the first seven months of 1989 than the corresponding period in 1988. These concentration levels are high enough that market power is a concern, but they are still lower than for beef processing. As expected, buyer concentration is much higher by weight and sex than for all steers and heifers as a whole.

While overall concentration at the SLA increased slightly between 1987 and 1989, concentration by weight and weight and sex has decreased (Table 2). This implies that large buyers were purchasing a wider range of cattle types (sex and/or weight types) in 1989 than in 1987.

The Herfindahl Index reflects the growth in market share between 1987 and 1989 for the four largest firms but also suggests that all firms have become relatively larger and/or fewer on the average than in the past. This is likely due to some consolidation in feedlot numbers. The HI's by sex and weight follow similar patterns to the CR_4's.

Market Shares by Buyer Type

Table 3 presents the market shares for different buyer types at the SLA for 1987-89. Large and medium feedlots and order buyers account for more than 70 percent of purchases at the video auction. However, order buyers have increased their purchases of video auction

cattle while large feedlots decreased their volume of purchases in both absolute and relative terms between 1987 and 1989. This indicates large feedlots are either purchasing more cattle through order buyers at the SLA or are seeking other sources of supply. Bailey et al. found that net prices paid at video auctions are higher than those received at regional auctions. Feedlots may perceive video auctions as relatively high priced markets and use alternative markets.

Small buyers are participating at the video auction in significant numbers. These small buyers are usually identified as of "unknown" type (Table 3). The number of buyers purchasing steers and heifers at the SLA increased dramatically (about 46 percent) between 1987 and 1989. However, buyer concentration still increased, indicating large buyers still dominate the auction even though more small buyers are participating.

Regression Results

Table 4 presents the OLS parameter estimates for the hedonic price model measuring the impact of buyer concentration on feeder cattle prices at the SLA (equation (3). The parameter estimates and signs for the lot and market characteristics are similar to the results of past studies using hedonic price models of feeder cattle prices (e.g., Buccola; Faminow and Gum; Schroeder et al.; Schultz and Marsh). The similarity of the regression results with other estimates for traditional livestock markets (e.g., Schroeder et al.) suggests that pricing at the video auction is quite comparable with pricing at other markets such as OKC. This coincides with the work of Bailey and Peterson who found little difference in hedonic pricing between video cattle auctions and traditional markets.

The test for the impact of market structure on feeder cattle prices at the SLA reveals little impact on overall prices as buyer concentration increases (HI in Table 4). However,

the impact of buyer concentration on steers weighing over 600 lbs. and heifers weighing 600 lbs. or less is significant.

The market for light heifers is occasionally very thin. As few as three buyers purchased heifers weighing 600 lbs. or less at one of the SLA auctions during the study period. Buyer concentrations for light heifers can be extremely high during low volume periods such as early summer. These occasions likely contribute to the result that increasing buyer concentration does depress light heifer prices.

Of more concern is the result that prices for steers weighing over 600 lbs. are negatively affected by buyer concentration. Concentration levels are higher for heavy steers than light steers and purchases of heavy steers are dominated by feedlots and order buyers (Table 2). While the CR_4's for heavy steers decreased on an annual basis between 1987 and 1989 and have increased only slightly for the first seven months of the year between 1987 and 1989, the seven-month HI reveals a steady increase in the size of firms participating at the SLA during the three-year period. This increase in concentration, from .125 in 1987 to .162 in 1989, has had only a small affect on prices, however, since prices have only been depressed an average of about \$0.13/cwt. ((.162 - .125) x (-3.544)) for heavy steers for the first seven months of 1989 relative to 1987. This would indicate that sellers selling 700 lb. steers at the SLA during the first seven months of 1989 received about \$0.92/head less than in the first seven months of 1987 due to increasing buyer concentration.

These results suggest buyer concentration at the SLA has greatest influence on prices for cattle going into feedlots. However, the influence of buyer concentration, while significantly negative, has had only a marginal impact on seller revenues.

Table 5 presents the parameter estimates for the model testing the influence of buyer concentration on monthly prices at the OKC feeder cattle market. The parameter estimate for buyer concentration in the OKC market (HI in Table 5) suggests that increasing buyer concentration does not significantly depress prices in that market. When the model was estimated using the CR_4's for OKC, buyer concentration did have a significant negative impact on feeder cattle prices (CR_4 in Table 5). For example, the increase in concentration during the first seven months of the year between 1988 and 1989 is estimated to have decreased prices an average of \$0.46/cwt. ((63.6% - 59.9%) x (-0.123)). This is a much larger impact on price from increased concentration than observed at the SLA. This might be expected, however, since buyers at OKC are bidding more directly against each other than at SLA and are also not bidding anonymously. Also, since the data are so highly aggregated much of the variation in prices for individual lots is removed. As a result, a definitive conclusion regarding the relative impact of buyer concentration at the OKC and SLA markets cannot be reached. These results do suggest that the effects of buyer concentration are not equal across markets since the concentration elasticities may be different. Consequently, the type of market, buyers, and cattle may all influence the impact of buyer concentration on prices.

Summary and Conclusions

Buyer concentration in feeder cattle auctions is high but is still lower than aggregate concentration measures in meatpacking. For example, the market shares of the four largest buyers at OKC and SLA during the first seven months of 1989 (including all cattle types) were 63.6 percent and 49 percent, respectively, while the CR_4 for meatpacking in 1989 was

over 70 percent for steers and heifers. Feeder cattle auctions have become only slightly more concentrated since 1987. However, buyers have become larger, on the average, as indicated by the Herfindahl Index. Buyer concentration is seasonal and appears to reflect the relative level of placements in feedlots.

There is no strong evidence to suggest that increasing buyer concentration has had a general large depressing influence on feeder cattle prices. Buyer concentration did not have a significant impact on overall prices at the SLA. But, increasing concentration did have a small negative impact on prices for categories defined by sex and weight. For example, the increasing buyer concentration from 1987 to 1989 reduced revenues for steers weighing over 600 lbs. by only about $0.13/cwt. Thinner markets, such as light heifers, have also had slightly depressed prices as a result of buyer concentration. Concentration appears to have a larger impact on prices at the traditional auction where bidding is not anonymous. However, more complete information on cattle weights, sex, and quality would need to be made available by OKC before a definite conclusion could be made about the relative impact of concentration at the two different types of markets.

These results imply increasing concentration is not a grave concern in the two largest cash feeder cattle auctions in the country. Some price depressing effect is occurring, but it appears to be small, especially in the case of the SLA. Concentration may be of more concern in smaller markets or for direct sales. However, if further consolidation is experienced in the aggregate cattle feeding and meatpacking industries, concentration in individual auctions or other markets will likely continue to increase. Currently no method for gathering concentration information for individual or aggregate feeder cattle markets exists. Some monitoring of concentration in individual feeder cattle markets, such as

auctions, would provide buyers, sellers, and researchers with valuable information about the impact of specific groups of buyers and buyer market shares on relative prices. This type of information will improve market efficiency, if inefficiencies exist, between auctions or other individual markets as a result of buyer concentration.

Endnote

1. The four-firm concentration ratio for steer and heifer slaughter increased from 46.6 percent to approximately 70 percent between 1983 and 1988 (USDA, P & SA).

2. For example, Graham and Marshall suggest that the affect of cartel pricing by buyers in an English auction can be reduced by establishing reservation prices that are a function of the number of cartel members.

3. A division occurred at the Oklahoma National Stockyards Company in April of 1989 and a competing auction was established in Oklahoma City. This may influence the future level of concentration at this market.

4. However, Smith also suggests that buyers, in some instances, may bid less aggressively if the "magnitude of the highest competing bid and the value of the contested item" are uncertain (pg. 385) since substantial risk exists that the winning bidder may overestimate the true value of the object. This phenomenon is also referred to as the "winner's curse."

5. While this may not be true if more buyers custom feed than before, the existence of fewer and larger feedlots does lead one to suspect that concentration has increased.

6. The Herfindahl Index is also referred to as the Hirschman-Herfindahl Index in some of the literature but, is referred to simply as the Herfindahl Index in this study for simplicity.

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Table 1. Independent Variables Used in Video Auction Feeder Cattle Price Model[a]

Independent Variables	
Lot Characteristics	
Sex:	steers*
	heifers
Number in lot (Number)	
Average estimated weight in lbs. (Weight)	
Number-squared (HDSQ)	
Weight-squared (WSQ)	
Truckloads:	At least 40,000 lbs. (Truck)
	Fewer than 40,000 lbs.*
Sorting:	Lots unmixed by sex (Unmixed)
	Lots mixed by sex*
Weight Risk (WRISK)[b]	
Miles to delivery point designated by buyer (Miles)	
Breed:	Hereford*
	English-Cross
	English-Exotic-Cross
	Exotic-Cross
	Angus
	Dairy
Flesh:	Medium heavy
	Medium
	Medium light
	Light*
Frame:	Large
	Medium-large
	Medium
	Small*
Horns:	No horns
	Some horns
	Horned*
Location at time of sale:	
	Western States (West)[c]
	South[d]
	Midwest*[e]
	Upper Midwest (Upper)[f]
	West Coast (WCoast)[g]
	Lower Southwest (LSW)[h]
Market Characteristics	
Futures price (Futures)	
Seasonality:	1st quarter
	2nd quarter*
	3rd quarter
	4th quarter
Days to delivery (Date)	
Market Structure	
HI	
Year Dummies:	1987*
	1988
	1989

*Base for a set of binary variables such as sex, breed, etc.

[a]See equation (3).

[b]The ratio of an acceptable variance in weight above the estimated delivery weight (no discount) and the price slide in cents specified by the seller.

[c]Montana, Wyoming, Idaho, Utah, and Nevada.

[d]Mississippi, Florida, Louisiana, Alabama, Arkansas, North Carolina, Georgia, Tennessee, and Kentucky.

[e]Nebraska, Kansas, Colorado, Missouri, Illinois, and Iowa.

[f]South Dakota, North Dakota, and Wisconsin.

[g]California, Arizona, Oregon, and Washington.

[h]Texas, Oklahoma, and New Mexico.

Table 2. Average Four-Firm Concentration Ratios and Herfindahl Indices, 1987-89

Location/Unit	Measure of Concentration					
	CR_4 (%)			HI		
	1987	1988	1989	1987	1988	1989
	12-Month Averages					
SLA:						
Steers and heifers	43.6	43.3	44.9	0.075	0.070	0.096
Steers 600 lbs. & under	66.1	52.7	58.7	0.158	0.102	0.137
Steers over 600 lbs.	65.1	64.6	60.7	0.158	0.147	0.139
Heifers 600 lbs. and under	62.2	54.2	63.1	0.203	0.116	0.181
Heifers over 600 lbs.	71.3	73.1	68.1	0.189	0.194	0.175
OKC:						
All lots[a]	N/A[b]	56.2	N/A	N/A	0.100	N/A
	7-Month Averages[c]					
SLA:						
Steers and heifers	44.7	46.6	50.3	0.074	0.078	0.112
Steers 600 lbs. and under	74.7	58.2	69.5	0.194	0.117	0.193
Steers over 600 lbs.	59.0	63.1	61.7	0.125	0.141	0.162
Heifers 600 lbs. and under	70.1	60.3	73.7	0.290	0.135	0.243
Heifers over 600 lbs.	60.1	72.1	71.6	0.151	0.171	0.192
OKC:						
All lots	N/A	59.9	63.6	N/A	0.115	0.113

[a]1988 was the only year when 12 months of information was available for OKC.

[b]Not applicable.

[c]Information for the first seven months of 1988 and 1989 was available for OKC. The averages for the first seven months are consequently calculated for both auctions to give more information for comparisons.

Table 3. Percentage of Steers and Heifers Purchased by Different Buyer Types at the SLA, 1987-89

Buyer Type	Year								
	1987			1988			1989		
	% of All Purchases (%)	Average Lot Size Purchased (Head)	Average Weight Per Head (lbs.)	% of All Purchases (%)	Average Lot Size Purchased (Head)	Average Weight Per Head (lbs.)	% of All Purchases (%)	Average Lot Size Purchased (Head)	Average Weight Per Head (lbs.)
Large feedlots	33.7	202	657	24.2	173	634	16.4	184	656
Order buyers	37.7	166	620	49.2	181	610	49.5	183	599
Medium feedlots	4.5	201	553	5.2	153	541	5.6	228	551
Farmer feeder (small feedlots)	9.6	137	614	6.4	164	590	6.2	195	603
Ranchers	3.4	180	556	4.5	159	566	7.8	157	553
Wheat farmers	0.9	135	580	0.7	174	505	0.7	140	509
Investors	0	0	0	2.3	295	460	0.5	266	461
Stocker operations	0.6	154	558	2.0	301	460	1.2	373	453
Unknown	9.6	126	525	5.5	163	508	12.0	177	534

Table 4. OLS Parameter Estimate for Feeder Cattle Price Model Measuring the Impact of Market Concentration.[a]

Independent Variable	Model: Overall	Steers Under 600 lbs.	Steers 600 lbs. and Over	Heifers Under 600 lbs.	Heifers 600 lbs. and Over
Intercept	56.747 (31.585)**	74.532 (16.187)**	49.563 (12.298)**	64.489 (11.630)**	-1.398 (-0.169)
Futures price	0.984 (51.506)**	1.218 (32.869)**	0.763 (31.014)**	1.102 (25.403)**	0.848 (25.510)**
Steers	7.265 (73.727)**	N/A	N/A	N/A	N/A
Number	0.003 (5.573)**	0.004 (4.265)**	0.002 (3.087)**	0.019 (2.808)**	-0.002 (-0.902)
Weight	-0.146 (-51.603)**	-0.241 (-16.541)**	-0.059 (-6.912)**	-0.228 (-12.242)**	0.035 (1.733)
HDSQ	-0.000 (-2.310)*	-0.000 (-3.309)**	-0.000 (-1.870)	-0.000 (-1.097)	0.000 (0.958)
WSQ	0.000 (33.028)**	0.000 (10.231)**	0.000 (3.189)**	0.000 (8.603)**	-0.000 (2.494)*
BREED:					
English-Cross	-0.272 (-0.833)	1.267 (2.481)*	-0.592 (-1.463)	-2.124 (-2.850)**	-0.552 (-0.879)
English-Exotic Cross	0.015 (0.047)	1.609 (3.254)**	-0.641 (-1.595)	-1.429 (-1.955)	-0.669 (-1.077)
Exotic-Cross	-0.081 (-0.232)	1.527 (2.758)**	-1.186 (-2.730)**	-0.986 (-1.243)	-0.241 (-0.361)
Angus	1.101 (1.601)	2.408 (2.304)*	1.041 (1.278)	-0.963 (-0.637)	2.217 (1.080)
Dairy	-8.802 (-17.005)**	-8.981 (-10.410)**	-10.325 (-19.545)**	N/A	N/A
FLESH:					
Medium-Heavy	-0.320 (-0.871)	-1.970 (-3.163)**	-1.561 (-3.398)**	-0.173 (-0.209)	-0.108 (-0.092)
Medium	0.082 (0.246)	-1.195 (-2.397)*	-1.368 (-3.129)**	0.994 (1.449)	0.733 (0.629)

Table 4. (Continued)

Independent Variable	Model				
	Overall	Steers Under 600 lbs.	Steers 600 lbs. and Over	Heifers Under 600 lbs.	Heifers 600 lbs. and Over
Light-Medium	-0.267 (-0.743)	-1.048 (-1.965)*	-1.749 (-3.569)**	0.596 (0.829)	0.302 (0.248)
FRAME:					
Large	4.005 (5.281)**	2.701 (2.138)*	1.485 (1.023)	4.645 (3.725)**	1.049 (0.632)
Medium-Large	3.313 (4.382)**	2.121 (1.686)*	0.881 (0.607)	4.146 (3.353)**	0.589 (0.354)
Medium	0.161 (1.195)	-1.603 (-1.118)	-0.852 (-0.559)	-0.348 (-0.252)	-0.434 (-0.251)
HORNS:					
No Horns	1.563 (4.248)**	1.688 (3.263)**	0.292 (0.419)	1.863 (2.846)**	2.977 (1.510)
Some Horns	1.319 (3.560)**	1.057 (2.036)*	0.216 (0.306)	1.652 (2.521)*	2.810 (1.423)
SEASONALITY:					
1st Quarter	-0.685 (-4.148)**	-0.364 (-0.950)	0.398 (0.266)	-1.799 (-4.048)**	0.076 (0.299)
3rd Quarter	-0.045 (-0.239)	-0.914 (-2.410)	1.001 (4.305)**	-1.408 (-3.173)**	-0.335 (-1.004)
4th Quarter	-2.687 (-13.463)**	-4.378 (-10.845)**	0.354 (1.305)	-4.685 (-9.896)**	-0.388 (-0.950)
LOCATION:					
West	-0.358 (-2.480)**	-1.170 (-5.185)**	-0.249 (-1.066)	-0.394 (-1.373)	-0.960 (-2.810)**
South	-6.252 (-28.698)**	-8.208 (-22.481)**	-1.981 (-5.448)**	-7.139 (-16.496)**	-2.566 (-5.569)**
Upper	0.804 (2.323)*	0.132 (0.253)	2.696 (4.082)**	-0.057 (-0.094)	1.541 (1.787)
W. Coast	-3.649 (-5.366)**	-5.117 (-11.618)**	-2.605 (-7.459)**	-4.328 (-7.902)**	-2.300 (-5.001)**

Table 4. (Continued)

Independent Variable	Overall	Model: Steers Under 600 lbs.	Model: Steers 600 lbs. and Over	Model: Heifers Under 600 lbs.	Model: Heifers 600 lbs. and Over
OTHER LOT CHARACTERISTICS:					
LSW	-2.494 (-19.109)**	-3.884 (-15.516)**	-0.560 (-3.683)**	-4.020 (-12.845)**	-1.014 (-4.940)**
Truck	0.079 (0.420)	0.178 (0.583)	-0.091 (-0.213)	0.390 (1.194)	-1.420 (-3.021)**
Unmixed	1.254 (8.848)**	1.191 (5.276)**	0.354 (1.305)	0.171 (0.632)	1.449 (3.156)**
Date	0.018 (12.366)**	0.021 (7.138)**	0.006 (3.313)**	0.020 (5.914)**	0.004 (1.747)*
Wrisk	-0.090 (-3.159)**	-0.288 (-4.102)**	-0.036 (-4.114)**	-0.379 (-5.050)**	-0.240 (-4.540)**
Miles	-0.000 (-4.659)**	-0.001 (-2.995)**	-0.002 (-6.304)**	-0.000 (-1.066)	-0.001 (-4.081)*
MARKET STRUCTURE:					
HI	-1.424 (-1.873)	-2.170 (-2.170)	-3.540 (-2.674)**	-3.778 (-2.725)**	0.421 (0.306)
D88	0.539 (3.006)**	0.327 (1.037)	1.802 (6.472)**	0.724 (1.929)	-0.755 (-2.048)*
D89	0.425 (1.845)	0.219 (0.589)	2.666 (6.757)**	0.365 (0.757)	-1.204 (-2.355)*
R-Square	0.888	0.836	0.862	0.778	0.766
Observations	7076	2205	1860	1868	1143
RMSE	3.851	3.682	2.436	4.143	2.737
Model F	1604.036**	325.843**	335.789**	195.153**	110.157**

*Denotes statistically different than zero at the 5% level.

**Denotes statistically different than zero at the 1% level.

[a]t-values are in parentheses.

Table 5. OLS Parameter Estimates for Average Monthly Price Model Testing the Influence of Buyer Concentration at OKC, January 1988 - July 1989.[a]

Independent Variable	Parameter Estimates Model Using HI	Model Using CR_4
Intercept	9.388 (1.092)	15.177 (1.923)
FUTURES	0.899 (8.098)**	0.881 (9.174)**
HI	-24.630 (-1.603)	N/A
CR_4	N/A	-12.267 (-2.714)*
Seasonality:		
1st Quarter	1.405 (1.958)	1.826 (2.777)*
3rd Quarter	1.254 (1.772)	0.961 (1.532)
4th Quarter	2.838 (3.174)**	2.481 (3.135)**
R-Square	0.942	.955
Observations	19	19
Model F	41.858**	55.557

*Denotes statistically different than zero at the 5% level.
**Denotes statistically different than zero at the 1% level.
[a]t-values are in parentheses.