AN ANALYSIS OF FEEDER CATTLE PRICING DETERMINATES AT KANSAS AND NEBRASKA AUCTIONS

by

PHILIP RAY HUSTON

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Approved by:

John W McCoy
Major Professor

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CHAPTER I

INTRODUCTION

For many years the major emphasis in the beef cattle industry was on improvement in production in quality and quantity. It has only been in recent decades that the search for optimum marketing techniques for livestock has shared the spotlight with improved production practices. This trend of further analysis of marketing alternatives and their importance to livestock producers has cast considerable light on the importance of the livestock auction and its place in the marketing structure.

A 1971 survey of cow herd owners, feeder cattle growers and feedlot operations revealed that price discrepancies occurred both within local markets and between markets.[1] As a follow-up of this survey a study was designed to investigate factors which affect feeder cattle prices. This study along with the survey, and other aspects comprise a North Central regional research project under the joint cooperation of Kansas and Nebraska, i.e. North Central Regional Project 106. The objective of the feeder cattle price analysis is to investigate these reported inconsistencies. This was achieved by examining specific variables to determine their effect on the final selling price of cattle sold through selected Kansas and Nebraska auctions.

Six auctions, three in Kansas and three in Nebraska, were selected because of their geographical distribution and volume of livestock handled (Figure 1). The Nebraska auctions and locations were: Alliance, western Nebraska; Lexington, south-central Nebraska; and Norfolk, eastern Nebraska. Kansas auctions included: Dodge City, south-western Kansas; Salina,

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[1]J. H. McCoy, J. W. Koudele, et al., "Feeder Cattle Pricing at Kansas and Nebraska Auctions," Manuscript under review for North Central Regional Publication.

central Kansas; and Emporia, eastern Kansas. The Alliance auction was the smallest of the six considered, selling 75,516 head of cattle in 1973 (Table 1).[2] Dodge City was the largest, selling 368,222 head from the period July 1, 1972, to June 30, 1973.[3]

Table 1. Volume of Cattle Handled by the Kansas and Nebraska Auctions Included in this Study.

Auction	Time Period	Volume
Alliance	1/1/73-12/30/73	75,516
Lexington	1/1/73-12/30/73	205,854
Norfolk	1/1/73-12/30/73	142,322
Dodge City	7/1/72-6/30/73	368,220
Salina	7/1/72-6/30/73	147,236
Emporia	7/1/72-6/30/73	120,569

Data were collected from these weekly auctions for a period of three weeks during late November and early December of 1972 by Kansas State University Cooperative Extension Service Specialists who recorded each group of feeder cattle that were sold. This data was then key-punched and analyzed using N-way analysis of variance.

The desire for a longer time series study to compare with the findings generated from the 1972 data resulted in the collection of data from the Salina auction for a period of eight weeks beginning March 21, 1974. This data was also analyzed using N-way analysis of variance.

In 1972, about 67 percent of all farm cash receipts in Kansas and approximately 71 percent in Nebraska came from the livestock sector.[4]

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[2]State of Nebraska, Department of Agriculture, "Total Livestock Sold and Fees Collected-1973," undated publication of the office of the Nebraska State Veterinarian.

[3]"Annual Report of Public Livestock Markets in Kansas, July 1, 1972 to June 30, 1973," undated publication of the office of the Kansas Livestock Commissioner.

[4]United States Department of Agriculture, Agricultural Statistics 1973 (United States Government Printing Office, Washington, D.C., 1973), p. 469.

THIS BOOK CONTAINS NUMEROUS PAGES WITH DIAGRAMS THAT ARE CROOKED COMPARED TO THE REST OF THE INFORMATION ON THE PAGE.

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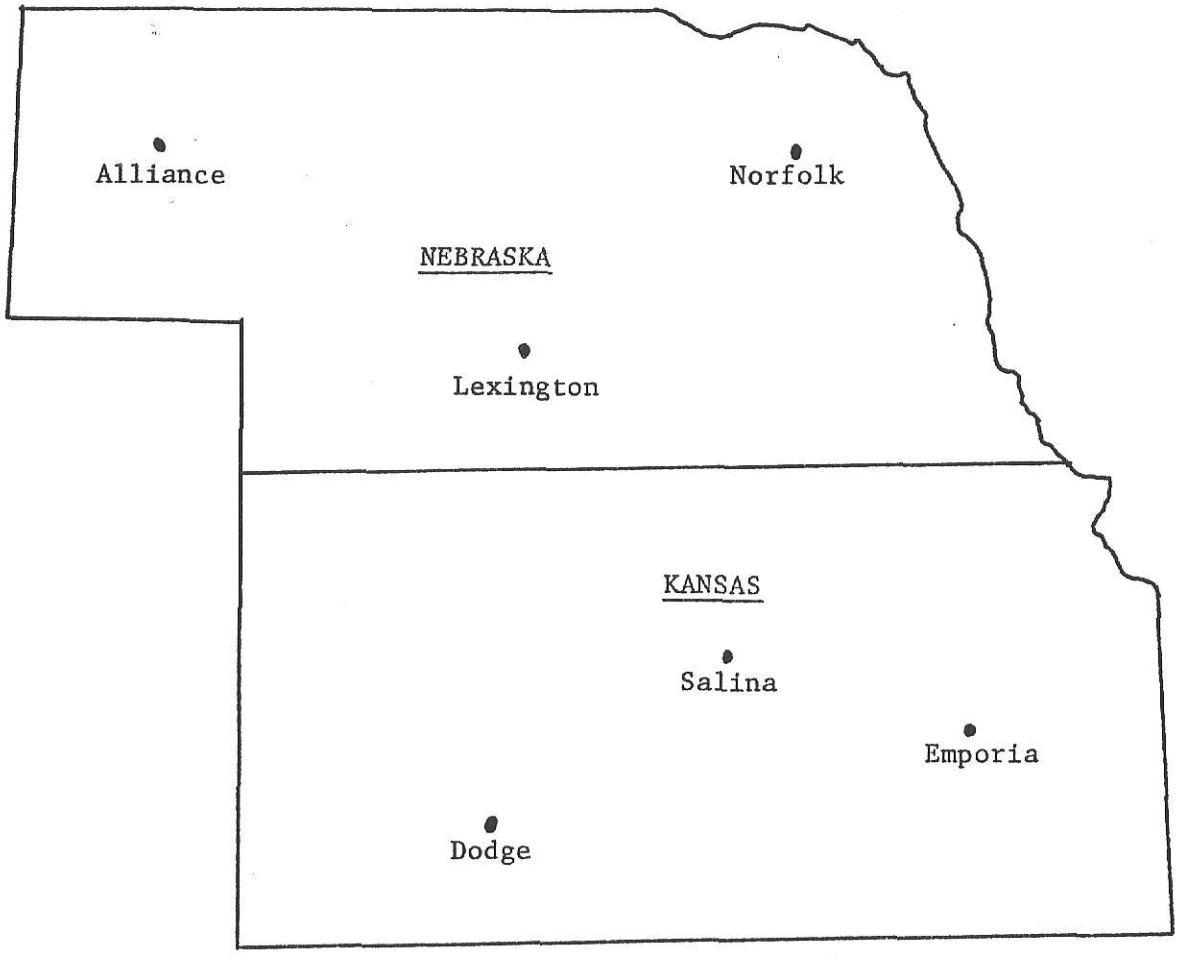
FIGURE 1. LOCATION OF SELECTED AUCTIONS USED IN FEEDER CATTLE PRICING STUDY, KANSAS AND NEBRASKA, 1972.



The largest portion of this income is attributable to the beef cattle industry of which feeder cattle are a significant part. The importance of feeder cattle to Kansas and Nebraska auctions is something that is generally known but difficult to document. Nebraska had 81 licensed markets in operation in 1973 which sold a total of 2,529,262 head of cattle.[5] These cattle were divided into slaughter and feeder classifications with 388,415 and 2,140,847 in the respective classes for a .83 ratio of feeder to total cattle marketed. Other livestock classifications sold were: stock hogs, fat hogs, horses, and goats and sheep. Difficulty arises in that auction fees generated from the sale of feeder cattle are not available in order to determine the percentage that feeder cattle sale charges are of total auction revenue. On a per head basis, feeder cattle made up 46 percent of all livestock sold at Nebraska auctions in 1973. Thus a very conservative estimate would be that 50 percent of Nebraska auction revenue is generated by feeder cattle with the actual probably close to 70 percent.

Data from the 99 licensed Kansas auctions are more difficult to analyze for several reasons. The first is that unlike Nebraska there is only one classification of cattle. The second problem in comparing Kansas and Nebraska auction data is that the fiscal year, for purposes of gathering data, runs from July 1 to June 30. The following procedure was used to estimate the percentage of feeder cattle to total cattle sold through Kansas auctions. A two-year average of 2,851,085 head were sold during the period July 1, 1971 to June 30, 1973.[6] This was believed to be a sound estimate of the Kansas marketings for the period January 1, 1972 to December 31, 1972 especially

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[5]State of Nebraska, Department of Agriculture, "Auction Markets Licensed in Nebraska, 1973-74," undated publication of the office of the Nebraska State Veterinarian.

[6]"Annual Report of Public Livestock Markets in Kansas, July 1, 1972 to June 30, 1973."

since the difference in the number of marketings the two years was only 9,826 head. The assumption was made that the vast majority of cows and bulls and fat steers and heifers sold through Kansas auctions were purchased by packers for slaughter. These classes totaled 154,000 head for 1972 as listed by the Packers and Stockyards Resume'.[7] Using this data one concludes that 94 percent of all cattle sold at Kansas auctions were feeder cattle. This percentage is slightly high due to the fact some cows and bulls are returned to the farm or ranch for future service and some fat cattle are purchased by "traders" and held for a short period of time before reselling, possibly through another marketing channel. But the .94 ratio is not completely invalid when one considers that the Nebraska data when analyzed in this fashion yielded a .89 ratio, or a .06 higher ratio than obtained from the first method of analysis. Most of this difference can probably be attributed to the previously mentioned reason. Considering the classes of livestock sold at Kansas auctions: cattle, hogs, horses and mules, and sheep and goats and using the .94 ratio one concludes that on a per head basis feeder cattle account for 59 percent of all livestock marketed through Kansas auctions and probably a somewhat higher percentage of total auction revenue.

Perhaps a better idea of the relative importance of the use of auctions as a marketing channel for feeder cattle can be gained through the results of personal interviews and questionnaires mailed to Kansas and Nebraska feeder cattle growing operations and feedlots in 1971. The survey of feedlot operations revealed that approximately 56 percent and 49 percent of all feeder cattle procured by feedlots were through local auctions in Kansas and

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[7]Packers and Stockyards Administration, United States Department of Agriculture, XI (1973), p. 10-12.

Nebraska, respectatively (Table 2).[8] In addition, the majority of feeder cattle listed as originating at terminals were actually obtained through auctions operating at terminal market locations. As feedlot size increased, a smaller percentage of cattle were obtained from local auctions and a larger percentage was obtained through direct purchases from cow herd owners and feeder cattle growers.

The 1971 survey of Kansas and Nebraska feeder cattle growing operations indicated that 60 percent of all Nebraska and 68 percent of all Kansas feeder cattle produced by these operations were initially procured from sources outside their own herds (Table 3).[9] Nebraska growers purchased 48 percent of these procured feeders through auctions (Table 4)[10] for a total of 29 percent of all cattle produced by feeder cattle growing operations (Table 5).[11] The general trend of Nebraska growers was to purchase a smaller percentage of these cattle through auction markets as operation size increased. Kansas growers obtained 76 percent of their purchased cattle through livestock auctions (Table 3) for a total of 52 percent of all cattle produced by feeder cattle growing operations in Kansas (Table 4). In opposite fashion of their Nebraska counterparts, Kansas growers purchased a larger percentage of their feeder cattle through auctions as their operations increased in size.

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[8]J. H. McCoy, et al., "The Kansas-Nebraska Cattle Feedlot Industry-Feeder Cattle Procurement Practices and Operational Characteristics," Manuscript under review for North Central Regional publication.

[9]"Structural and Operational Characteristics of Nebraska and Kansas Feeder-Cattle-Growing-Operations," Table 7., Manuscript under review for North Central Regional publication.

[10]ibid., combination of Tables 7 and 8.

[11]ibid.

Table 2. Market Channels Used to Procure Feeder Cattle, by Feedlot Size, Kansas and Nebraska, 1971.

Market channel	KANSAS Feedlot size (no. head)					NEBRASKA Feedlot size (no. head)			
	Fewer than 1,000	1,000 to 4,999	5,000 to 9,999	10,000 or more	All feedlots	Fewer than 1,000	1,000 to 4,999	5,000 or more	All feedlots
	% of cattle[1]					% of cattle[1]			
Raised own cattle[2]	7.0	2.2	0.2	0.0	1.4	6.4	3.1	0.0	2.4
Local auction	62.2	60.6	59.3	47.2	55.8	68.2	57.4	31.6	48.6
Terminal market[3]	9.2	3.4	0.0	1.1	2.2	1.1	0.5	9.0	4.1
Direct from:									
Cowherd owners	14.1	15.3	28.7	7.9	16.6	18.7	23.1	14.6	18.8
Growers	5.8	16.5	4.4	36.7	18.7	4.8	14.2	36.1	21.7
Order buyers and traders	1.7	2.0	7.4	7.1	5.3	0.8	1.7	8.7	4.4
	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[1]Weighted average.

[2]Not a market channel but included for completeness.

[3]Includes terminal auctions as well as private treaty.

Source: J. H. McCoy, et al., "The Kansas-Nebraska Cattle Feedlot Industry-Feeder Cattle Procurement Practices and Operational Characteristics," Manuscript under review for North Central Regional publication.

Table 3. Percent of Feeder Cattle Grown, by Procurement Source, 1971.

Source	NEBRASKA Number of cattle grown 0 to 99	100 to 249	250 or more	Total	KANSAS Number of cattle grown 0 to 99	100 to 249	250 or more	Total
	percent				percent			
From own herd	53	42	36	40	64	33	18	32
Purchased	47	58	64	60	36	67	82	68

Source: J. H. McCoy, et al., "Structural and Operational Characteristics of Nebraska and Kansas Feeder-Cattle-Growing-Operations," Table 7., Manuscript under review for North Central Regional publication.

Table 4. Percent of Feeder Cattle Purchased for Growing, by Procurement Source, 1971.

Source	NEBRASKA Number of cattle grown 0 to 99	100 to 249	250 or more	Total	KANSAS Number of cattle grown 0 to 99	100 to 249	250 or more	Total
	percent				percent			
At auctions	74	64	44	48	79	80	76	76
Other sources	26	21	56	52	21	20	26	26

Source: J. H. McCoy, et al., "Structural and Operational Characteristics of Nebraska and Kansas Feeder-Cattle-Growing-Operations," combination of Tables 7 and 8., Manuscript under review for North Central Regional publication.

Table 5. Percent of Feeder Cattle Purchased at Auction Relative to all Cattle Fed by Growers

Source	NEBRASKA Number of cattle grown 0 to 99	NEBRASKA Number of cattle grown 100 to 249	NEBRASKA Number of cattle grown 250 or more	NEBRASKA Total	KANSAS Number of cattle grown 0 to 99	KANSAS Number of cattle grown 100 to 249	KANSAS Number of cattle grown 250 or more	KANSAS Total
	percent				percent			
At auction	35	37	28	29	28	54	62	52
Other	65	63	72	71	72	46	38	48
Total	100	100	100	100	100	100	100	100

Source: J. H. McCoy, et al., "Structural and Operational Characteristics of Nebraska and Kansas Feeder-Cattle-Growing-Operations," combination of Tables 7 and 8., Manuscript under review for North Central Regional publication.

CHAPTER II

REVIEW OF RELEVANT AUCTION STUDIES

Three studies have been conducted which deal with determining the importance of selected variables on the final selling price of feeder cattle at livestock auctions. The portion of these studies that are revelant to this paper are reviewed below.

Major Determinates of Feeder Cattle Prices at Arizona Livestock Auctions - 1969

In 1969 forty-seven livestock auctions were visited in the state of Arizona in order to analyze the major determinates of feeder cattle prices.[12] A cross-section of regularly scheduled and special auctions were used in that study. Arizona has seven weekly auctions: four in Phoenix, two in Tucson and one in Willcox. In addition to these weekly auctions there were 19 Indian Reservation sales; eight Cattlemen's Association Auctions and four special feeder cattle sales at the Willcox auction. The composition of the 47 auctions was: one Hopi Indian sale, six Navajo Indian sales, six Fort Apache Indian sales, two Hualapai Indian sales, three San Carlos Indian sales, four Willcox special feeder cattle sales, six sales sponsored by the Cattlemen's Associations, nine sales at Phoenix, and ten at Tucson.

The chief objective of the analysis of feeder cattle prices received by producers at various Arizona auctions was to determine what characteristics of the cattle and the auctions significantly affected these prices. The specific variables analyzed for their significance of final

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[12]Elmer L. Menzie, Russell L. Gum, and C. Curtis Cable Jr., "Major Determinates of Feeder Cattle Prices at Arizona Livestock Auctions," Technical Bulletin, Agricultural Experiment Station, University of Arizona, CCXLVII (September, 1972).

selling price were: (1) animal weight, (2) grade, (3) sex, (4) breed, (5) size of lots, and (6) current fat cattle price. The other objective was to estimate the magnitude of the differences in those instances when the above mentioned variables were found to be significant with relation to selling price.

Sales information pertaining to the variables considered was recorded on all steers and heifers, including calves, between the weights of 200 and 875 pounds. Grading was done on the basis of official United States Standards and was conducted by individuals familiar with feeder cattle and feeder cattle auctions in Arizona. All animals fell into a standard, good, or choice classification with each of these having three sub-classes of low, average, and high for a total of nine grading categories. Breeds were analyzed in terms of Hereford, Angus, Hereford-Angus crosses, Brahman, and Brahman crosses and "other crosses." "Okie" cattle and nondescriptive breeds composed the "other crosses."

Sample Description

A total of 2,941 lots of feeder cattle were observed which contained 28,501 head for an average lot size slightly less than 10 head. Sixty-four percent were steers and thirty-four percent were heifers. By breed classification, 54 percent of the lots were Herefords, 9 percent Hereford-Angus Crosses, 6 percent Angus, 7 percent Brahman and Brahman crosses, and 24 percent other crosses. Seventy-one percent of the feeders in this sample graded good, 15 percent standard, and 14 percent choice.

Statistical Analysis

Multiple regression analysis utilizing dummy variables was used to estimate the influence of the selected variables on price. An R squared of .819 was achieved with this model.

The 21 variables included in this model are as follows: (1) weight, (2) weight squared, (3) weight of heifer adjustment, (4) number of head in lot, (5) Hereford, (6) Angus, (7) Hereford-Angus Crosses, (8) Brahman crosses, (9) other crosses, (10) low standard grade, (11) average standard grade, (12) high standard grade, (13) low good grade, (14) average good grade, (15) high good grade, (16) low choice grade, (17) average choice grade, (18) high choice grade, (19) fat cattle price, (20) fat cattle price heifer adjustment, (21) fat cattle price heifer adjustment squared.

Variables 1-3 allowed for the effect of animal weight on price. The inclusion of variable 3, specifically for the weight of heifers, allowed a differential influence of weight on price depending upon the sex of the animals. Variable 4 was simply the number of head sold in any one auction lot. Variables 5-9 allowed for price differentials due to breed and variables 10-18 due to grade. Variable 19, the fat cattle price at Phoenix on the day of sale, was included as a method to allow for general pricing trends of cattle over the different time periods that this auction data was collected. Variable 20-21 allowed the effect of fat cattle prices to be different for heifers and steers.

Results of Analysis

Influence of Fat Cattle Price

The higher the fat cattle price at time of auction the greater was the discount of heifers relative to steers and vise-versa. Thus if the price of fat cattle declines, feeder steer prices declines at a faster rate than feeder heifer prices.

Influence of Weight

Weight was a major influence on the selling price of the animal. An inverse relationship between weight and price existed for both steers and heifers with the price decrease for steers being more rapid as weight increases, than for heifers. Exemplifying this was the fact that the steer-heifer price differentials for 200 pound animals was $6.05 per hundredweight while the differential was $1.45 per hundredweight for 800 pound animals when fat cattle prices were $28.00 per hundredweight.

Grade Differentials

As expected higher grade cattle sold at a premium relative to lower grade cattle with an $11.00 per hundredweight differential between the average price received for low standard and high choice grades. Price differences tended to decline as quality improved from low standard to low choice. For example, the price differential between low and average standard was $2.13 per hundredweight while the differential between high good and low choice was only $0.45 per hundredweight.

Lot Size Effects

A linear relationship was found to exist between increasing lot size and selling price. For each increase in lot size of one animal the price was estimated to have increased $0.0234 per hundredweight. Thus, with other factors held constant, similar cattle sold in a lot of 100 would command a price of $2.34 more per hundredweight than if they had sold singularly.

Effects of Breed on Price

Breed variations had a relatively minor effect on price. When all factors other than breed were held constant and with straight breed

Herefords designated as the base the following price differentials were found to exist: Brahman crosses commanded an $0.89 per hundredweight premium over Herefords; Angus, Hereford-Angus crosses and "Okie" cattle sold for $0.27, $0.37, and $0.28 per hundredweight more than Herefords.

Pricing Feeder Cattle at Colorado Auctions - 1969

This study which was conducted by the Colorado State University Experiment Station to determine the relative significance of various components of the livestock auctions and was concurrent (1969) with the Arizona study previously mentioned.[13] The purpose of the study was to analyze feeder cattle prices paid at five Colorado Auctions Markets during 1969 for differences related to time of year (month), market in which sold, grade of cattle, size of lot, and the market weight and sex of cattle marketed. The necessary market data was obtained by auditing each sale on a weekly basis. The price differences were measured and statistically tested using linear regression procedures with binary variables to test the significance of price difference arising from these variables.

Analysis Results

Explained Price Variation

The price variation that was explained by variables considered in this study (type of cattle, grade, size of lot and market) ranged from 86 percent (R^2 coefficient) in January to 69 percent in July. During 8 of the 12 months of 1969 the above mentioned variables explained 81 percent or more of the price variation in Colorado feeder cattle.

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[13]Albert G. Madsen and Zeny Rumg Liu, "Pricing Feeder Cattle at Colorado Auctions," Technical Bulletin, Agricultural Experiment Station, Colorado State University, CXIV (June, 1971).

Auction Price Differences by Time of Year

In the use of a standard linear regression model of the y=a + bx type the "a" value represents the base animal. In this study, it was designated as a standard grade steer calf weighing 500 pounds or less, sold in lots of 1-10 head in the La Junta Winter auction. This animal commanded its highest price in June and lowest in January. The implication drawn from this study in 1969 was that feeder cattle of this type were most highly demanded during early summer and least attractive during the first three months of the year.

Auction Market Price Differences

The spread in the average prices paid compared to the relative base at each of the five auctions varied from a low of $0.34 per hundredweight in January to a high of $1.59 per hundredweight in July. There was extensive variability in the monthly ranking of livestock auctions by average selling price. Each auction attained the highest and lowest ranking of the five at least once during the course of the year.

Pricing by Sex and Weight of Feeder Cattle

This portion of the study was consistent with the generally accepted idea that heavier cattle are discounted relative to lighter cattle of a similar grade and that steers sell at a premium in relation to heifers of a corresponding weight.

Pricing by Grade

A very consistent pattern developed of the higher grade of cattle receiving a premium price relative to an inferior grade. Cattle were graded prime, choice, good, or standard with standard being made the base

for comparison. Prime grade cattle fluctuated between $9.38 and $7.20 per hundredweight on the monthly average relative to the base. Choice cattle sold for between $7.57 and $5.72 per hundredweight premium over standard while good was $3.95 to $3.10 per hundredweight above the base.

Pricing by Lot Size

The general trend seemed to indicate that the average selling price for feeder cattle was higher the larger the lot sold. However, there was some unexplained pricing differences evident. The smallest lot size, 1-10 head, sold for the lowest price 8 of the 12 months studied. The inconsistency is that the largest lot size, 50 head and over, occupied this position the other four months and achieved the market high only one month suggesting that for optimum marketing lots of 50 cattle or more should be divided into lots of 20 head or larger.

Feeder Cattle Pricing at Kansas and Nebraska Auctions - 1973

A study closely patterned after the one conducted in Colorado was carried out in Kansas and Nebraska in the late fall of 1972.[14] Six auctions were chosen, three in Kansas and three in Nebraska for their geographical distribution and size. The Kansas auctions were Salina, Emporia, and Dodge City. The Nebraska auctions were Alliance, Lexington, and Norfolk. This study was conducted for a period of three weeks as compared to the one year Colorado project. Thus, individual monthly averages were not obtained and all analysis was done on the aggregate basis.

Linear regression analysis was used to estimate price differentials associated with ten selected variables. The variables were: weight, sex, grade, lot size, breed, fresh vs "trader" cattle, degree of fill, degree

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[14]J. H. McCoy, J. W. Koudele, et al., "Feeder Cattle Pricing at Kansas and Nebraska Auctions," Manuscript under review for North Central Regional Publication.

of fleshiness, presence of horns, time of sale during day and the particular auction itself. This data was analyzed in the $y = b_o + b_1x$ form with the independent variables set up in binary form. The designated "b_o" or base animal was a medium-choice, fresh (non-trader), horned, Hereford steer weighing less than 400 pounds with normal fill and fleshiness, sold individually and early during the day at the Alliance, Nebraska auction.

Results of Analysis

Estimated Base Price and Price Differentials

The average price of the base animal (as defined above) was $51.75 with the aggregate data from the six auctions generating an R squared coefficient of .72. This indicates that 72 percent of the variation in the auction market selling prices can be explained by the ten selected variables.

Fill

Fill refers to the condition of feeder cattle with respect to the amount of feed and water consumed just prior to sale. Shrunk out or unfilled cattle sold for significantly more, $0.91 per hundredweight, than normal filled feeder cattle. Overfilled feeder cattle were discounted $0.77 per hundredweight relative to cattle of normal fill but this difference was not significant.

Fleshiness

Fleshiness refers to the amount of fat that cattle are carrying at time of market. A premium of $0.78 was paid for relatively thin cattle in comparison to normal fleshiness. Fleshy feeder cattle were discounted $0.16 per hundredweight compared to those of normal flesh. The premium

for thin cattle was statistically significant compared to the normal base but the fleshy cattle differential was not.

Location of Auction

With the use of Alliance, Nebraska as the relative base, non-significant differences were found among the Norfolk, Dodge City, and Salina average selling prices. The differences were +0.49, -0.54 and -0.36 respectively for a range of $1.03. The Alliance auction commanded a premium of $2.76 while the Emporia auction was discounted $1.43; both these differences were significant.

Time of Sale

Data were collected on time of sale within the day to determine if price differentials were associated with sale order. The first ten lots were designated as the base. It was shown statistically that comparable cattle sold for $0.73 per hundredweight more in transactions 11 to 50 and $.80 per hundredweight more in transactions 50 and up, than the base.

Weight-Sex Categories

Consistent with the Colorado study, weight-by-sex differentials indicated that steers in similar weight classes sold for more than heifers by approximately $5.00 to $5.50 per hundredweight. Heifers were also discounted relative to steers on a comparative age basis (i.e. steers 100 pounds heavier) with the discount on heifers progressively greater at heavier weights.

Grade

Preliminary statistical analysis indicated a non-significant price difference between prime and high choice feeder cattle thus these grades

were aggregated. The general trend was that of the better grade of cattle bring higher prices. The prime and high choice grades brought a $0.50 per hundredweight premium over the medium choice base, while low choice, high good, and medium good were discounted $0.94, $1.72, and $3.88 per hundredweight relative to the base. All grade differentials proved to be statistically significant.

Lot Size

Price increased as lot size increased with a premium of $3.34 per hundredweight for lot sizes of 50 or more head as compared to singles. There was only a slight differential ($0.29) between lots of 10-29 head and 30-49 head. There was, however, a larger differential ($1.22) between lots of 31-49 head and lots of 50 or more head. All price differences attributed to lot size proved to be significant.

Fresh vs "Trader" Cattle

Cattle were classified as "fresh" if it was apparent that they had come directly from the ranch or farm to auction. "Trader" cattle were those being resold from a previous recent purchase. The regression analysis showed that fresh cattle sold for $0.58 per hundredweight more than trader cattle. This was not a significant difference at the 95 percent confidence level.

Horns

Data were collected on the selling prices of horned and non-horned animals to determine if there was a significant price differential due to this factor. Analysis proved the difference was non-significant.

CHAPTER III

METHODOLOGY

N-way analysis of variance was used to estimate price differentials associated with selected variables. These variables were: weight, sex, grade, lot size, breed, day, buyer desirability, degree of fleshiness, degree of fill, presence of horns, transaction number and the particular auction itself. Each variable and its subclasses are listed below with the sex weight variables combined for more descriptive analysis.

Weight-by-sex

1. Steers less than 400 lbs.
2. Steers 401-500 lbs.
3. Steers 501-600 lbs.
4. Steers 601-700 lbs.
5. Steers 701-800 lbs.
6. Steers 801-999 lbs.
7. Heifers less than 400 lbs.
8. Heifers 401-500 lbs.
9. Heifers 501-600 lbs.
10. Heifers 601-700 lbs.
11. Heifers 701-999 lbs.

Grade

1. Prime and high choice
2. Medium choice
3. Low choice
4. High good
5. Medium good
6. Low good
7. Standard
8. Utility

Lot Size

1. 1 head
2. 2-9 head
3. 10-29 head
4. 30-49 head
5. 50+ head

Breed

1. Angus
2. Hereford
3. Shorthorn
4. Charolais
5. Dairy
6. Okie #1
7. Okie #2
8. Mixed
9. Cross-breed

Buyer Desirability

1. Fresh
2. Trader
3. Unknown

Fill

1. Under
2. Normal
3. Over

Fleshiness

1. Normal
2. Thin
3. Fleshy

Day

1. Wednesday
2. Thursday
3. Friday

Auction

1. Alliance
2. Lexington
3. Norfolk
4. Dodge City
5. Salina
6. Emporia

Sales Transaction Number

1. 1-10
2. 11-50
3. 51+

Horns

1. No horns
2. Horns

The analysis of variance depends upon separation of the variance into parts (each due to some specific variable or source of error). The F test, utilized in an analysis of variance procedure, is usable on a sum of squares of the differences basis. F is defined as $F = \frac{\text{external variance}}{\text{internal variance}}$ where external variance is that among or between the variables considered and internal variance is the variance within the variables considered and is sometimes referred to as residual variance. The precise notation of F is as follows:[15]

$$\text{Variance} = \text{sigma}^2$$

but $$\text{sigma}^2 = \frac{\Sigma(\text{differences})^2}{N - 1} = \text{mean square}$$

where $$\Sigma(\text{differences})^2 = \text{sum of squares}$$

$$\text{Mean square} = \frac{\Sigma(\text{differences})^2}{\text{d.f.}} = \frac{\text{sum of squares}}{\text{d.f.}}$$

$$F = \frac{\text{mean square (external)}}{\text{mean square (residual)}}$$

An F value larger than the appropriate table value at the corresponding degrees of freedom and agreed on level of confidence indicates that the variable is significant, i.e., causes one to reject the null hypothesis

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[15]Harry H. Holscher, Simplified Statistical Analysis (Boston, 1971), p. 146.

that this variable causes no differences in the mean selling price of feeder cattle at auction markets.

The statistical interaction among variables was not individually examined due to the large size of this model. Analysis of these interactions would be helpful in explaining some of the unexplained price differentials found and would be recommended for further research in this area.

CHAPTER IV

SAMPLE DESCRIPTION OF KANSAS AND NEBRASKA AUCTIONS - 1972

The sample of Kansas and Nebraska auctions consisted of 2,064 lots of feeder cattle observed at six auctions, three in Kansas and three in Nebraska. A total of 18,996 head were sold for an average lot size of 9.2 head. The mean selling price for lots was $44.32 per hundredweight with an average weight of 547 pounds per head and grade of high good.

Sixty-four percent of the sample was steers while thirty-six percent were heifers. By breed classification 22.2 percent were Angus, 34.1 percent Herefords, 2.1 percent Shorthorn, 4.6 percent Charolais, 6.0 percent Dairy, 2.7 percent Okie #1, 2.1 percent Okie #2, 2.7 percent mixed breeds, and 23.5 percent crossbreed.

In the aggregate analysis 46.7 percent of all lots graded prime or choice, 42.6 percent good, 6.3 percent standard, and 4.1 percent utility. More detailed information of breakdown by grade and breed can be gained from Appendix Table 1. Shorthorn lots yielded 54.7 percent prime of choice grade animals to lead all other breeds in this category. Herefords, Crossbreeds, and Angus followed with prime or choice yields of 54.1, 51.3 and 47.8 percent respectively (Table 6). Cattle classified as "Okie" had the highest percentage in the good category while Dairy breeds lead both standard and utility classes.

Table 6. Breed-Grade Distribution on Per Head Basis at Kansas and Nebraska Livestock Auctions - 1972.

	Prime & Choice	Good	Standard	Utility	Total	Percent of Total Cattle
Angus	47.8%	40.6%	11.2%	0.4%	100%	21.3%
Hereford	54.1%	33.6%	9.6%	2.7%	100%	38.8%
Shorthorn	54.7%	36.1%	0.8%	8.4%	100%	0.6%
Charolais	25.5%	60.3%	11.6%	2.6%	100%	2.3%
Dairy	4.4%	47.3%	20.4%	27.9%	100%	5.1%
Okie #1	15.7%	69.0%	4.8%	10.5%	100%	1.1%
Okie #2	6.7%	87.6%	4.8%	0.9%	100%	0.6%
Mixed Breeds	41.4%	33.6%	21.6%	3.4%	100%	6.3%
Crossbreeds	51.3%	34.4%	8.3%	6.0%	100%	23.9%

Results of Analysis of Kansas and Nebraska Auction Data

Statistical analysis of 1972 Kansas and Nebraska Livestock Auction data indicated that all variables considered except buyer desirability, fleshiness and horn presence exerted significant influence on the final selling price of feeder cattle at the 95 percent confidence level (Table 7). The eleven variables accounted for 75.1 percent (R squared coefficient) of the variation in pricing. The significance of each variable on the aggregate basis (among or between variables) can be found by consulting Table 7. If the variable has a probability of less than .05 then it is deemed statistically significant at the 95 percent confidence level. Individual variable differentials (those within the variable) are significant if the 95 percent confidence intervals for the components of that variable do not intersect. These confidence intervals can be found in the tables following the explanation of the results of the analysis of each variable. The results of the individual variables follow.

Table 7. Analysis of Variance of Price Variables at Kansas and Nebraska Auctions - 1972.

Source	Degrees of Freedom	Sums of Squares	Mean Squares	F-ratio	Probability
Auction	5	2676.3472	535.2692	50.659	0.0000
	2	877.9432	438.9714	41.545	0.0000
Transaction Number	2	102.1726	51.0863	4.835	0.0080
Lot Size	4	1216.2188	304.0546	28.776	0.0000
Sex-weight	10	31601.5987	3160.1596	299.083	0.0000
Breed	23	1819.3998	79.1043	7.487	0.0000
Fill	2	198.4666	99.2333	9.392	0.0001
Buyer Desirability	2	34.7224	17.3612	1.643	0.1931
Grade	6	1613.3075	268.8845	25.448	0.0000
Flesh	2	52.9980	26.4989	2.508	0.0814
Horns	1	11.8951	11.8951	1.126	0.2875
Residual	2140	22611.6054	10.5661		
TOTAL	2199	90707.8125			

[1]Variables are considered statistically significant at the 95 percent confidence level if their probability is less than .05.

Location of Auction

Statistical analysis showed that a $4.03 difference existed between the mean selling price of the Lexington and Emporia auction (Table 8). This difference was attributed to market location. Lexington's mean selling price was significantly higher than all other auctions while Norfolk's mean selling price varied significantly from only that of Emporia's. The short time period involved in this study was inadequate to hypothesize as to the cause of the intermarket price differentials existing. Additional observations and analysis would be required to reach valid judgments as to the causations of these differentials.

Table 8. Price Differentials Associated With Auction Location at Kansas and Nebraska Auctions - 1972.

Auction	Mean Selling Price	Standard Error	95% Confidence Interval
Alliance	$40.80	$0.57	$39.68 - $41.92
Lexington	$43.82	$0.45	$42.95 - $44.70
Norfolk	$41.75	$0.49	$40.79 - $42.70
Dodge City	$40.78	$0.47	$39.87 - $41.68
Salina	$40.84	$0.46	$39.94 - $41.74
Emporia	$39.80	$0.46	$38.89 - $40.70

[1]All calculations were carried out to 3 decimal places then rounded in this and following tables.

[2]Ninety-five percent confidence intervals were found by using the following formula: confidence interval = mean selling price $\pm$ (1.96) (Standard Error).

Day

Day refers to the day of the week that the auction was held. Alliance and Dodge City conducted their auctions on Wednesday while Norfolk and Salina auctions were held on Thursday. Friday's auctions, Lexington and Emporia, had an average selling price of $1.67 per hundredweight higher than Wednesday's auctions but this difference was not significant (Table 9).

Table 9. Price Differentials Associated With Date at Kansas and Nebraska Auctions - 1972.

Day	Mean Selling Price	Standard Error	95% Confidence Interval
Wednesday	$40.49	$0.45	$39.60 - $41.37
Thursday	$41.24	$0.43	$40.40 - $42.09
Friday	$42.16	$0.44	$41.30 - $43.02

Weight-by-Sex

Weight-by-Sex is the variable that allows simultaneous consideration in the analysis of the sex and weight of each animal marketed. As expected, the trend of discounting heavier cattle relative to lighter cattle and heifers relative to steers was observed. Heifers less than 400 pounds were discounted $6.25 per hundredweight compared to steers of the same weight class (Table 10). This differential declined to $2.39 per hundredweight for animals in the heaviest weight class for each sex. Significant differences existed between the mean selling prices of steers and heifers of similar weight classes and between most weight classes of animals of the same sex.

Transaction Number

The transaction number indicates the order that each individual lot of cattle sold relative to other cattle sold that day. To determine what influence selling order had on the final price received transaction numbers were grouped into three classes: lots 1-10, lots 11-50 and lots 51 and over. Cattle sold in the initial 10 lots brought an average selling price of $40.72 per hundredweight (Table 11). While the 11-50 class and the 50+ class brought premiums of $0.81 and $0.92 respectively thus indicating that selling later in the sale, if possible, is preferable, although the price differentials between these classes were not significant at the 95 percent confidence level.

Table 10. Price Differentials Associated With Sex-weight Classifications at Kansas and Nebraska Auctions - 1972.

Sex-weight	Mean Selling Price	Standard Error	95% Confidence Interval
Steers less than 400 lbs.	$50.14	$0.47	$49.22 - $51.07
Steers 401-500 lbs.	$46.30	$0.47	$45.38 - $47.21
Steers 501-600 lbs.	$43.42	$0.48	$42.49 - $44.35
Steers 601-700 lbs.	$41.70	$0.49	$40.74 - $42.64
Steers 701-800 lbs.	$40.42	$0.49	$39.45 - $41.38
Steers 801-999 lbs.	$37.56	$0.47	$36.64 - $38.49
Heifers less than 400 lbs.	$43.90	$0.48	$42.95 - $44.84
Heifers 401-500 lbs.	$40.73	$0.47	$39.80 - $41.66
Heifers 501-600 lbs.	$38.37	$0.50	$37.39 - $39.36
Heifers 601-700 lbs.	$36.56	$0.53	$35.52 - $37.60
Heifers 701-999 lbs.	$35.18	$0.55	$34.09 - $36.26

Table 11. Price Differentials Associated With Transaction Order at Kansas and Nebraska Livestock Auctions - 1972.

Transaction Number	Mean Selling Price	Standard Error	95% Confidence Interval
Lots 1-10	$40.72	$0.49	$39.77 - $41.68
Lots 11-50	$41.52	$0.44	$40.67 - $42.38
Lots 51+	$41.64	$0.43	$40.79 - $42.49

Lot-Size

Lot size refers to the number of head of cattle sold in each individual pen. Average lot size was slightly more than nine head. A positive relationship was found to exist between lot size and selling price (Table 12). Lots were divided in the following five classes for analysis: 1 head, 2-9 head, 10-29 head, 30-49 head and 50+ head. Single unit lots brought an average price of $39.37 per hundredweight with lots of 50 head or more commanding a price of $43.02 per hundredweight. Intermediate size lots brought prices between these two extremes. The lot class of 50 or more head sold for significantly more than either of the two smallest classes.

Table 12. Price Differentials Associated With Lot Size at Kansas and Nebraska Livestock Auctions - 1972.

Lot Size	Mean Selling Price	Standard Error	95% Confidence Interval
1 head	$39.37	$0.43	$38.53 - $40.19
2-9 head	$40.85	$0.43	$40.00 - $41.70
10-29 head	$41.37	$0.44	$40.50 - $42.24
30-49 head	$41.88	$0.51	$40.88 - $42.88
50+ head	$43.02	$0.63	$41.78 - $44.26

Breed

Herefords commanded a mean selling price of $42.71 to lead straight breed cattle (Table 13). Price differentials existed among the various breeds with Herefords selling for significantly more than Angus, or Shorthorn. Angus, Shorthorn, and Charolais were discounted $2.02, $2.17 and $1.66 respectively in relation to Herefords. Okie #1 and #2 were discounted $1.48 and $2.59 respectively, relative to Herefords. Straight Dairy breed cattle brought $3.40 per hundredweight less than Herefords while the Hereford-Dairy cross had the highest mean selling price of $44.50 per hundredweight. The Angus-Hereford cross, the most prevalent among cross-breeds was discounted $0.22 per hundredweight relative to straight grade Herefords but this difference was non-significant.

Fill

Fill refers to the amount of feed and water that livestock consume just prior to sale. Feeder cattle of normal fill had a mean selling price of $41.32 while shrunk or underfilled cattle brought a $0.67 premium and overfilled cattle were discounted $0.73 relative to normal filled animals (Table 14). No significant differences existed between these classes.

Table 13. Price Differentials Associated With Breed at Kansas and Nebraska Auctions - 1972.

Breed	Mean Selling Price	Standard Error	95% Confidence Interval
Angus	$40.69	$0.39	$39.92 - $41.46
Hereford	$42.71	$0.37	$41.98 - $43.44
Shorthorn	$40.54	$0.61	$39.37 - $41.74
Charolais	$41.05	$0.50	$40.07 - $42.02
Dairy	$39.31	$0.47	$38.38 - $40.23
Okie #1	$41.23	$0.58	$40.09 - $42.37
Okie #2	$40.62	$0.63	$39.38 - $41.85
Angus-Hereford Mixed	$42.34	$0.63	$41.09 - $43.58
Angus-Shorthorn Mixed	$40.43	$1.93	$36.65 - $44.20
Angus-Charolais Mixed	$41.26	$1.21	$38.88 - $43.64
Hereford-Shorthorn Mixed	$42.07	$1.68	$38.77 - $45.37
Hereford-Charolais Mixed	$41.66	$2.35	$37.05 - $46.26
Angus-Hereford Cross	$42.49	$0.40	$41.70 - $43.28
Angus-Shorthorn Cross	$39.41	$1.15	$37.16 - $41.66
Angus-Charolais Cross	$41.75	$0.73	$40.32 - $43.18
Angus-Dairy Cross	$40.96	$0.72	$39.55 - $42.37
Hereford-Shorthorn Cross	$42.32	$0.61	$41.12 - $43.52
Hereford-Charolais Cross	$42.40	$0.68	$41.06 - $43.73
Hereford-Dairy Cross	$44.50	$0.99	$42.55 - $46.44
Shorthorn-Charolais Cross	$42.08	$2.34	$37.49 - $46.67
Shorthorn-Dairy Cross	$35.74	$3.29	$29.29 - $42.19
Charolais-Dairy Cross	$42.08	$2.34	$37.49 - $46.67

Table 14. Price Differentials Associated With Livestock Fill at Kansas and Nebraska Auctions - 1972.

Fill	Mean Selling Price	Standard Error	95% Confidence Interval
Under	$41.99	$1.03	$40.95 - $43.02
Normal	$41.32	$0.83	$39.70 - $42.94
Over	$40.59	$0.88	$38.87 - $42.41

Grade

All cattle sold were placed into one of the following seven grade classifications: prime and high choice (combined), medium choice, low choice, high good, medium good, low good and standard. Due to the small number of prime cattle and the fact that preliminary analysis showed no significant difference

between prime and high choice grades mean selling price of these grades were combined. Utility grade was dropped since there was no observations. As expected, buyers paid more for the higher grade cattle with the prime and high choice classification selling for $44.36 per hundredweight (Table 15). This was significantly more than any of the other subsequent grades. Medium and low choice were discounted $0.66 and $1.54 respectively per hundredweight compared to the top grade. Each grade was discounted relative to the one above it with the exception of standard which brought a $0.20 per hundredweight premium over low good. However, this difference was statistically non-significant.

Table 15. Price Differentials Associated With Grade at Kansas and Nebraska Livestock Auctions - 1972.

Grade	Mean Selling Price	Standard Error	95% Confidence Interval
Prime and High Choice	$44.36	$0.42	$43.54 - $45.18
Medium Choice	$43.70	$0.39	$42.94 - $44.45
Low Choice	$42.82	$0.39	$42.06 - $43.57
High Good	$42.25	$0.39	$41.48 - $43.02
Medium Good	$40.96	$0.45	$40.09 - $41.82
Low Good	$37.40	$0.65	$36.14 - $38.66
Standard	$37.60	$1.70	$34.27 - $40.93

Fleshiness

Fleshiness is the degree of finish an animal has relative to its weight. Fleshy, or fat cattle sold at a $0.46 discount compared to feeder cattle of normal fleshiness (Table 16). Thin cattle brought a premium of $0.43 over the normal base. These are non-significant differences.

Buyer Desirability

Buyer desirability, which refers to whether cattle are of the fresh or "trader" origin, proved to be a non-significant variable in the aggregate analysis (Table 7). Fresh cattle are those that come directly from farm or ranch to

auction while "trader" cattle are those being resold from a recent purchase. "Fresh cattle sold at a $0.41 premium relative to "trader" cattle (Table 17) but this is a non-significant difference.

Table 16. Price Differentials Associated With Fleshiness at Kansas and Nebraska Auctions - 1972.

Fleshiness	Mean Selling Price	Standard Error	95% Confidence Interval
Under	$41.74	$0.52	$40.72 - $42.76
Normal	$41.31	$0.41	$40.50 - $42.12
Over	$40.85	$0.48	$39.91 - $41.78

Table 17. Price Differentials Associated With Buyer Desirability at Kansas and Nebraska Auctions - 1972.

Type of Cattle	Mean Selling Price	Standard Error	95% Confidence Interval
Fresh	$41.55	$0.43	$40.71 - $42.40
Trader	$41.14	$0.50	$40.17 - $42.12
Unknown	$41.19	$0.46	$40.30 - $42.09

Horns

The presence of horns also proved to be non-significant in its influence on the selling price of feeder cattle. Horned animals, which composed eight percent of the total lots, sold for $0.28 per hundredweight less than non-horned cattle (Table 18).

Table 18. Price Differentials Associated With Horn Presence at Kansas and Nebraska Auctions - 1972.

Animal	Mean Selling Price	Standard Error	95% Confidence Interval
Horned	$41.44	$0.42	$40.62 - $42.25
Nonhorned	$41.16	$0.48	$40.22 - $42.09

CHAPTER V

SAMPLE DESCRIPTION OF SALINA AUCTION DATA - MARCH 21, 1974 - MAY 9, 1974

The desire for a longer time series study to compare with findings generated from the 1972 data was the chief reason the Salina auction was analyzed for a period of eight weeks in the spring of 1974. During this time, 1,338 lots of feeder cattle were observed. A total of 11,618 head were included in the sample providing an average lot size of 8.6 head. The mean grade of all lots sold was low choice with an average weight of 568 pounds and a selling price of $41.67 per hundredweight.

Sixty percent of these lots were steers and 40 percent were heifers. By breed classification 16.4 percent of the lots were Angus, 34.2 percent Herefords, 2.2 percent Shorthorn, .1 percent Charolais, 6.0 percent Dairy, 1.3 percent Okie #1, 12.2 percent were mixed breeds and 27.6 percent were crossbreeds.

The analysis showed that 78.8 percent of all lots graded prime or choice (grades combined), 14.8 percent good, 6.3 percent standard and .1 percent utility. More detailed information of breakdown by grade can be gained from Appendix Table 2. Feeder cattle grades were coded identical to those of Appendix Table 1.

Angus lead all breeds by grade classification with 98.2 percent of all animals grading prime or choice (Table 19). Hereford lots yielded 88.5 percent prime or choice feeder cattle while Shorthorns, Dairy and Okie #1 graded 91.9 percent, .4 percent and .5 percent respectively, prime or choice. The remaining lots graded good except for Dairy breeds which

had 99.2 percent of its lots yielding standard and 0.4 percent utility. One lot of crossbreeds also graded standard.

Table 19. Breed-Grade Distribution on Per Head Basis at Salina Auction - 1974.

	Prime & Choice	Good	Standard	Utility	Total	Percent of all Cattle
Angus	98.2%	1.8%	0.0%	0.0%	100%	14.1%
Hereford	88.5%	11.5%	0.0%	0.0%	100%	31.7%
Shorthorn	91.9%	8.1%	0.0%	0.0%	100%	1.2%
Charolais	0.0%	100.0%	0.0%	0.0%	100%	0.0%*
Dairy	0.0%	0.4%	99.2%	0.4%	100%	4.3%
Okie #1	0.5%	99.5%	0.0%	0.0%	100%	1.8%
Mixed Breeds	91.1%	8.9%	0.0%	0.0%	100%	29.8%
Crossbreeds	87.8%	11.7%	0.5%	0.0%	100%	17.1%

*Straight breed Charolais constituted less than .01% of the sample and thus was recorded as zero.

Results of Analysis of Salina Auction Data - 1974

Statistical analysis of the Salina auction data revealed that all variables considered except horn presence were significant relative to the final selling price of feeder cattle (Table 20). The ten variables analyzed accounted for 64.7 percent (R squared coefficient) of the variation in pricing. Results of the analysis of the individual variables follow.

Week

The Salina auction was audited each Thursday for a period of eight weeks beginning March 21, 1974. The mean selling price declined each week from a first week high of $39.99 per hundredweight to an eighth week low of $32.21 per hundredweight reflecting the general trend of cattle prices for this period (Table 21).

Table 20. Analysis of Variance of Price Variables at the Salina, Kansas Auction - 1974

Source	Degrees of Freedom	Sums of Squares	Mean Squares	F-ratio	Probability
Week	7	5206.9915	743.8557	62.899	0.0000
Transaction Number	2	101.2813	50.6406	4.282	0.0140
Lot Size	4	2098.6270	524.6567	44.364	0.0000
Sex-weight	10	13491.7356	1349.1733	114.084	0.0000
Breed	20	2785.9365	139.2968	11.779	0.0000
Fill	2	232.3798	116.1899	9.825	0.0001
Fleshiness	2	178.3150	89.1575	7.539	0.0006
Buyer Desirability	1	57.0764	57.0764	4.826	0.0282
Grade	7	505.6992	72.2427	6.109	0.0000
Horns	1	9.0384	9.0384	0.764	0.3828
Residual	1282	15161.1640	11.8261		
TOTAL	1338	46503.1484			

[1]Variables are considered statistically significant at the 95 percent confidence level if their probability is less than .05.

Table 21. Price Differentials Associated With Week Sold at the Salina, Kansas Auction - 1974.

Week	Mean Selling Price	Standard Error	95% Confidence Interval
3/21/74	$39.99	$0.82	$38.38 - $41.59
3/28/74	$39.00	$0.82	$37.39 - $40.61
4/04/74	$36.50	$0.83	$34.88 - $38.12
4/11/74	$38.29	$0.82	$36.67 - $39.90
4/18/74	$37.67	$0.83	$36.05 - $39.29
4/25/74	$34.79	$0.83	$33.17 - $36.42
5/02/74	$33.19	$0.86	$31.50 - $34.89
5/09/74	$32.21	$0.98	$30.30 - $34.13

Weight-by-Sex

Weight-by-sex price differentials indicated that heavier cattle were discounted relative to lighter cattle and heifers relative to steers. These differentials decreased as animal size increased. A $7.29 per hundredweight differential existed between steers and heifers of the less than 400 pound class while heifers of the heaviest weight class were only discounted $2.97 per hundredweight compared with steers of a similar (100 lbs. heavier) class (Table 22).

Table 22. Price Differentials Associated With Weight-by-Sex at the Salina, Kansas Auction - 1974.

Weight-by-Sex	Mean Selling Price	Standard Error	95% Confidence Interval
Steers less than 400 lbs.	$43.56	$0.86	$41.85 - $45.28
Steers 401-500 lbs.	$41.43	$0.85	$39.77 - $43.08
Steers 501-600 lbs.	$39.19	$0.81	$37.59 - $40.78
Steers 601-700 lbs.	$37.07	$0.83	$35.44 - $38.69
Steers 701-800 lbs.	$35.83	$0.85	$34.17 - $37.49
Steers 801-999 lbs.	$34.99	$0.82	$33.39 - $36.60
Heifers less than 400 lbs.	$36.27	$0.88	$34.54 - $37.99
Heifers 401-500 lbs.	$34.80	$0.86	$33.12 - $36.48
Heifers 501-600 lbs.	$33.23	$0.84	$31.57 - $34.87
Heifers 601-700 lbs.	$32.63	$0.88	$30.91 - $34.34
Heifers 701-999 lbs.	$32.02	$0.89	$30.27 - $33.77

Transaction Number

In order to determine the influence of transaction order, or time of sale, on final selling price transaction numbers were grouped into three classes: lots 1-10, lots 11-50 and lots 50 and over. Cattle sold in the initial 10 lots had an average selling price of $36.04 per hundredweight (Table 23). The 11-50 class and the 51+ class brought premiums of $0.34 and $0.91 per hundredweight respectively when compared with the first 10 lots sold.

Table 23. Price Differentials Associated with Transaction Number at the Salina, Kansas Auction - 1974.

Transaction Number	Mean Selling Price	Standard Error	95% Confidence Interval
Lots 1-10	$36.04	$0.87	$34.33 - $37.74
Lots 11-50	$36.38	$0.80	$34.81 - $37.95
Lots 50+	$36.95	$0.79	$35.40 - $38.50

Lot-Size

Lot sizes were divided into five classes which were: 1 head, 2-9 head, 10-29 head, 30-49 head and 50+ head. Single unit lots brought an average price of $33.80 per hundredweight while the 50+ head class had a mean selling price of $37.19 per hundredweight for a difference of $3.39 attributed to this variable (Table 24). Lots of the 10-29 head and 30-49 head class both received $0.15 and $0.43 premiums respectively when compared to the largest class.

Breed

As in the earlier analysis, Herefords sold for significantly more than did Angus or Shorthorn cattle. Herefords commanded a price of $37.95 per hundredweight as compared with $33.84 per hundredweight for Angus and

$33.36 per hundredweight for Shorthorns (Table 25). Charolais cattle topped all other breeds with a mean selling price of $39.27 per hundredweight but undue importance should not be attributed to this figure since only one lot of straight Charolais cattle was sold. Dairy breed cattle, surprisingly, brought the second highest average price at $38.42 per hundredweight for its 81 lots sold. No specific reason is known why these cattle commanded such a high price. Possibly it is due to the fact that only one auction instead of six were examined and this differential was characteristic for this particular auction and time period. An explanation offered by the individual collecting information was that dairy breed cattle were characteristically heavier than other breeds being sold and the premium they received was due to the fact that it was more efficient to buy existing gain on feeder cattle (i.e., heavier cattle) than purchasing lighter cattle to be fed to this weight. Cattle classed as Okie #1 were discounted $2.22 per hundredweight relative to Herefords. Angus-Hereford crosses brought $0.93 per hundredweight less than did straight grade Herefords.

Table 24. Price Differentials Associated With Lot Size at the Salina, Kansas Auction - 1974.

Lot Size	Mean Selling Price	Standard Error	95% Confidence Interval
1 head	$33.80	$0.78	$32.27 - $35.33
2-9 head	$36.32	$0.79	$34.78 - $37.86
10-29 head	$37.34	$0.81	$35.76 - $38.93
30-49 head	$37.62	$0.93	$35.79 - $39.44
50+ head	$37.19	$0.98	$35.27 - $39.11

Fill

Although no significant price difference existed between normal, under and over-filled cattle their mean selling prices varied in an unexpected pattern. Normal filled cattle brought an average selling price of $37.06

per hundredweight while over-filled cattle were discounted $1.60 per hundredweight relative to the normal base (Table 26). Surprisingly, thin or under-filled cattle which expectedly would sell for a premium were discounted $0.22 per hundredweight compared to the normal base but this difference was not statistically significant.

Table 25. Price Differentials Associated With Breed at the Salina, Kansas Auction - 1974.

Breed	Mean Selling Price	Standard Error	95% Confidence Interval
Angus	$33.84	$1.00	$31.87 - $35.81
Hereford	$37.95	$0.98	$36.03 - $39.87
Shorthorn	$33.30	$1.17	$31.00 - $35.60
Charolais	$39.27	$3.61	$32.18 - $46.36
Dairy	$38.42	$1.94	$34.63 - $42.21
Okie #1	$35.73	$1.19	$33.41 - $38.06
Angus-Hereford Mixed	$36.91	$1.00	$34.93 - $38.88
Angus-Shorthorn Mixed	$35.02	$1.71	$31.66 - $38.37
Angus-Charolais Mixed	$34.80	$1.25	$32.35 - $37.26
Hereford-Shorthorn Mixed	$36.34	$2.64	$31.17 - $41.54
Hereford-Charolais Mixed	$35.84	$1.99	$31.93 - $39.75
Dairy-Okie #1 Mixed	$35.21	$3.71	$27.94 - $42.48
Angus-Hereford Cross	$37.02	$1.00	$35.05 - $38.98
Angus-Charolais Cross	$36.11	$1.18	$33.81 - $38.42
Angus-Dairy Cross	$36.15	$1.23	$33.73 - $38.56
Hereford-Shorthorn Cross	$34.70	$2.22	$30.35 - $39.05
Hereford-Charolais Cross	$36.50	$1.01	$34.52 - $38.48
Hereford-Dairy Cross	$40.78	$2.64	$35.61 - $45.96
Shorthorn-Charolais Cross	$32.13	$2.64	$26.97 - $37.29
Shorthorn-Dairy Cross	$41.64	$3.98	$33.83 - $49.44
Charolais-Dairy Cross	$37.88	$1.73	$34.50 - $41.28

Table 26. Price Differentials Associated with Livestock Fill at the Salina, Kansas Auction - 1974.

Fill	Mean Selling Price	Standard Error	95% Confidence Interval
Under	$36.84	$0.96	$34.97 - $38.72
Normal	$37.06	$0.78	$35.53 - $38.59
Over	$35.46	$0.84	$33.83 - $37.10

Grade

Cattle sold were graded as either: prime and high choice (combined), medium choice, low choice, high good, medium good, low good, standard or utility. Medium choice cattle brought a premium relative to all other grades with a mean selling price of $40.60 per hundredweight (Table 27). Prime and high choice cattle were discounted $2.01 per hundredweight. This is an unexpected price difference. Low choice cattle were discounted $1.07 per hundredweight relative to medium choice. Utility grade cattle brought less than all other grades with a mean selling price of $28.89 per hundredweight. The reason why prime and high choice cattle sold at a discount relative to other grades is unclear. An explanation offered by the individual who gathered this data and who has had extensive experience in the beef cattle industry was that this grade of animal tended to be fleshy and was less efficient in terms of weight gained than animals of a slightly lower grade. He also emphasized that this was especially true for the initial period directly after purchase.

Table 27. Price Differentials Associated With Grade at the Salina, Kansas Auction - 1974.

Grade	Mean Selling Price	Standard Error	95% Confidence Interval
Prime and High Choice	$38.59	$1.06	$36.51 - $40.66
Medium Choice	$40.60	$0.76	$39.11 - $42.09
Low Choice	$39.53	$0.74	$38.08 - $40.98
High Good	$38.65	$0.73	$37.22 - $40.07
Medium Good	$36.75	$1.00	$34.77 - $38.72
Low Good	$35.72	$1.55	$32.68 - $38.76
Standard	$32.92	$2.27	$28.48 - $37.36
Utility	$28.89	$4.16	$20.74 - $37.04

Fleshiness

Fleshiness, the degree of finish or fat an animal has relative to its weight, proved to be a significant variable unlike the earlier 1972 data. Cattle of normal fleshiness sold for $36.71 per hundredweight while fleshy cattle were discounted $1.08 per hundredweight relative to normal fleshiness (Table 28). Thin cattle brought a premium of $0.32 per hundredweight compared to the normal base.

Table 28. Price Differentials Associated with Fleshiness at the Salina, Kansas Auction - 1974.

Fleshiness	Mean Selling Price	Standard Error	95% Confidence Interval
Thin	$37.03	$0.80	$35.46 - $38.60
Normal	$36.71	$0.80	$35.14 - $38.27
Fleshy	$35.63	$0.83	$34.00 - $37.26

Buyer Desirability

Also in contrast with the earlier analysis, buyer desirability proved to be a significant variable at the Salina auction market. Buyer desirability is the term used to refer to the classification of cattle as the fresh or trader variety. Trader cattle were discounted $1.35 per hundredweight relative to fresh cattle but this difference was not statistically significant (Table 29).

Table 29. Price Differentials Associated with Buyer Desirability at the Salina, Kansas Auction - 1974.

Type of Cattle	Mean Selling Price	Standard Error	95% Confidence Interval
Fresh	$37.13	$0.79	$35.59 - $38.67
Trader	$35.78	$0.91	$34.00 - $37.56

Horns

Horn presence was the only variable of the ten considered that proved insignificant in the aggregate analysis (Table 7). Slightly less than 2.0 percent of the lots were classified as horned. Horned lots were discounted $0.29 per hundredweight compared to nonhorned lots (Table 30). This difference is not significant at the 95 percent confidence level.

Table 30. Price Differentials Associated With Horn Presence at the Salina, Kansas Auction - 1974.

Animal	Mean Selling Price	Standard Error	95% Confidence Interval
Horned	$36.31	$0.82	$34.70 - $37.92
Nonhorned	$36.60	$0.79	$35.05 - $38.16

CHAPTER VI

SUMMARY & CONCLUSIONS

Pricing at livestock auctions as in any marketing mechanism is a total of many parts that fit together to form the aggregate. This study has attempted to analyze the individual importance and magnitude of these parts.

Auction location was one variable that could be analyzed only in the 1972 segment of this study. However, the $4.03 price differential that existed between, for example, the Lexington and Emporia markets confirmed what most people in the survey of feedlots, cow-calf and feeder growing operations said about price differences existing among auctions. These auctions may change in terms of price differentials and rankings as shown in the Colorado study (review of literature) thus the results of this study are meant to apply only to the time period in which the study was conducted.

The day of week in which the auction was held was also only applicable to the 1972 data. Friday's auctions, Lexington and Emporia, which proved to have the highest mean selling price were ranked second and sixth in individual mean selling price. They sold for $1.67 per hundredweight more than did the Wednesday auctions, Alliance and Dodge City, which ranked first and fourth in terms of individual mean selling price but this difference was not statistically significant. Further analysis would be necessary to see if these differentials would exist on a monthly or yearly basis.

All lots of feeder cattle were analyzed in the same sex-by-weight classifications and while all price differences that existed in the 1972

segment of the study also existed in the 1974 portion their magnitudes should not be compared directly because of the different price level associated with cattle at these two times. The mean selling price paid for all feeder cattle in the 1972 study was $2.65 per hundredweight more than its counterpart in the 1974 study. This is not an exact differential since grade, weight, and other variables are not held constant between the two studies but are comparable in nature. Heifers were discounted relative to steers and heavier cattle relative to lighter cattle. Although these findings reflect what already has been well known this study quantified the differentials. If producers would compare these differentials when buying feeder cattle while simultaneously considering prices for finished cattle and the relative feeding efficiency of animals of each sex and weight class, better marketing decisions could be made.

A conversation with a livestock owner and operator[16] indicated that most sellers of feeder cattle expressed desire to sell early in the day. By grouping transaction numbers into three classes analysis consistently showed that it was to the sellers benefit to sell later in the day, i.e., after the first fifty lots rather than before.

The determination of the impact that lot size had on final selling price was found to be significant in all data analyzed. Analysis of the 1972 data showed that lots of 50 or more head brought premiums relative to all other lot sizes while the 1974 data revealed that lots of the 30-49 head size brought a premium of $0.42 per hundredweight over the largest lot size but this difference was not significant. The generally positive relationship between price and lot size can be explained by the fact that feedlot operators are looking for fairly large numbers of cattle. Handling,

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[16]Lawrence Clemence, owner and operator of the Farmers and Ranchers Livestock Commission Company, Inc., Salina, Kansas, personal interview, July 21, 1974.

transportation and administrative costs are also minimized when purchasing on a larger scale basis.

In both segments of this study significant differentials existed between the mean selling prices of various breeds of cattle. Herefords sold for a significantly higher price than other breeds. Charolais cattle were discounted $1.66 per hundredweight relative to Herefords in the 1972 portion of this study but received $1.32 per hundredweight premium compared to the same base at the Salina auction in 1974. There was, however, only one lot of straight breed Charolais sold at the Salina sale thus undue importance should not be attached to this finding. Okie #1 and #2 cattle were also discounted relative to straight breed Herefords with Okie #2 receiving the largest discount. Hereford-Angus crosses were discounted $0.22 per hundredweight at the six auctions audited in the fall of 1972 and $0.93 per hundredweight at the Salina auction relative to Herefords. In neither case was the difference statistically significant. This study was not intended to be a complete analysis of the relative economic merits of various breeds. Results of this study apply only to cattle which were sold through selected auctions at the times indicated. Among additional considerations which would need to be investigated are: (1) selling prices of cattle marketed through all other channels e.g. direct sales, special auctions, terminals, etc. (2) selling price of finished cattle by breed, (3) importance attached to cow characteristics such as temperament, mothering ability, calving problems, dehorning problems, etc., (4) and other considerations that might effect selling price.

Fill refers to the amount of feed and water consumed by livestock just prior to sale. In both cases over-filled cattle were discounted

compared to animals of normal fill. The 1972 data showed that thin or under-filled cattle brought a $0.67 per hundredweight premium over the normal fill base while in 1974 they were discounted $0.22 per hundredweight. Both differences were non-significant.

Price differentials associated with grade were as expected with the higher grades bringing higher prices relative to the lower grades in the 1972 data. In the 1974 study the prime and high choice grade was discounted $2.01 per hundredweight relative to medium choice. The remaining grades, low choice through utility, were discounted relative to medium choice with the discount increasing as the grade declined.

Animal fleshiness proved to be a significant variable in the aggregate analysis of the 1974 segment of this study but not in the 1972 portion. In both cases fleshy cattle were discounted relative to cattle of normal fleshiness. Thin (cattle of under-normal fleshiness) brought a premium of $0.43 per hundredweight in the 1972 analysis and $0.32 per hundredweight in the 1974 study relative to the normal base but these differences proved not to be individually significant.

Buyer desirability which refers to whether cattle are of the "fresh" or "trader" variety also proved to be non-significant for the 1972 data but significant in the 1974 analysis. In both cases "fresh" cattle brought a premium over "trader" cattle although this difference was non-significant.

Horn presence was the only variable that in both cases exerted a non-significant influence on the mean selling price of feeder cattle. Horned cattle constituted eight percent of the 1972 sample and only 1.8 percent of the 1974 sample. Price differentials between the horned and nonhorned cattle was $0.29 per hundredweight in 1972 and $0.28 per hundredweight in 1974.

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APPENDIX

Appendix Table 1. Sample Distribution of Breed by Grade at Kansas and Nebraska Auctions - 1972.

Breed		Grade									
		2	3	4	5	6	7	8	9	Total	Mean Grade
Angus	# of lots	21.0	81.0	119.0	99.0	65.0	42.0	23.0	9.0	459	
	# of head	54.0	656.0	1225.0	688.0	574.0	379.0	454.0	17.0	4047	
	Percentage	1.3	16.2	30.3	17.0	14.2	9.4	11.2	0.4	100%	4.52
Herefords	# of lots	49.0	143.0	182.0	121.0	89.0	61.0	43.0	15.0	703	
	# of head	462.0	1572.0	1954.0	636.0	900.0	944.0	706.0	199.0	7373	
	Percentage	6.2	21.3	26.5	8.6	12.2	12.8	9.6	2.7	100%	4.25
Shorthorn	# of lots	0.0	8.0	12.0	7.0	7.0	6.0	1.0	3.0	44	
	# of head	0.0	24.0	41.0	8.0	19.0	16.0	1.0	10.0	119	
	Percentage	0.0	20.2	34.5	6.7	16.0	13.4	0.8	8.4	100%	5.21
Charolais	# of lots	0.0	8.0	19.0	14.0	23.0	18.0	7.0	5.0	94	
	# of head	0.0	28.0	82.0	43.0	82.0	135.0	50.0	11.0	431	
	Percentage	0.0	6.5	19.0	10.0	19.0	31.3	11.6	2.6	100%	5.94
Dairy	# of lots	2.0	4.0	13.0	21.0	18.0	19.0	22.0	25.0	124	
	# of head	4.0	8.0	31.0	154.0	133.0	175.0	199.0	272.0	976	
	Percentage	0.4	0.8	3.2	15.8	13.6	17.9	20.4	27.9	100%	7.16
Okie #1	# of lots	1.0	3.0	6.0	8.0	16.0	10.0	7.0	4.0	55	
	# of head	2.0	12.0	19.0	12.0	37.0	96.0	10.0	22.0	210	
	Percentage	1.0	5.7	9.0	5.7	17.6	45.7	4.8	10.5	100%	6.41
Okie #2	# of lots	1.0	3.0	3.0	8.0	12.0	11.0	5.0	1.0	44	
	# of head	1.0	3.0	3.0	31.0	19.0	42.0	5.0	1.0	105	
	Percentage	0.9	2.9	2.9	29.5	18.1	40.0	4.8	0.9	100%	6.04
Aggregate Mixed Breed	# of lots	1.0	7.0	12.0	14.0	9.0	1.0	7.0	3.0	56	
	# of head	13.0	170.0	313.0	251.0	137.0	15.0	259.0	4.0	1199	
	Percentage	1.1	14.2	26.1	20.9	11.4	1.3	21.6	3.4	100%	5.34

[1]Grade Code: 2-prime and high choice (combined), 3-medium choice, 4-low choice, 5-high good, 6-medium good, 7-low good, 8-standard, 9-utility.

Appendix Table 1. (continued)

Breed		Grade									
		2	3	4	5	6	7	8	9	Total	Mean Grade
Aggregate	# of lots	24.0	93.0	149.0	87.0	51.0	40.0	22.0	19.0	485	
Cross-	# of head	68.0	664.0	1597.0	526.0	520.0	511.0	379.0	271.0	4536	
Breeds	Percentage	1.5	14.6	35.2	11.6	11.5	11.3	8.3	6.0	100%	5.13
Angus	# of lots	1.0	8.0	8.0	10.0	7.0	0.0	5.0	0.0	39	
Hereford	# of head	13.0	157.0	298.0	200.0	120.0	0.0	225.0	0.0	1013	
Mixed	Percentage	1.3	15.5	29.4	19.8	11.8	0.0	22.0	0.0	100%	5.14
Angus	# of lots	0.0	0.0	0.0	1.0	0.0	0.0	0.0	2.0	3	
Shorthorn	# of head	0.0	0.0	0.0	10.0	0.0	0.0	0.0	26.0	36	
Mixed	Percentage	0.0	0.0	0.0	27.8	0.0	0.0	0.0	722.0	100%	7.88
Angus	# of lots	0.0	0.0	1.0	1.0	2.0	1.0	2.0	1.0	8	
Charolais	# of head	0.0	0.0	5.0	28.0	17.0	15.0	34.0	15.0	114	
Mixed	Percentage	0.0	0.0	4.4	24.6	14.9	13.2	29.8	13.1	100%	6.78
Hereford	# of lots	0.0	0.0	3.0	1.0	0.0	0.0	0.0	0.0	4	
Shorthorn	# of head	0.0	0.0	10.0	4.0	0.0	0.0	0.0	0.0	14	
Mixed	Percentage	0.0	0.0	71.4	28.6	0.0	0.0	0.0	0.0	100%	4.28
Hereford	# of lots	0.0	1.0	0.0	1.0	0.0	0.0	0.0	0.0	2	
Charolais	# of head	0.0	13.0	0.0	9.0	0.0	0.0	0.0	0.0	22	
Mixed	Percentage	0.0	59.1	0.0	40.9	0.0	0.0	0.0	0.0	100%	3.818
Angus	# of lots	15.0	65.0	90.0	58.0	37.0	33.0	18.0	12.0	328	
Hereford	# of head	40.0	461.0	1200.0	351.0	479.0	479.0	339.0	244.0	3593	
Cross	Percentage	1.1	12.8	33.4	9.8	13.3	13.3	9.5	6.8	100%	5.33
Angus	# of lots	0.0	3.0	3.0	2.0	0.0	0.0	0.0	1.0	9	
Shorthorn	# of head	0.0	77.0	100.0	50.0	0.0	0.0	0.0	7.0	234	
Cross	Percentage	0.0	32.9	42.7	21.4	0.0	0.0	0.0	3.0	100%	4.03

Appendix Table 1. (continued)

Breed		Grade									
		2	3	4	5	6	7	8	9	Total	Mean Grade
Angus	# of lots	1.0	6.0	14.0	4.0	2.0	1.0	0.0	0.0	28	
Charolais	# of head	1.0	23.0	107.0	21.0	7.0	14.0	0.0	0.0	173	
Cross	Percentage	0.6	13.3	61.8	12.1	4.1	8.1	0.0	0.0	100%	4.30
Angus	# of lots	0.0	6.0	5.0	8.0	5.0	2.0	0.0	0.0	26	
Dairy	# of head	0.0	37.0	20.0	11.0	9.0	2.0	0.0	0.0	79	
Cross	Percentage	0.0	46.9	25.3	13.9	11.4	2.5	0.0	0.0	100%	3.97
Hereford	# of lots	4.0	4.0	21.0	8.0	2.0	2.0	2.0	1.0	44	
Shorthorn	# of head	9.0	15.0	93.0	19.0	2.0	10.0	4.0	1.0	153	
Cross	Percentage	5.9	9.8	60.8	12.4	1.3	6.5	2.6	0.7	100%	4.11
Hereford	# of lots	2.0	5.0	11.0	5.0	3.0	2.0	2.0	3.0	33	
Charolais	# of head	15.0	47.0	72.0	44.0	20.0	6.0	36.0	6.0	246	
Cross	Percentage	6.0	19.1	29.3	17.9	8.2	2.4	14.7	2.4	100%	4.80
Hereford	# of lots	2.0	3.0	4.0	0.0	2.0	0.0	0.0	1.0	12	
Dairy	# of head	3.0	3.0	4.0	0.0	3.0	0.0	0.0	1.0	14	
Cross	Percentage	21.4	21.4	28.6	0.0	21.4	0.0	0.0	7.2	100%	4.14
Shorthorn	# of lots	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	2	
Charolais	# of head	0.0	1.0	0.0	0.0	0.0	0.0	0.0	12.0	13	
Cross	Percentage	0.0	7.7	0.0	0.0	0.0	0.0	0.0	92.3	100%	8.53
Shorthorn	# of lots	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1	
Dairy	# of head	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1	
Cross	Percentage	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100%	4.0
Charolais	# of lots	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	2	
Dairy	# of head	0.0	0.0	0.0	30.0	0.0	0.0	0.0	0.0	30	
Cross	Percentage	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100%	5.0

Appendix Table 2. Sample Distribution of Breed by Grade at Salina Auction - 1974.

Breed		Grade									
		2	3	4	5	6	7	8	9	Total	Mean Grade
	# of lots	18.0	112.0	84.0	5.0	0.0	0.0	0.0	0.0	219	
Angus	# of head	144.0	859.0	6.9	29.0	0.0	0.0	0.0	0.0	1641	
	Percentage	8.8	52.3	34.1	1.8	0.0	0.0	0.0	0.0	100%	3.31
	# of lots	3.0	124.0	250.0	79.0	2.0	0.0	0.0	0.0	458	
Hereford	# of head	39.0	1511.0	1706.0	420.0	2.0	0.0	0.0	0.0	3678	
	Percentage	1.1	41.0	46.4	11.4	0.1	0.0	0.0	0.0	100%	3.68
	# of lots	0.0	8.0	14.0	7.0	0.0	0.0	0.0	0.0	29	
Shorthorn	# of head	0.0	36.0	89.0	11.0	0.0	0.0	0.0	0.0	136	
	Percentage	0.0	26.5	65.4	8.1	0.0	0.0	0.0	0.0	100%	3.81
	# of lots	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1	
Charolais	# of head	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1	
	Percentage	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	100%	5.0
	# of lots	0.0	0.0	0.0	0.0	0.0	1.0	79.0	1.0	81	
Dairy	# of head	0.0	0.0	0.0	0.0	0.0	2.0	498.0	2.0	502	
	Percentage	0.0	0.0	0.0	0.0	0.0	0.4	99.2	0.4	100%	8.0
	# of lots	0.0	0.0	1.0	7.0	7.0	2.0	0.0	0.0	17	
Okie #1	# of head	0.0	0.0	1.0	97.0	111.0	2.0	0.0	0.0	211	
	Percentage	0.0	0.0	0.5	46.0	52.6	0.9	0.0	0.0	100%	5.54
Aggregate	# of lots	1.0	71.0	76.0	16.0	0.0	0.0	0.0	0.0	164	
Mixed	# of head	5.0	1775.0	1371.0	308.0	0.0	0.0	0.0	0.0	3459	
Breed	Percentage	0.2	51.3	39.6	8.9	0.0	0.0	0.0	0.0	100%	3.57
Aggregate	# of lots	3.0	132.0	156.0	61.0	10.0	3.0	4.0	0.0	369	
Cross-	# of head	32.0	848.0	868.0	208.0	17.0	7.0	10.0	0.0	1990	
Breeds	Percentage	1.6	42.6	43.6	10.5	0.8	0.4	0.5	0.0	100%	3.69

[1]See footnote in Appendix Table 1 for explanation of Grading Code.

Appendix Table 2. (continued)

Breed		Grade									
		2	3	4	5	6	7	8	9	Total	Mean Grade
Angus	# of lots	1.0	64.0	58.0	10.0	0.0	0.0	0.0	0.0	133	
Hereford	# of head	5.0	1670.0	1188.0	243.0	0.0	0.0	0.0	0.0	3106	
Mixed	Percentage	0.2	53.8	38.2	7.8	0.0	0.0	0.0	0.0	100%	3.53
Angus	# of lots	0.0	1.0	5.0	0.0	0.0	0.0	0.0	0.0	6	
Shorthorn	# of head	0.0	11.0	40.0	0.0	0.0	0.0	0.0	0.0	51	
Mixed	Percentage	0.0	21.6	78.4	0.0	0.0	0.0	0.0	0.0	100%	3.84
Angus	# of lots	0.0	5.0	10.0	4.0	0.0	0.0	0.0	0.0	19	
Charolais	# of head	0.0	88.0	119.0	51.0	0.0	0.0	0.0	0.0	258	
Mixed	Percentage	0.0	34.1	46.1	19.8	0.0	0.0	0.0	0.0	100%	3.85
Hereford	# of lots	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2	
Shorthorn	# of head	0.0	0.0	22.0	0.0	0.0	0.0	0.0	0.0	22	
Mixed	Percentage	0.0	0.0	100%	0.0	0.0	0.0	0.0	0.0	100%	4.0
Hereford	# of lots	0.0	1.0	1.0	2.0	0.0	0.0	0.0	0.0	4	
Charolais	# of head	0.0	6.0	2.0	14.0	0.0	0.0	0.0	0.0	22	
Mixed	Percentage	0.0	27.3	9.1	63.6	0.0	0.0	0.0	0.0	100%	4.36
Angus	# of lots	3.0	123.0	104.0	18.0	2.0	0.0	0.0	0.0	250	
Hereford	# of head	32.0	784.0	627.0	47.0	2.0	0.0	0.0	0.0	1492	
Cross	Percentage	2.1	52.6	42.0	3.2	0.1	0.0	0.0	0.0	100%	3.46
Angus	# of lots	0.0	5.0	14.0	10.0	0.0	0.0	0.0	0.0	29	
Charolais	# of head	0.0	53.0	60.0	41.0	0.0	0.0	0.0	0.0	154	
Cross	Percentage	0.0	34.4	39.0	26.6	0.0	0.0	0.0	0.0	100%	3.92
Angus	# of lots	0.0	0.0	0.0	8.0	5.0	2.0	0.0	0.0	15	
Dairy	# of head	0.0	0.0	0.0	15.0	12.0	2.0	0.0	0.0	29	
Cross	Percentage	0.0	0.0	0.0	51.7	41.4	6.9	0.0	0.0	100%	5.55

Appendix Table 2. (continued)

Breed		Grade									
		2	3	4	5	6	7	8	9	Total	Mean Grade
Hereford	# of lots	0.0	0.0	2.0	0.0	1.0	0.0	0.0	0.0	3	
Shorthorn	# of head	0.0	0.0	2.0	0.0	1.0	0.0	0.0	0.0	3	
Cross	Percentage	0.0	0.0	66.6	0.0	33.4	0.0	0.0	0.0	100%	4.66
Hereford	# of lots	0.0	4.0	34.0	24.0	0.0	0.0	0.0	0.0	62	
Charolais	# of head	0.0	11.0	176.0	104.0	0.0	0.0	0.0	0.0	291	
Cross	Percentage	0.0	3.8	60.5	35.7	0.0	0.0	0.0	0.0	100%	4.31
Hereford	# of lots	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	1	
Dairy	# of head	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	1	
Cross	Percentage	0.0	0.0	0.0	0.0	50.1	0.0	50.0	0.0	100%	7.0
Shorthorn	# of lots	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	2	
Charolais	# of head	0.0	0.0	3.0	0.0	0.0	0.0	0.0	0.0	3	
Cross	Percentage	0.0	0.0	100.0	0.0	0.0	0.0	0.0	0.0	100%	4.0
Shorthorn	# of lots	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1	
Dairy	# of head	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1	
Cross	Percentage	0.0	0.0	0.0	0.0	0.0	0.0	100.0	0.0	100%	8.0
Charolais	# of lots	0.0	0.0	0.0	1.0	1.0	1.0	2.0	0.0	5	
Dairy	# of head	0.0	0.0	0.0	1.0	1.0	5.0	8.0	1.0	15	
Cross	Percentage	0.0	0.0	0.0	6.7	6.7	33.3	53.3	0.0	100%	7.33

AN ANALYSIS OF FEEDER CATTLE PRICING DETERMINATES AT KANSAS AND NEBRASKA AUCTIONS

by

PHILIP RAY HUSTON

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ABSTRACT

A 1971 survey of Kansas and Nebraska cow herd owners, feeder cattle growers and feedlot operators indicated that discrepancies existed in feeder cattle prices both within local markets and between markets. To determine the validity of these reports specific variables were examined at six selected Kansas and Nebraska auctions for a period of three weeks in the fall of 1972 in order to analyze their exact effect on final selling price of feeder cattle. Auction selection was based on geographical distribution and volume of livestock handled. Lack of detailed published data on local auction prices necessitated the collection of original data by university and extension personnel. A N-way analysis of variance procedure was used to analyze this data. The desire for a longer time series study resulted in a similar, additional study being conducted for a period of eight weeks beginning March 21, 1974.

The analysis of 1972 data indicated that all variables except buyer desirability, fleshiness and horn presence exerted significant influence on the final selling price of feeder cattle at Kansas and Nebraska auctions in 1972 (note following table). Variables that were significant are: location of auction, day of sale, transaction number, lot size, sex-weight, breed, fill, and grade. A similar study conducted at Salina in the fall of 1974 analyzing the same variables indicated that all variables were significant at the ninety-five percent confidence level except horn presence.

PROBABILITY AND SIGNIFICANCE OF VARIABLES ANALYZED IN THE 1972 AND 1974 SEGMENTS OF THIS STUDY

	1972 Data		1974 Data	
Variable	Probability	Significance	Probability	Significance
Auction	0.0000	significant		not apply
Sale Order	0.0080	significant	0.0140	significant
Lot Size	0.0000	significant	0.0000	significant
Sex-Weight	0.0000	significant	0.0000	significant
Breed	0.0000	significant	0.0000	significant
Fill	0.0001	significant	0.0001	significant
Grade	0.0001	significant	0.0000	significant
Day	0.0000	significant		not apply
Buyer Desirability	0.1931	nonsignificant	0.0282	significant
Fleshiness	0.0814	nonsignificant	0.0006	significant
Horn Presence	0.2815	nonsignificant	0.3828	nonsignificant
Week		not apply	0.0000	significant

[1]Variables are considered statistically significant at the 95 percent confidence level if their probability is less than .05.