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by

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A Comparison of Traditional Livestock Auctions, Teleauctions, and Satellite Video Auctions: Price Differences Between Markets

Beth Adams and Steve Turner[1]

Research was conducted comparing the price differences observed in traditional livestock auctions, teleauctions, and satellite video auctions. Several significant price differences were found to exist between the three auction markets. The largest and most significant differences occurred between the teleauctions and the local sale barn auction and between the satellite video auction and the local sale barn auction. Price determination results of this study were found to be similar to previous price determination studies. The price differences are believed to be the result of the differing emphasis that is placed on various cattle characteristics in each of these markets. This study tests the relevant variables which determine the price differences between the three markets using data from each of the cattle auctions.

INTRODUCTION

The emergence of electronic markets in the livestock industry can be attributed to an attempt to increase both technical and allocative efficiencies. Teleauctions were an initial form of electronic marketing with computerized trading systems being the latest progression. But computerized trading systems never succeeded in livestock to any great degree (Henderson; Schrader). Instead, satellite video auctions have become the dominant form of electronic marketing for livestock.

Since prices incorporate and synthesize differences in time, space and form, price differences are thought to reveal crucial information in competitive environments. Thus, prices generated by alternative market institutions have traditionally been a rich area of research. Price differences observed in and between traditional livestock auctions, teleauctions, and satellite video auctions are believed to be the result of the interaction of several factors (Bailey et al.; Schroeder et al.; Turner et al.). These differences are hypothesized to exist due to the different emphasis placed on various cattle characteristics in each of these markets and upon specific market characteristics.

This study extends electronic marketing pricing research by examining price differences between traditional livestock auctions, teleauctions, and satellite video auctions. The major contribution is the examination between teleauctions and satellite video auctions but the objectives are three-fold. First, the price differences between the three markets are documented and discussed. Second, cattle and market characteristics important in determining prices are investigated. Third, marketing strategies based on the above results are proposed for buyers, sellers, and market operators. Georgia feeder cattle are the commodity traded over the three markets.

Description of Auctions

Traditional livestock auctions bring sellers of cattle and buyers of cattle together at a specific location. At these auctions, sellers are usually responsible for transporting the cattle to the auction and buyers are responsible for transporting the cattle from the auction site. Therefore, both buyers and sellers are restricted by distance constraints. The greater

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the distance for the buyer or seller to the auction site, the greater the transportation costs and time involved. At the sale barn auction, cattle are brought into the viewing ring individually or in small groups. Potential buyers are seated around the ring and can place bids on the cattle once the auction begins. As each lot of cattle is sold another lot is brought in and bidding begins again. Sale barn auctions are held in many cities and counties throughout Georgia. Auctions typically occur weekly but some are more variable.

Teleauctions differ from sale barn auctions in several ways. Where sale barn auction buyers actually view the cattle before placing bids, teleauction buyers can bid without seeing the cattle. Instead, bids are made over the telephone as the auction occurs. Weeks before the auction, potential buyers receive information sheets on the cattle to be sold. The information sheets contain the seller's name, address, and telephone number; health treatments the cattle have received; a classification of the muscle, frame, and grade of the cattle; estimated weights and weighing conditions; breed and sex of the cattle; the number of head of cattle in the lot and the order of sale in the auction. Any questions potential buyers have about the cattle can then be addressed before the teleauction occurs.

Satellite video auctions are, in effect, the result of a merger between traditional livestock auctions and teleauctions. These auctions are rapidly becoming a popular alternative for selling cattle (Scharlier). Satellite video auctions combine the traditional livestock auction advantage of viewing the cattle with the convenience of the teleauction. Video auctions have two separate components- the sales catalogue or written part and the video or visual part. The sales commission usually includes a videotaping fee unless the bid is rejected by the seller. A regional representative of the satellite video auction is responsible for taping the cattle and the sales catalogue descriptions are then prepared by the auction company and the seller (Bailey et al.). Potential buyers receive the sales catalogues on the cattle several weeks prior to the sale. Buyers must pre-register with the satellite video auction and receive a buyer number to be eligible to participate in the auction. The auction occurs at a central location and is then transmitted via satellite throughout the United States. The videotapes on each lot (about two minutes in length) are usually shown sometime before the sale and as the auctioneer solicits bids on sale day. Buyers can bid in person or by telephone as the auction occurs (Bailey et al.).

Data, Procedures, and Model

Primary and secondary data were used in this study. Primary data came from two teleauctions in Georgia and one satellite video auction. The teleauction data came from the Red Carpet Cattlemen's Association, which began operation in 1976, and the Georgia Farm Bureau Marketing Association, begun in 1979. The satellite video auction data, for Georgia cattle, was obtained from the Superior Livestock Auction, the largest video livestock auction in the United States. Secondary data included futures data from the Chicago Mercantile Exchange, as reported in the Wall Street Journal, as well as sale barn auction data obtained from the United States Department of Agriculture (Georgia Livestock Market News). The sale barn data was for similar cattle sold on the same day as the teleauction or satellite video auction. A median sale barn price was used. All data was from 1990 and 1991. Table 1 presents basic information on the three electronic markets examined.

To determine the price differences which exist between the three markets, data were separated by six variables: year, month, sex, estimated weight, frame and flesh. These classifications are based upon previous research by Menkaus and Kearl, Schroeder et al., and Turner et al. The differences were determined between each teleauction and the nearby sale barn auction and between the satellite video auction and the nearby sale barn auction. Nearby sale barn auction was defined as being the closest to the seller's location. In addition, the teleauctions and satellite video auction price differences were compared using the nearby sale barn price as the unifying base. Data that was not comparable between the three markets was not included in the analysis. The differences of the similar

data were then used to find a mean difference. A t-statistic was calculated for the mean difference and the significance of the difference was determined.

Feeder cattle price determination is dependent upon several factors. Specific cattle characteristics including weight, breed, grade, sex, health treatments, muscle, frame, and flesh have been analyzed to determine the impact each one has on price. Market characteristics have also been examined to obtain the price impacts. These characteristics include market location, lot size, order of lot in the auction, and futures prices (Schroeder et al.; Lambert et al.).

Following research conducted by Menkaus and Kearl, Schroeder et al., and Turner et al., a general model was developed to determine teleauction feeder cattle prices. The general model was then customized for use with the data available for each teleauction and for the satellite video auction. The modified model was somewhat unique for each organization depending upon the amount and type of information collected. The general model was specified as follows:

$$P = f(S_j, FR_j, MSC_j, FL_j, EW_j, SEX, HEAD, LOTNO, TREND, H_j, B_j, SHRINK, HAUL, CUTBACK, FCF, PDOA, TOTLOT, TOTBUY),$$

where:

S_j = 1 if season = j,
= 0 otherwise,
where j = 1 if winter,
= 2 if spring,
= 3 if summer,
= 4 if fall;

FR_j = 1 if frame = j,
= 0 otherwise,
where j = 1 if medium and large,
= 2 if medium,
= 3 if small;

MSC = 1 if Grade 1,
= 0 otherwise;

FL_j = 1 if flesh = j,
= 0 otherwise,
where j = 1 if heavy,
= 2 if medium,
= 3 if light;

EW_j = 1 if weight = j,
= 0 otherwise,
where j = 3 if 300-399 lbs.,
= 4 if 400-499 lbs.,
= 5 if 500-599 lbs.,
= 6 if 600-699 lbs.,
= 7 if 700-799 lbs.;
= 8 if 800-899 lbs.,
= 9 if 900-999 lbs.;

SEX = 1 if steers,
= 0 if heifers;

HEAD = number of cattle in the lot;

HEAD2 = number of cattle in the lot squared;

LOTNO = order of lot in the auction;

TREND = number of auctions in data set;

H_j = 1 if health treatment = j,
= 0 otherwise,

where j = 1 if cattle were dewormed,
= 2 if cattle were treated for external parasites,
= 3 if cattle were given a growth stimulant,
= 4 if cattle were treated for a specific disease,
= 5 if cattle were dehorned, tattooed, etc.,
= 6 if cattle were weaned,
= 7 if cattle were described as preconditioned;

B_j = 1 if breed was greater than or equal to 50% of the lot;
= 0 otherwise,
where j = 1 if Hereford or Hereford dominant cross,
= 2 if Angus or Angus dominant cross,
= 3 if Brahman or Brahman dominant cross,
= 4 if Exotic or Exotic dominant cross,
= 5 if Dairy breed,
= 6 if Mixed;

SHRINK = 1 if shrink was allowed,
= 0 otherwise;

HAUL = 1 if cattle were hauled to pick-up point,
= 0 otherwise;

CUTBACK = 1 if buyer has right to cull specified percentage of cattle at shipping,
= 0 otherwise;

FCF = closing feeder cattle futures price for the nearby contract on the day the teleauction occurred;

PDOA = nearby sale barn price for similar cattle, the day the teleauction occurred;

TOTLOT = total number of lots in the teleauction;

TOTLOT2 = TOTLOT squared;

TOTBUY = total number of different buyers in the teleauction.

These independent variables were chosen based upon the consistency of each across the three markets and because they have been used in previous feeder cattle price determination studies (Turner et al.; Schroeder et al.; Dykes). The base lot used for comparison was a medium frame, medium flesh, muscle grade 2 heifer sold in the spring. The heifers had no known health treatments, weighed 500-599 lbs., and were no more than 50 percent of any particular breed. The parameters were estimated by the use of Ordinary Least Squares.

The individual teleauction and satellite video auction models were adjusted to take into account the differences in the variables specified for each organization. The satellite video auction data used did not include health treatments (H_i), a HAUL variable, or a CUTBACK variable in the data set. The model did include an implant variable (IMP) that showed whether or not the cattle had been implanted. A variable for horns (HORN) was included in this model, also. These variables were specified as follows:

HORN = 1 if cattle had horns,
= 0 otherwise;

IMP = 1 if cattle were implanted,
= 0 otherwise;

The teleauction models did not contain these variables.

Results

The results of the paired t-test are followed by the price determination model results. Then specific strategies are suggested based on the above results.

Paired Price Differences

The results of the paired t-test are given in Table 2. The mean price difference in each comparison is given, along with the standard error, t-value, and number of observations. The first three comparisons are the price differences between each teleauction organization and satellite video auction and the sale barn auctions. The next set of comparisons is the price differences between the teleauctions themselves and the teleauctions and the satellite video auction. Finally, the price differences observed between the satellite video auction and each of the teleauctions are determined, using the sale barn data as a base.

The difference between Red Carpet Cattlemen's Association (RC) teleauction price and the median sale barn price was $3.20 per hundredweight (cwt.) with a t-value of 9.40. This difference was significant at the 99% confidence level. The mean price difference between the Georgia Farm Bureau Marketing Association (GFB) teleauction price and the sale barn (SB) auction price was significant at the 0.01 level. The t-value was 4.70 for the mean price difference of $2.64/cwt. The Superior Livestock Auction (SLA) mean price difference of $1.25/cwt. was significant at the 0.01 level. Superior Livestock Auction data contained 127 observations, as compared to the 78 observations from Georgia Farm Bureau. These numbers are substantially lower than the 216 observations from the Red Carpet market.

The mean price difference between the two teleauctions was $1.09/cwt. and significant at the .01 level. However, only 28 observations could be included in the analysis due to incomparable time periods and cattle characteristics. The mean differences between the satellite video auction and the teleauctions were $0.94/cwt. (significant at .01 level) for Red Carpet and -$0.14/cwt. for Georgia Farm Bureau. Again, the sample was small in each of these comparisons. The Red Carpet model contained 55 observations while only 15 observations were included in the Georgia Farm Bureau model.

Another approach to examining the price differences between the electronic markets is to use the local sale barn prices as a base. A seasonal breakout of the months was used instead of comparing only cattle sold in the same month. The three seasonal patterns used to pair the cattle were:

(1) January-March
(2) April-June
(3) July-December.

This method enables more lots of cattle to be examined. The mean difference between Red Carpet Cattlemen's Association and Superior Livestock Auction was $0.67/cwt. and was not significant at the 0.10 level. The $1.50/cwt. difference between Georgia Farm Bureau Marketing Association and Superior Livestock Auction was also not significantly different from zero at the .10 level. The mean difference between the two teleauctions was -$0.67/cwt. and was not significant at the 0.10 level.

Overall, the results were consistent with expectations. The standard error consistently decreased with increasing number of observations, and vice versa. The most dramatic differences were between the electronic markets and the sale barn auctions. These price differences are hypothesized to exist due to the increased information and efficiency inherent in electronic trading relative to traditional livestock auctions. Some inter-electronic market differences were detected, but no significant differences existed when the electronic market lots of cattle were standardized by the local sale barn prices.

Price Determination

The base lot for the price determination comparison was a medium frame, medium flesh, muscle grade 2 heifer sold in the spring. This lot of heifers had no known health treatments, weighed 500-599 lbs., and no particular breed composed more than 50% of the lot.

The parameter estimates and t-values for Red Carpet Cattlemen's Association price determination model are given in Table 3. The model accounted for approximately 79 percent of the price variation and had an F-value of 23.83 which was significant at the 0.01 level.

Two of the seasonal variables were significant at the 0.01 level. Fall had an impact of $2.88/cwt. relative to the base season which was spring. Summer had a positive price impact of $4.90/cwt. on cattle price relative to spring. The seasonality of cattle prices can be used by producers (sellers) when developing marketing strategies. Light frame cattle had a -$3.94/cwt. impact on price and was significant at the 0.05 level. Grade 1 muscled cattle had a $2.37/cwt. impact on price, which was significant at the 0.01 level. The heavier weight classes revealed significant price discounts, which increased the heavier the cattle became. Relative to 500-599 lb. cattle, 600-699 lb. lots received a -$2.24/cwt. discount while 700-799 lb. lots were discounted by -$4.76/cwt. and 800-899 lb. cattle were discounted by -$7.87/cwt. Steers received a $3.95/cwt. premium over heifers. Lots with over 50% of Hereford or Hereford dominant breeds received a discount of -$2.69/cwt., while mixed breeds received discounts of -$1.94/cwt.

There appears to be a significant negative trend of -$0.20/cwt. over the time period examined for the Red Carpet market. The number of head in a lot (HEAD) was significant at the 0.01 level and had a $0.07/cwt. impact on price. Number of head squared (HEAD2) was significant at the 0.01 level. This implies a curvilinear relationship exists between price and the number of cattle in a lot. As the number of head in a lot increases up to approximately 118 cattle, price also increases. Once this optimum is reached, price begins to decrease.

The number of lots of cattle in an RC auction also appears to have a significant curvilinear relationship with price. More lots implies higher price. This relationship holds for auctions of 18 lots or less. Feeder cattle futures price had a $0.62/cwt. impact on price and was significant at the 0.01 level. As the nearby feeder cattle futures price increased by $1.00/cwt., the Red Carpet price increased by $0.62/cwt. Sale barn price (PDOA) had a positive impact of $0.14/cwt. on teleauction price and was significant at the 0.10 level. The total number of buyers in each auction (TOTBUY) was a significant influence on price at the 0.05 level. TOTBUY had a -$0.76/cwt. impact on price which was contrary to what would be expected.

The Georgia Farm Bureau Marketing Association price determination results are given in Table 4. This model accounted for approximately 66 percent of the price variation and had an F-value of 5.99 which was significant at the 0.01 level. One of the seasonal variables showed significance at the 0.10 level. Fall had a -$4.53/cwt. impact on teleauction price relative to the base season of spring. Small framed cattle received a discount of -$8.39/cwt. relative to medium framed cattle. This was significant at the 0.05 level. In this teleauction, only 700-799 lbs. (-$6.05/cwt.) and 800-899 lbs. (-$7.54/cwt.) cattle received significant discounts relative to the base weight of 500-599 lbs. Steers received a premium of $3.95/cwt.

Allowing buyers to cull cattle at shipment (CUTBACK) resulted in a significant premium ($2.34/cwt.). Unweaned cattle that weighed over 500 lbs. received a premium of $5.33/cwt. Feeder cattle futures prices were significant at the 0.01 level and had a positive impact of $0.84/cwt. on the teleauction price. This auction showed the closest relationship between auction prices and the futures market. HEAD, HEAD2, TOTLOT, TOTLOT2, and TOTBUY were not found to be significant at the 0.10 level in this model.

Superior Livestock Auction parameter estimates and t-values for the price determination model are given in Table 5. This model accounted for approximately 83 percent of the price variation. The model had an F-value of 21.46 which was significant at

the 0.01 level. Winter lots received a significant discount (-$2.77/cwt.) relative to the base season which was spring. Light flesh cattle received a $1.70/cwt. premium compared to medium flesh cattle. This variable was significant at the 0.05 level. All of the estimated weights included in the model were significant at the 0.01 level. Cattle weighing over 600 lbs. received a price discount relative to the base weight of 500-599 lbs. cattle. These discounts increased from -$3.45/cwt. for 600-699 lbs. cattle to -$10.24/cwt. for 900-999 lbs. cattle. Cattle weighing 400-499 lbs. received a $7.33/cwt. premium relative to the base weight. Steers had a price premium of $4.21/cwt. which is significant at the 0.01 level. Cattle with horns received a price discount of -$2.08/cwt. which was significant at the 0.01 level.

Dairy breeds displayed a significant -$10.53/cwt. impact on satellite video auction price. This large price discount is not surprising since dairy breeds typically receive price discounts in feeder cattle auctions (Turner et al).

Feeder cattle futures price was significant at the 0.01 level and had an impact of $0.70/cwt. on satellite video auction price. As feeder cattle futures prices rise, satellite video auction prices rise, also. The order of the lot in the auction (LOTNO) had a significant (0.05 level) and slightly negative (-$0.001/cwt.) impact on price. TOTLOT and TOTLOT2 were also significant at the 0.05 level and had impacts of $0.14/cwt. and -$0.0015/cwt., respectively. Again, this demonstrates the curvilinear relationship between total number of lots in an auction and feeder cattle price with the optimal number of lots being about 47 lots. Of course, this optimal number is generated using a subset of the total number of lots traded in the Superior Livestock Auction.

Suggested Strategies

Selected marketing strategies are recommended based primarily on the previous price determination model results. These strategies are specific to Georgia sellers, buyers, and auction operators of feeder cattle and are appropriate to time periods closest to the period of analysis. Strategies for sellers will be discussed first, followed by suggestions for buyers, then market operators.

Sellers of feeder cattle in Georgia now face the three market alternatives examined in this study, in addition to graded and pooled sales, and private treaty selling. All six of these alternatives have advantages and disadvantages (McKissick and Brown). But this analysis has shown that electronic marketing of feeder cattle is a viable alternative in Georgia. As concerns cattle characteristics, the three markets give premiums to lighter (400-599 lbs.), medium frame steers sold in the summer and fall. Each market also had unique premiums and discounts. Red Carpet discounted heavier frame cattle and Hereford and Mixed breeds while Grade 1 muscled cattle received a premium. Georgia Farm Bureau discounted small frame cattle severely. Offering buyers the opportunity to cull cattle at pickup had a positive impact on price in the GFB market. Sellers should be aware that reporting unweaned calves can have positive impacts on price. In the GFB auction, unweaned cattle received a significant premium. Superior Livestock, the satellite video auction, generated premiums for light flesh cattle also but discounted cattle with horns. As would be expected, dairy breeds were severely discounted.

The main strategies for buyers would relate more to market characteristics. For example, knowledge of the relationship between price and futures price or nearby sale barn price could be beneficial. GFB price appears to move almost perfectly with feeder cattle futures price, while Red Carpet responds less rapidly. On the other hand, the relationship between GFB price and local prices is not as significant as the other two markets examined. Another important result to buyers in the RC market is the negative impact of more buyers. Economic theory does not support this result, though experimental economics research indicates that competitive equilibrium prices arise with as few as six buyers (Smith; Plott). One within auction strategy for buyers relates to the order of the lot. Previous livestock auction research indicated a significant negative relationship between price and order

(Buccula; Schroeder et al; Turner et al). But the teleauctions examined here do not support these previous findings. The SLA market does appear to still maintain this relationship though at the lowest rate of any previous findings.

Each market operator can effectively utilize the information of this study with respect to both cattle and market characteristics. The findings that relate to cattle characteristics should be clearly communicated to sellers. Cattle in the Red Carpet market receive premiums for muscle Grade 1 and being in larger lots (up to 118) and discounts for large frames and being Hereford and Mixed breeds. Cattle in the GFB market were discounted for small frames and reporting that the cattle were weaned. Premiums in the GFB market were associated with allowing cattle to be culled at pickup. In the SLA market, light flesh was rewarded with price premiums while cattle with horns were discounted.

Important market characteristics also differed across the three markets examined. The optimal number of lots in the RC market appears to be 18 lots over the study period, while for the SLA market the optimal number of Georgia lots appears to be 47. Likewise, the rate of auction price change and futures price change varies across the three markets. GFB has almost a perfect relationship with the futures market, while both SLA and RC have less strong relationship.

Conclusions

Electronic markets have been around for more than 30 years. They change and evolve dependent on technology, perceived problems, and institutional impetus. The livestock industry has been a heavy experimenter with this type of marketing. Yet few successful electronic markets of livestock exist today. Three of these trade feeder cattle in Georgia. Two of them are teleauctions and solicit cattle primarily from Georgia (Red Carpet and Georgia Farm Bureau). The other is a satellite video auction and solicits cattle from across the United States. One objective of this study was to compare prices received in the three markets for similar cattle. This was done by using local (to the seller) sale barn prices as a base of comparison. Results indicate that significant price differences exist between all three markets and the local sale barn prices. But no significant differences existed between the teleauctions and the satellite video auction. This results implies increased efficiencies associated with electronic markets are primarily incurred in the initial change from traditional to electronic. These results do not imply that continued gains in efficiency cannot be attained by continued evolution, such as the combination of satellite video and telephone technology.

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Table 1. Descriptive Data for Auction Organizations (1990-1991).

Auction Organization			
Characteristic	Red Carpet Cattlemen's Association	Georgia Farm Bureau	Superior Livestock Auction (Georgia Cattle)
Beginning Date	01-09-90	01-17-90	02-24-90
Ending Date	11-12-91	10-09-91	12-21-91
Years in Study	2	2	2
Number of Auctions	14	13	33
Average Number of Auctions Per Year	7	6.5	16.5
Number of Lots	216	78	233
Average Lots Per Auction	31	12	7
Total Head	10,699	6,693	19,706
Average Head Per Auction	764	515	597
Average Head Per Lot	50	86	85
Number of Steers	6,335	4,310	13,211
Number of Heifers	4,334	2,383	6,495
Maximum Head Per Lot	240	240	440
Minimum Head Per Lot	3	22	22
Number of Buyers	31	27	38
Number of Sellers	52	25	---*

* Seller data not supplied in data set.

Table 2. Paired t-test Results for Average Price Differences (1990-1991).

Category	Mean ($/cwt.)	Std Error	t-value	N
RC-SB	3.2081	0.3412	9.4013***	216
GFB-SB	2.6471	0.5628	4.7030***	78
SLA-SB	1.2549	0.4376	2.8676***	127
GFB-RC	1.0964	0.6426	1.7061*	28
SLA-RC	0.9473	0.5699	1.6622*	55
SLA-GFB	-0.1467	0.8615	-0.1702	15
(RC-SB)-(SLA-SB)	0.6709	0.7442	0.9016	74
(GFB-SB)-(SLA-SB)	1.5047	1.0242	1.4691	47
(RC-SB)-(GFB-SB)	-0.6728	0.6833	-0.9846	60

* = significant at the .10 level ** = significant at the .05 level *** = significant at the .01 level.

RC = Red Carpet Cattlemen's Association
GFB = Georgia Farm Bureau Marketing Association
SLA = Superior Livestock Auction
SB = Local Sale Barn auction.

Table 3. Parameter Estimates and t-values for Red Carpet Cattlemen's Association Price Determination Model.

Independent Variables	Parameter Estimates	t-values
Intercept	12.0858	1.21
$Season_1$	1.1750	1.52
$Season_3$	4.9005	3.62***
$Season_4$	2.8847	2.54***
$Frame_1$	-3.9430	-2.17**
$Frame_3$	-0.8463	-1.12
Muscle	2.3796	2.70***
$Flesh_1$	0.9379	0.35
$Flesh_3$	0.6221	0.59
$Weight_3$	-0.9264	-0.63
$Weight_5$	-2.2438	-3.12***
$Weight_6$	-4.7651	-5.40***
$Weight_7$	-7.8758	-6.58***
SEX	3.9502	6.10***
HEAD	0.0705	3.86***
HEAD2	-0.0003	-2.90***
LOTNO	-0.0457	-1.20
TREND	-0.2006	-2.79***
Health $treatment_1$	1.9418	1.40
Health $treatment_2$	0.2827	0.11
Health $treatment_3$	-1.5325	-0.91
Health $treatment_4$	0.4360	0.77
Health $treatment_6$	1.0592	1.36
Health $treatment_7$	0.8624	0.81
$Breed_1$	-2.6969	-2.52***
$Breed_2$	-0.1904	-0.39
$Breed_3$	1.6325	1.36
$Breed_4$	0.4189	0.90
$Breed_6$	-1.9404	-1.93**
SHRINK	0.0389	0.07
CUTBACK	-1.9412	-1.59*
FCF	0.6265	5.12***
PDOA	0.1433	1.64*
TOTLOT	0.7931	4.16***
TOTLOT2	-0.0216	-4.78***
TOTBUY	-0.5452	-1.93**
SUMMARY STATISTICS		
R^2 = .8323	F-value$_{(34,170)}$ = 23.83	
Adjusted R^2 = .7974	Dependent Mean = 82.2900	
Degrees of Freedom = 169	N = 204	

* = significant at the .10 level ** = significant at the .05 level *** = significant at the .01 level.

Table 4. Parameter Estimates and t-values for Georgia Farm Bureau Marketing Association Price Determination Model.

Independent Variables	Parameter Estimates	t-values
Intercept	4.4085	0.18
$Season_1$	-1.4856	-0.70
$Season_3$	-2.6013	-0.78
$Season_4$	-4.5295	-1.70*
$Frame_1$	-0.1194	-0.09
$Frame_3$	-8.3890	-2.19**
Muscle	-1.3915	-0.81
$Flesh_3$	1.7783	1.01
$Weight_6$	-1.2008	-0.74
$Weight_7$	-6.0536	-2.78***
$Weight_8$	-7.5412	-2.91***
SEX	3.9458	2.84***
HEAD	0.0492	1.35
HEAD2	-0.0001	-0.84
LOTNO	-0.2938	-1.31
TREND	-0.0872	-0.39
Health $treatment_1$	-2.6663	-1.24
Health $treatment_2$	0.9117	0.59
Health $treatment_3$	-0.6545	-0.47
Health $treatment_5$	0.3870	0.18
Health $treatment_6$	-5.3302	-2.05**
$Breed_1$	2.7585	1.10
$Breed_2$	0.5902	0.67
$Breed_4$	2.2499	0.85
CUTBACK	2.3365	2.16**
FCF	0.8394	2.57***
PDOA	0.1069	0.61
TOTLOT	1.5633	0.75
TOTLOT2	-0.1603	-1.23
TOTBUY	1.1667	1.37

SUMMARY STATISTICS	
R^2 = .7871	F-value$_{(28,49)}$ = 5.99***
Adjusted R^2 = .6557	Dependent Mean = 84.7136
Degrees of Freedom = 48	N = 77

* = significant at the .10 level ** = significant at the .05 level *** = significant at the .01 level.

Table 5. Parameter Estimates and t-values for Superior Livestock Auction Price Determination Model.

Independent Variables	Parameter Estimates	t-values
Intercept	14.8973	1.38
$Season_1$	-2.7745	-2.45***
$Season_3$	0.2934	0.19
$Season_4$	3.0928	1.45
$Frame_1$	0.8940	1.25
$Frame_3$	-2.5563	-0.82
$Flesh_1$	-0.7643	-0.28
$Flesh_3$	1.7062	1.93**
$Weight_3$	7.3362	5.71***
$Weight_5$	-3.4506	-3.11***
$Weight_6$	-7.0461	-6.05***
$Weight_7$	-8.7042	-6.58***
$Weight_8$	-10.2441	-3.28***
SEX	4.2189	5.80***
IMP	0.0499	0.06
HORN	-2.0848	-2.79***
HEAD	0.0129	0.83
HEAD2	-0.000009	-0.22
LOTNO	-0.0013	-1.99**
TREND	0.0763	1.31
$Breed_1$	-1.1437	-0.36
$Breed_4$	-0.9377	-0.64
$Breed_5$	-10.5345	-5.82***
SHRINK	-0.1439	-0.27
FCF	0.7093	5.03***
PDOA	0.1414	1.57
TOTLOT	0.1436	2.06**
TOTLOT2	-0.0015	-2.07**
TOTBUY	-0.1431	-0.91

SUMMARY STATISTICS	
R^2 = .8723	Dependent Mean = 85.4795
Adjusted R^2 = .8316	F-value$_{(27,90)}$ = 21.46***
Degrees of Freedom = 89	N = 117

* = significant at the .10 level ** = significant at the .05 level *** = significant at the .01 level