FACTORS INFLUENCING THE PRICES OF MARKET CATTLE IN SOUTH TEXAS

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ABSTRACT

The purpose of this study was to see what factors influenced the price of market cattle in South Texas. Feeder and slaughter cattle were examined, and the factors proposed to have an influence on these cattle were type, sex, weight, buyer, condition, grade, horns, market and area.

The results showed that, of the nine variables proposed, sex, grade and weight had the most significant influence on the price paid for market cattle in South Texas. Condition and presence of horns was revealed as being significant in influencing market cattle prices.

On the basis of this study it is recommended that (1) dehorning and castration of male calves become a regular practice, (2) condition of the cattle should be examined before marketing, (3) a grading system for feeder cattle should be instituted and (4) the optimum weights at which to sell cattle should be investigated.

REVIEW OF LITERATURE

The average cattle producer in the state of Texas does not have enough volume of cattle to sell directly to feedlots (Walters, 1965). Therefore, the majority of producers sell their feeder cattle through local auctions. Generally, the market at the feeder calf level is close to being purely competitive and so is subject to a broader price variability than are the more monopolistically competitive slaughter and wholesale markets (Franzmann and Walker, 1972).

"Many factors influence the price producers receive for their cattle, and if these factors can be identified and substantiated then a marketing strategy can be formulated." (Hayenga and Hacklander, 1971). Price analysis is used to relate the behavior pattern of price to variables (Tomek and Robinson, 1972). One of the major factors that influence the price received for feeder and slaughter cattle is the weight of the cattle (Breimyer, 1961 and Ward, 1976). Also selling cattle by their sex is an important marketing consideration (Dahl and Hammond, 1977). Hayenga and Hacklander (1971), suggested that the price received for live cattle changed in relation to grade and condition. Dahl and Hammond (1977) stated in their study that most buyers wanted choice and good grade slaughter cattle and that the buyers wanted feeder cattle that were in medium condition.

"Cattle cycles have been observed since the late 1800's. Over the period, cycles have averaged 12 years in length, but earlier cycles were longer than later ones. Each cycle is divided in two phases: (1) the accumulation phase, and (2) the liquidation phase" (McCoy, 1978). Lower prices start occurring and cattle producers begin to reduce the size of their breeding herd. This situation adds more to total production and causes prices to falter even more. An additional factor that influences the cattle cycle is the availability of feed.

Price cycles are usually the inverse of supply cycles. As the supply of cattle increases price tends to decline. Franzmann (1967) reported that, "On the average the adjusted price paid decreased $2.35 per cwt. as the industry progressed from a peak to a trough in the cycle. Conversely, when the industry went from a trough to a peak, price increased by $2.35 per cwt." By being aware what part of the cycle in which a study is being conducted, price analysis can be carried out in coordination with other information collected at different times during the cattle cycle. Prices of market cattle are usually high in the first phase (accumulation) of a cycle because there is confidence that the price will be high when the cattle are sold, and the price of fed cattle is so much higher than feed cost, only a small margin between buying and selling prices for the market cattle is necessary for profit (Breimyer, 1955). This study was conducted during a time period when market cattle prices were high and most experts expected the price of fed cattle to remain high for at least a year.

MATERIALS AND METHODS

The goal of this study was to determine which factors influence the price of feeder and slaughter cattle. The independent variables used were type, sex, weight, buyer, condition, grade, horns, market and area. Four South Texas auctions and three terminal markets were studied. Data was collected at these markets for a three year period. Data was collected bi-weekly at each market on a bi-monthly basis. One hundred head of cattle were observed at each market during each observation period. The number of cattle observed during the three year period totaled 25,200 head.

The type of cattle were either feeder or slaughter. Five sex categories were established: bull, cow, steer, heifer and calf. Weight was also broken down into five categories by scale readings:

(1) 300 pounds
(2) 301-500 pounds
(3) 501-700 pounds
(4) 701-1000 pounds
(5) 1000 + pounds

The buyer was either a farmer, feedlot operator, dealer, older buyer or packer buyer. Condition scores were 1 (best condition), through 3 (worst condition). The grades of the cattle were choice through canner. The presence or absence of horns was decided at both the feeder calf and slaughter calf stage. The market was either terminal or auction and the area was either north, central or south.

The analytical technique used in this study may be described as the general linear regression model incorporating dummy variables in the regression equation. It was desired to determine whether the covariates (independent variables, X's) had a significant influence on price (Y). Regresssion analysis shows the linear relationship between the independent variables (X's) and the dependent variable (Y).

The regression model used can be stated algebraically as follows:

$$P = a + T_i + S_j + W_k + B_1 + Cd_m + G_n + H_o + M_p + A_q + e \quad (1)$$

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where:

P = price, a quantitative dependent variable
a = intercept term
T_i = type — i = 1,2.
S_j = sex — j = 1,2 . . . ,5.
W_k = weight — k = 1,2 . . . ,5.
B_1 = buyer — 1 = 1,2 . . . ,5.
Cd_m = condition — m = 1,2,3.
G_n = grade — n = 1,2, . . . ,6.
H_o = horns — o = 1,2.
M_p = market — p = 1,2.
A_q = area — q = 1,2,3.
e = error term

The subsidiary hypotheses were of the form:

$$P = f(T_i, S_j, \ldots\ldots, A_q) \quad (2)$$

where:

$(T_i, S_j, \ldots, A_q)$ denotes the variables specified in (1) and took on the values 1 or 0, depending on whether or not the variable was included. The use of dummy variables in regression analysis is used to quantify variables that are not otherwise nonquantifiable (Morgan and Sonqist, 1963). The essence of the technique involves assigning a dummy variable to all categories of a characteristic except one. Since this variable takes a value of 1 if the individual observed belongs to the category and 0 if not, it is called a dummy variable.

Tests of significance of the regression equations were based on their F statistics, while tests of significance of the individual coefficients were based on their t values. In making comparsions between intra-group coefficients the t test was employed by comparing the difference between the coefficients and the standard error of this difference. In all cases a positive test at the 0.05 level was regarded as significant.

RESULTS AND DISCUSSION

In general, there was a highly significant relationship between price and each of the independent variables. A comparsion between feeder and slaughter cattle shows a higher multiple correlation coefficient for slaughter cattle than for feeder cattle as shown in Table 1.

Table 1. Multiple correlation coefficients for slaughter, feeder and entire sample of cattle.

Slaughter	Feeder	Whole Sample
.9446	.8053	.8936

The variables hypothesized to influence both feeder and slaughter cattle prices most were sex, grade, and weight. In all cases, more highly significant results were obtained for slaughter than for feeder cattle.

Feeder steers and calves were above average price by $2.23 and $1.84 per 100 pounds, respectively. These coefficients were significantly different from zero but not from each other. Feeder bulls were significantly higher than average by $0.63 per 100 pounds but significantly lower than steers and calves. Cows and heifers were significantly lower than average by $41.17 and $0.53 per 100 pounds, respectively. The same relationship held for slaughter cattle and for the whole sample, the coefficients differing only in magnitudes which is shown in Table 2. These results reflect the established preference pattern of consumers for different types of beef.

As noted in Table 3, prices showed a marked decline as weight increased above 300 lbs for both feeder and slaughter cattle.

For slaughter cattle, prices decreased as weight increased up to 501 to 600 pounds, stabilized with further increases in weight, and then declined sharply for animals weighing over 1000 pounds. The data in Table 3 suggests that an optimum weight for selling both feeder and slaughter cattle exists.

Table 2. Regression coefficient and standard errors for the variable sex.

			Regression Coefficients (Standard Error)		
Group Variable	Specific Variable	Symbol	Feeder	Slaughter	Whole Sample
Sex	Bull	C_1	0.63(0.16)*	0.71(0.41)	0.74(0.11)
	Cow	C_2	-4.17(0.13)	-4.38(0.07)	-4.25(0.07)
	Steer	C_3	2.23(0.08)	2.26(0.08)	2.26(0.06)
	Heifer	C_4	-0.53(0.09)	-0.43(0.08)	-0.40(0.06)
	Calf	C_5	1.84(0.24)	1.95(0.20)	1.65(0.15)
Intercept	Term		17.04	17.29	17.04

*The standard errors of the regression coefficients are in parentheses.

Table 3. Regression coefficients and standard error for the variable weight.

			Regression Coefficients (Standard Error)		
Group Variable	Specific Variable	Symbol	Feeder	Slaughter	Whole Sample
Weight	300	W_1	1.46(0.24)**	1.28(0.21)	1.52(0.16)
	301-500	W_2	0.29(0.10)	-0.48(0.14)	0.12a(0.09)
	501-700	W_3	-0.54(0.10)	-0.55(0.12)	-0.59(0.06)
	701-1000	W_4	-0.61(0.10)	-0.13a(0.10)*	-0.56(0.06)
	1000+	W_5	-0.59(0.30)	-0.22a(0.30)	-0.49(0.20)
Intercept	Term		17.04	17.29	17.04

* Coefficients with an **a** were not significantly different from zero.
** The standard errors of the regression coefficients are in parentheses.

It will be noted in Table 4, that for feeder cattle the coefficient for packer buyers was negative but not significantly different from zero. The coefficients for all other buyers were significantly different from zero. The analysis for feeder cattle held true for the whole sample. Dealers were consistently low in their bidding and competition among buyers of slaughter cattle was high (Table 4).

Table 4. Regression coefficients and standard errors for the varible buyer.

			Regression Coefficients (Standard Error)		
Group Variable	Specific Variable	Symbol	Feeder	Slaughter	Whole Sample
Buyer	Farmer	B_1	0.28(0.11)**	0.31a(0.31)	0.29(0.08)
	Feedlot Operator	B_2	-0.30(0.10)	-0.23a(0.21)	-0.34(0.07)
	Dealer	B_3	-0.25(0.08)	-0.25(0.11)	-0.32(0.10)
	Order Buyer	B_4	0.45(0.09)	-0.01a(0.12)	0.21(0.06)
	Packer Buyer	B_5	-0.18a(0.19)*	0.19a(0.41)	0.16a(0.15)
Intercept	Term		17.04	17.29	17.04

* Coefficients with an **a** were not significantly different from zero.
** The standard errors of the regresssion coefficients are in parentheses.

Results recorded in Table 5 indicate that condition 1 feeders were discounted $0.24 per 100 pounds, but condition 3 feeders received a premium of $0.22 per 100 pounds, a significant difference between the two groups and from zero. The whole sample showed a discount for condition 2 and 3 cattle. The data in Table 5 indicate that a feeder can put the condition on an animal cheaper himself, than having to put a conditioned animal through the market.

Table 5. Regression coefficients and standard errors for the variable condition.

			Regression Coefficients (Standard Error)		
Group Variable	Specific Variable	Symbol	Feeder	Slaughter	Whole Sample
Condition	1	Cd_1	-0.24(0.07)**	-0.36(0.05)	-0.27(0.05)
	2	Cd_2	0.02a(0.06)*	0.17(0.04)	0.11(0.04)
	3	Cd_3	0.22(0.09)	0.19(0.07)	0.16(0.06)
Intercept	Term		17.04	17.29	17.04

* Coefficients with an **a** were not significantly different from zero.
** The standard errors of the regression coefficients are in parentheses.

Feeders were graded into three categories: choice, good and standard (Table 6). Buyers paid a premium for choice, good and slaughter cattle and discounted for utility, cutter and canner cattle. Between choice grades and canners there was a difference of $5.24 per 100 pounds. Though the differences between successive grades were not uniform, they were significant. The results in Table 6 implied that the USDA's grading system for slaughter and feeder cattle was effective in reflecting the retail meat values of the animals, thus encouraging the production of better grades.

Table 6. Regression coefficients and standard errors for the variable grade.

			Regression Coefficients (Standard Error)		
Group Variable	Specific Variable	Symbol	Feeder	Slaughter	Whole Sample
Grade	Choice	G_1	1.84(0.05)*	2.64(0.08)	2.74(0.07)
	Good	G_2	0.39(0.05)	1.39(0.06)	0.95(0.08)
	Standard	G_3	-2.21(0.08)	0.48(0.07)	1.44(0.09)
	Utility	G_4		-0.83(0.08)	-0.64(0.07)
	Cutter	G_5		-1.08(0.19)	-1.49(0.24)
	Canner	G_6		-2.60(0.24)	-3.01(0.28)

* The standard errors of the regression coefficients are in parentheses.

As noted in Table 7 for better types and for the whole sample, the coefficients for horns were not significantly different from zero. There was a significant difference of $0.16 per 100 pounds between horned and dehorned slaughter cattle. This price differential implies that the presence of horns depressed prices for slaughter cattle.

A fact also noted in Table 7 was that feeder prices were $0.18 per 100 pounds higher at auctions than at terminals, but slaughter cattle prices were $0.24 per 100 pounds higher at terminals than at auctions. These results support the theory that auction markets have a special advantage in handling feeder livestock and indicate a similar relationship for terminals in the case of slaughter cattle. Area had no significant influence on feeder cattle prices; the coefficients were not significantly different from zero (Table 7). Prices in the southern area were not significantly large to warrant a shift in supplies from one area to another (Table 7).

Table 7. Regression coefficients and standard errors for the variable horns, market and area.

			Regression Coefficients (Standard Error)		
Group Variable	Specific Variable	Symbol	Feeder	Slaughter	Whole Sample
Horns	Present	H_1	-0.03a(0.05)**	-0.08(0.04)	-0.06a(0.03)
	Absent	H_2	0.03a(0.05)	0.08a(0.04)	0.06a(0.03)
Market	Terminal	M_1	-0.09a(0.05)	0.12(0.03)	0.01a(0.03)
	Auction	M_2	0.09a(0.05)	-0.12(0.03)	-0.01a(0.03)
Area	North	A_1	0.10a(0.06)	0.12(0.04)	0.08(0.04)
	Central	A_2	0.01a(0.08)	-0.18(0.06)	-0.08a(0.05)
	South	A_3	-0.09a(0.10)	0.06a(0.08)	0.00a(0.06)
Intercept	Term		17.04	17.29	17.04

* Coefficients with an **a** were not significantly different from zero.
** The standard errors of the regression coefficients are in parentheses.

Finally, the type of cattle was regressed on the whole sample and Table 8 illustrates the results; feeders brought approximately a dollar more than slaughter cattle.

Table 8. Regression coefficients and standard errors for the variable type.

			Regression Coefficients (Standard Error)
Group Variable	Specific Variable	Symbol	Whole Sample
Type	Feeder	T_1	0.99(0.05)*
	Slaughter	T_2	-0.99(0.05)
Intercept	Term		17.04

* The standard errors of the regression coefficients are in parentheses.

Through the use of dummy variables in regression analyses the influence of certain qualitative variables were estimated. The results show that the hypothesized variables were important in explaining variation in cattle prices-80 percent in feeder cattle prices, 94 percent in slaughter cattle prices and 89 percent for the whole sample. Results indicated that the markets for feeder and slaughter cattle were some different.

SUMMARY

The grading system for slaughter cattle and that used in the study for feeders reflected the retail meat value of the animals and should be effective in encouraging the production of better grades. Prices tended to decrease as live weights increased and a condition 1 depressed prices for both types of cattle. Condition 3 feeder cattle and condition 2 and 3 slaughter cattle received a premium while condition 2 feeders brought average prices.

The presence of horns also influenced price adversely. Therefore, producers stood to gain if they sold condition 3 feeder cattle and condition 2 or 3 slaughter cattle that had been dehorned. The conversion of bull calves into steers could also result in higher prices per pound to the farmer. The price differences between areas were not sufficiently

large enough to warrant a shift in supplies from one area to another.

On the basis of this study it is recommended that (1) dehorning and castration of male calves should become a regular farm practice, (2) producers should pay attention to the condition of the animals at the time of sale, (3) a grading system for feeder cattle should be instituted and the optimum weights at which to sell feeder and slaughter cattle should be investigated, (4) in this area, producers with small volumes should sell feeders at auctions and slaughter cattle at the terminal market.

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