May 3, 1972

To the Graduate Council:

I am submitting herewith a thesis written by Harry Dott Bryan entitled "Factors Influencing Selling Price of Performance Tested Bulls." I recommend that it be accepted for nine quarter hours of credit in partial fulfillment of the requirements for the degree of Master of Science, with a major in Animal Husbandry.

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FACTORS INFLUENCING SELLING PRICE OF PERFORMANCE TESTED BULLS

A Thesis

Presented to

the Graduate Council of

The University of Tennessee

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

---

by

Harry Dott Bryan

June 1972

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ABSTRACT

Lifetime performance and sale records of 688 purebred, Angus, Hereford and Polled Hereford bulls, developed on breeder's farms and consigned to the Tennessee Breeders' Performance Tested Bull Sales during the 5-year period (1966-1971) were utilized in this study. In order to be eligible for these sales a bull had to have minimum requirements with reference to growth rate from birth to weaning, lifetime weight per day of age, type grades at weaning and at the end of the post-weaning test. All bulls were full fed for a period of 98 days.

The objective of this study was to ascertain the most important factor or factors influencing the selling price of bulls sold in performance tested sales.

A preliminary analyses on a within-year-sale location by breed indicated no apparent difference between breeds for any of the traits studied. In the final analyses, variation in the dependent variable, selling price of the bulls, was considered to be due to variation in seven independent variables. In order to assess the influence of each of the independent variables, after other variables had been considered, the order of incorporation into a regression model was based on the practical sequence of these variables in evaluating performance. This order was: (1) weight off test, (2) average daily gain on full feed, (3) age at the end of test, (4) lifetime weight per day of age, (5) average daily gain from birth to weaning, (6) adjusted average daily gain from birth to weaning, and (7) age at weaning.

The seven performance traits explained 60.4 percent of the variation in the selling price of performance tested bulls. Weight off test alone explained 28.6 percent of the variation in the selling price whereas average daily gain on full feed added only 11.0 percent to the explanation of the variation.

Grade at weaning had a significant effect ($P<.01$) on the selling price of performance tested bulls. Bulls grading average fancy at weaning, on the average, sold from $194.44 more than bulls grading low choice. However, when weaning grade alone was included in the model the R^2 value was only .024. Although the differences between grade at weaning on selling price was significant very little if any variation was explained.

Final type grade had a significant effect ($P<.01$) on the selling price of performance tested bulls. These data indicate that bulls grading low choice at the end of the test sold for $474.94 less than bulls grading average fancy. When final type grade was included the R^2 value was only .168.

In Analysis III final type grade was included as a discrete variable with age at the end of the test and lifetime-weight-per-day-of-age as continuous independent variables. Final type grade had a significant effect on the selling price of performance tested bulls. Bulls grading average fancy within the range of these data, sold on the average for $382.43 more than bulls grading low choice. When selling price was regressed on age at the end of the test, these data indicate that on the average for each increase in days of age above the mean,

that selling price increased $1.53. Lifetime-weight per day of age was also a significant ($P<.01$) source of variation. These data indicate that on the average for each unit of increase in lifetime-weight-per-day-of-age that selling price increased $527.94. These findings indicate that those individuals buying Breeders' Performance Tested bulls were concerned with final type grade, age at the end of the test as well as lifetime-weight-per-day-of-age.

Final type grade in Analysis IV had a significant ($P<.01$) effect on the selling price received of performance tested bulls. Weight off test as well as lifetime-weight per day of age when included as a continuous variable had a significant effect ($P<.01$) on the price received for the sale of performance tested bulls. The R^2 value of .438 indicates the variation that was accounted for by the inclusion of these independent variables. These data indicate that buyers of performance tested bulls were interested in the individual performance data presented in the catalog but tended to let conformation, size, as described by weight, and age influence them in their final decision.

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CHAPTER I

INTRODUCTION

The Tennessee Beef Cattle Improvement Program was established by the University of Tennessee in 1956. Through this program and the demonstrational feeder calf sales, the commercial cow-calf operation has emerged as the number one beef cattle enterprise in the state. Beef cattle producers have learned that one of the most rapid methods of improving their herds and producing fast growing feeder calves with acceptable quality is using a bull with known transmissable performance traits.

During the past decade, several hundred performance tested bulls have sold at auction at various sale locations in Tennessee. The sales were held through the cooperation of the University of Tennessee Agricultural Experiment Station, Agricultural Extension Service and the various breed organizations.

No organized statistical analysis has been made to assess the effects of various factors on the price of these performance tested bulls since the beginning of these sales. The objective of this study was to ascertain the most important factor or factors influencing the selling price of 688 bulls sold in performance tested bull sales from 1966 through 1971. The factors studied were sale location, breed, average daily gain and adjusted average daily gain (birth to weaning), type score at weaning, feed lot average daily gain, type score at the

end of the feed test, final age, final weight and final weight per day of age.

It is hoped that this study will be of help to the breeders of performance tested bulls in the continued efforts to improve the beef industry in Tennessee.

CHAPTER II

REVIEW OF LITERATURE

In observing the results of purebred performance tested sales. one can intuitively see that buyers are interested in different traits, performance information and/or appearance. Criteria used in bull selection are rather elusive and change with time. The interest in purebred performance tested beef bulls which excell with respect to traits of economic importance has increased during the past five years. There have been relatively few studies to evaluate the effects of selected variables on the price of performance tested bulls and breeders are concerned as to how to price their bulls to interested buyers.

In a twelve year study of 488 yearling performance tested bulls at Ames Plantation, Jamison et al. (1971) reported that those individuals purchasing spring and fall bulls evaluated the animals by different criteria. Those individuals purchasing fall bulls, which were sold at about two years of age, tended to place more emphasis on size and maturity than on individual performance. Whereas, those purchasing spring born bulls, sold at about 18 to 22 months of age, were more interested in bulls that excelled in individual performance. The data further indicated that breeders who purchased bulls in performance tested sales appeared to be concerned with the performance data made available to them and they tended to place maximum emphasis on lifetime average daily gain and final grade.

They also found lifetime average daily gain to be significant. For each one-tenth of a pound increase in lifetime average daily gain, the sale price of bulls increase $37.48. There was very little increase in the predictability of sale price when other sources of variation were added.

In a similar study of 791 bulls sold at the Virginia BCIA bull testing station at Culpepper, Virginia, Marlowe (1969) reported the most important criteria in beef bull selection was type as evaluated by a numerical grade. The average increase per grade point was $110 for Angus bulls and $170 for Hereford bulls. The influence of year effects was highly significant over the ten year study conducted from 1959 through 1968. Lifetime average daily gain for both Angus and Hereford was highly significant as related to sale price.

Brown (1971) found in the Kentucky performance tested bull sales that bulls with higher type scores (other factors being equal) tended to sell for higher prices in 1968 and 1969.

Rutherford et al., (1966) conducted a survey of 227 commercial beef cattlemen in Southern Indiana and found that breeders selected bulls on conformation and size as the first and second most important factors. Lifetime average daily gain was not included in the list of factors from which the cattlemen made their selection.

In another study of 201 purebred Hereford bull calves sold in Southern Virginia during the year 1955 through 1959, Marlowe (1964) reported that bulls averaging 2.5 pounds of gain per day sold for $34.67 more than bulls that averaged 2.0 pounds per day. The sale price

increased $17.10 for each one-third of a grade increase in conformation score from low good to top choice.

The results of this study indicated that buyers of performance tested bulls are willing to pay more for bulls that have quality as defined by final type score and bulls that have heavier weights and a high weight per day of age.

CHAPTER III

EXPERIMENTAL PROCEDURE

I. SOURCE OF DATA

The data used in this study were collected over a 6-year period (1966-1971) from the records of the Tennessee Breeder's Performance Tested Bull Sales. Those purebred breeders whose herds were participating in the Tennessee Beef Cattle Improvement Program were eligible to participate in these sales. The records of 688 bulls were found suitable for this study. Minimum requirements consisting of growth rate from birth to weaning, average daily gain during the full feed test, lifetime final weight and quality grade both at weaning and at the end of the test period, were prerequisite for participating in these events.

Sales were held at two or more locations within a year. Angus, Herefords and Polled Herefords appeared in most sales each year. The sales were usually held in December and March of most years.

The post-weaning development program was divided into three phases. In the winter (November through March) on the breeders farms the calves were full fed corn silage and/or hay with 4.5 pounds of shelled corn and 1.5 pounds of protein supplement. During the grazing phase (April through June), the bulls were grazed on good pastures and were fed one pound of grain for each 100 pounds of body weight per head per day. The final phase consisted of a 98-day full-feed of a concentrate.

At the end of the test a final type grade was placed on each animal by a member of the Animal Husbandry-Veterinary Science Department. In order for the bull to be eligible to sell, the final type grade had to be at least 12 (low choice). The minimum lifetime-weight-per-day-of age was 1.95 pounds per day.

II. CLASSIFICATION OF DATA

Data recorded for each calf at birth included birth date, sex, sire and dam. Weaning data included weaning weight and weaning type score. These data were taken from the calf records of the Tennessee Beef Cattle Improvement Program. Weights taken at the beginning and end of the feed test were supervised by the County Agricultural Extension Agent. The lifetime-weight-per-day-of-age, based on off test weights were calculated in the state office.

All calves were graded at weaning by a certified grader of the Tennessee Beef Cattle Improvement Program. The grades were coded by giving Good a numerical value of 10 and adding or subtracting one (1) for each one-third of a grade above or below Good. The numerical codes were: fancy plus (17), fancy (16), fancy minus (15), choice plus (14), choice (13), choice minus (12), good plus (11), good (10), good minus (9), medium plus (8), medium (7) and medium minus (6). The minimum final type grade acceptable for participation in the test was 12 (low choice).

III. METHOD OF ANALYSIS

In order to remove year differences which were certain to exist within and between the classification factor groups under analyses, it

was necessary to absorb year effects in all analyses. In using this procedure one assumes that interaction of this factor with other sources of variation included in these analyses were negligible.

Least-squares estimates of the effects of grade at weaning, grade at the end of the test period and continuous variables for age at end of the test, lifetime-weight-per-day-of-age, weight off test upon average selling price of performance tested bulls were obtained by the method of fitting constants as described by Harvey (1960).

The model on which the analyses were based was:

$$Y_{ij} = \mu + g_i + b_1 Aij + b_2 L_{ij} + b_3 W_{ij} + e_{ij}$$

Where:

Y_{ij} = is the observed value of a given trait

μ = the population mean with equal subclass numbers i.e., an effect common to all individuals in the population sampled.

g_i = the effect of i-th grade at weaning, or the effect of i-th grade at the end of test, i = 12 17

b_1 = partial regression of Y on age at end of test

b_2 = partial regression of Y on lifetime-weight per day of age

b_3 = partial regression of Y on weight off test

A = Age at end of test

L = Lifetime-weight per day of age

W = Weight off test

e_{ij} = random error associated with an individual record.

Four analyses, using various combinations of the elements in the above model, were used in these data and are as follows:

Analysis I -- The relationship of weaning grade on the dependent variable, selling price of bulls.

Analysis II -- The relationship of final grade on the dependent variable, selling price of bulls.

Analysis III -- The relationship of final grade, age at the end of the test and lifetime weight per day of age on the dependent variable, selling price of bulls.

Analysis IV -- The relationship of final grade, weight off test and lifetime weight per day of age on the dependent variables, selling price of bulls.

For ease of discussion future references will be made as Analysis I, II, III and IV, respectively.

Correlations and regressions coefficients on an overall basis and separating this relation for each breed importance of several variables affecting sale price were calculated. The data were subjected to form different analyses, on an overall basis, and form analyses each for the three breeds represented, to assess estimates of the effects of the independent variables on the performance traits studied.

CHAPTER IV

RESULTS AND DISCUSSION

The distribution of bulls by year and breed within a sale location along with the unadjusted means and standard deviations for average age at weaning, average daily gain from birth to weaning, adjusted average daily gain from birth to weaning, average daily gain on full feed, average age at the end of the test, final age in days on sale date, average selling price and lifetime-weight-per-day-of-age are shown in Table 1. The linear relationships of the traits studied, calculated on a within-year-sale location-breed basis, are presented in Table 2.

The overall average selling price of the 688 bulls during the 6-year period was $560.29. The average pre-weaning performance of the traits studied were: (1) average age at weaning -- 220 days, (2) average daily gain -- 2.07 pounds per day and (3) adjusted average daily gain -- 2.15 pounds per day. Average daily gain of all bulls on full feed was 2.65 pounds. The bulls had an overall average final weight at the end of the test of 1142 pounds and an average age of 532 days with a lifetime-weight-per-day-of-age of 2.18 pounds.

A preliminary analyses calculated on a within-year-sale-location by breed indicated no apparent significant difference between breeds on any of the effects studied. Therefore, the data were pooled. The correlations and regression coefficients and relative importance of several variables on sale price, the least-squares estimates and the

TABLE 1

UNADJUSTED MEANS AND STANDARD DEVIATIONS OF SELECTED VARIABLES

Year of Sale	Location of Sale	Breed	Number of Bulls	Avg. Age at Weaning	ADG Br. to Weaning	Adj. ADG Br. to Weaning	ADG Full Feed	Avg. Wt. at End of Test	Final Age in Days	Average Price	Final Wt. Per Day of Age
1966	Brownsville	Hereford	13	219 ± 6.84	1.96 ± .05	2.11 ± .06	2.74 ± .16	1254 ± 28.84	614 ± 9.70	495.77 ± 39.10	2.05 ± .05
		Angus	20	233 ± 6.08	2.06 ± .05	2.13 ± .07	2.73 ± .10	1231 ± 25.76	620 ± 9.52	479.25 ± 39.80	1.99 ± .05
		P. Hereford	25	224 ± 5.79	2.07 ± .04	2.16 ± .04	2.77 ± .09	1310 ± 16.89	612 ± 5.84	509.80 ± 22.12	2.14 ± .03
	Cookeville	Hereford	10	222 ± 9.26	2.07 ± .09	2.13 ± .09	2.82 ± .16	1289 ± 36.50	611 ± 18.44	458.00 ± 46.50	2.13 ± .09
		Angus	11	204 ± 10.31	2.00 ± .05	2.07 ± .04	2.50 ± .11	1132 ± 20.48	572 ± 12.44	443.63 ± 29.81	1.98 ± .03
		P. Hereford	6	219 ± 7.30	2.06 ± .07	2.14 ± .09	2.70 ± .20	1339 ± 39.96	617 ± 4.43	570.83 ± 63.17	2.17 ± .06
	Knoxville	Angus	16	228 ± 6.74	2.10 ± .03	2.13 ± .03	2.51 ± .12	1143 ± 23.69	575 ± 10.26	618.75 ± 59.30	1.99 ± .03
1967	Brownsville	Hereford	8	218 ± 8.31	2.03 ± .08	2.20 ± .07	3.01 ± .13	1342 ± 42.05	623 ± 10.36	550.00 ± 61.37	2.15 ± .05
		Angus	4	265 ± 11.03	1.94 ± .06	1.97 ± .08	2.91 ± .38	1294 ± 54.67	668 ± 13.21	606.25 ± 93.50	1.93 ± .07
		P. Hereford	2	207 ± 28.00	2.15 ± .12	2.38 ± .11	3.57 ± .10	1302 ± 7.50	621 ± 22.00	550.00 ± 5.00	2.10 ± .07
	Nashville	Hereford	12	215 ± 10.46	1.94 ± .06	1.99 ± .05	2.59 ± .14	1239 ± 20.31	623 ± 11.70	507.08 ± 17.29	1.98 ± .02
		P. Hereford	8	211 ± 8.73	2.03 ± .06	2.11 ± .09	2.33 ± .26	1125 ± 52.73	620 ± 12.13	591.25 ± 77.94	1.82 ± .10
	Knoxville	Hereford	3	213 ± 17.45	2.12 ± .16	2.21 ± .09	2.56 ± .06	918 ± 26.82	363 ± 20.08	608.33 ± 108.33	2.53 ± .07
		Angus	22	224 ± 2.50	2.03 ± .03	2.12 ± .03	2.44 ± .07	900 ± 10.60	376 ± 2.47	463.18 ± 20.04	2.40 ± .03
		P. Hereford	3	223 ± 2.33	2.08 ± .10	2.08 ± .10	2.46 ± .13	898 ± 18.33	377 ± 2.33	728.33 ± 134.97	2.38 ± .04
1968	Brownsville	Hereford	13	228 ± 9.90	2.04 ± .05	2.10 ± .05	3.04 ± .20	1314 ± 20.67	616 ± 11.82	446.15 ± 23.76	2.16 ± .03
		Angus	19	236 ± 8.35	2.06 ± .04	2.10 ± .04	2.58 ± .10	1236 ± 22.48	631 ± 8.69	488.42 ± 31.34	1.96 ± .03
		P. Hereford	15	195 ± 9.89	2.01 ± .08	2.11 ± .06	2.77 ± .19	1288 ± 26.57	620 ± 13.36	485.33 ± 40.38	2.10 ± .04
	Nashville	Hereford	14	214 ± 12.96	2.18 ± .07	2.21 ± .07	3.14 ± .15	1356 ± 23.86	614 ± 11.15	635.35 ± 60.37	2.20 ± .05
		Angus	37	219 ± 5.15	2.11 ± .04	2.21 ± .04	2.26 ± .11	1199 ± 19.24	575 ± 8.91	542.29 ± 23.23	2.06 ± .02
		P. Hereford	26	217 ± 7.33	2.09 ± .04	2.15 ± .04	2.43 ± .10	1234 ± 26.70	584 ± 14.65	536.92 ± 21.48	2.12 ± .03
	Knoxville	Hereford	9	200 ± 9.13	2.11 ± .06	2.17 ± .06	2.82 ± .08	927 ± 14.89	361 ± 7.54	504.44 ± 83.60	2.57 ± .06
		Angus	29	233 ± 4.78	2.03 ± .04	2.11 ± .04	2.41 ± .10	907 ± 11.21	383 ± 3.78	423.10 ± 29.15	2.36 ± .02
		P. Hereford	5	207 ± 9.15	2.41 ± .19	2.52 ± .20	2.61 ± .18	996 ± 52.00	377 ± 8.68	432.00 ± 80.13	2.64 ± .16
1969	Nashville	Hereford	20	208 ± 6.43	1.97 ± .05	2.07 ± .04	3.23 ± .18	1285 ± 36.66	576 ± 17.67	538.75 ± 34.79	2.24 ± .04
		Angus	51	223 ± 3.16	1.98 ± .03	2.07 ± .03	2.61 ± .09	1095 ± 22.68	527 ± 15.49	579.21 ± 28.29	2.11 ± .03
		P. Hereford	35	224 ± 5.00	2.10 ± .04	2.17 ± .04	2.75 ± .10	1209 ± 30.86	550 ± 17.78	579.85 ± 25.92	2.24 ± .04
	Knoxville	Angus	20	215 ± 6.35	2.15 ± .08	2.25 ± .08	2.57 ± .14	1109 ± 19.48	560 ± 8.95	596.50 ± 47.66	1.98 ± .02
1970	Nashville	Hereford	12	217 ± 12.24	2.03 ± .06	2.07 ± .05	3.22 ± .20	1232 ± 38.76	565 ± 24.96	647.50 ± 126.64	2.20 ± .05
		Angus	50	227 ± 4.40	2.07 ± .03	2.15 ± .03	2.65 ± .07	1120 ± 23.44	530 ± 14.70	678.10 ± 27.86	2.15 ± .03
		P. Hereford	42	214 ± 4.50	2.10 ± .05	2.19 ± .05	2.66 ± .10	1166 ± 23.70	526 ± 13.29	558.57 ± 22.58	2.23 ± .04
	Knoxville	Hereford	3	222 ± 6.00	2.03 ± .04	2.12 ± .04	2.23 ± .05	855 ± 2.88	373 ± 6.00	303.33 ± 3.33	2.30 ± .03
		Angus	35	223 ± 8.24	1.98 ± .03	2.07 ± .02	2.48 ± .08	1034 ± 29.28	492 ± 17.48	597.85 ± 32.71	2.15 ± .03
		P. Hereford	2	218 ± 5.50	2.32 ± .10	2.50 ± .17	2.44 ± .25	925 ± 20.00	369 ± 5.50	550.00 ± 50.00	2.51 ± .02
1971	Nashville	Hereford	10	207 ± 8.02	2.16 ± .04	2.19 ± .04	3.07 ± .11	1102 ± 25.05	439 ± 12.34	502.50 ± 40.23	2.51 ± .05
		Angus	19	221 ± 6.25	2.05 ± .05	2.15 ± .05	2.67 ± .13	1047 ± 28.74	459 ± 21.03	664.10 ± 30.74	2.33 ± .06
		Charolais	6	221 ± 17.69	2.41 ± .09	2.53 ± .10	3.02 ± .15	1224 ± 45.66	434 ± 12.69	1250.00 ± 254.29	2.81 ± .11
		P. Hereford	9	207 ± 3.19	2.39 ± .12	2.46 ± .13	2.55 ± .08	1010 ± 22.21	398 ± 10.72	543.33 ± 34.57	2.54 ± .07
	Knoxville	Hereford	8	209 ± 4.57	2.01 ± .05	2.14 ± .05	2.59 ± .10	893 ± 18.09	404 ± 20.94	481.25 ± 60.18	2.38 ± .07
		Angus	30	221 ± 4.41	2.12 ± .04	2.20 ± .05	2.56 ± .08	1058 ± 24.82	487 ± 17.64	622.16 ± 25.81	2.20 ± .04
		P. Hereford	6	215 ± 4.86	1.98 ± .04	2.08 ± .05	2.86 ± .08	925 ± 21.71	376 ± 4.73	594.16 ± 50.50	2.46 ± .05
	TOTAL		688	220 ± 1.17	2.07 ± .009	2.15 ± .009	2.65 ± .002	1142 ± 4.87	532 ± 2.78	560.29 ± 6.88	2.18 ± .007

TABLE 2

CORRELATIONS AMONG CERTAIN VARIABLES STUDIED[a]

	2	3	4	5	6	7	8
1. Age at weaning	-.15	-.17	-.16	.08	.16	-.04	-.13
2. Average daily gain		.90	-.08	.17	-.10	.20	.39
3. Adj. average daily gain			-.12	.11	-.15	.18	.38
4. Avg. daily gain on full feed				.29	.08	.33	.26
5. Wt. off test					.78	.54	-.11
6. Age off test						.27	.61
7. Sale price							.25
8. Lifetime wt./day of age							

[a]Correlations calculated on a within-year-sale location-breed basis.

analysis of variance for each of the breeds are presented in Tables 12 through 41 inclusive in the Appendix.

In the final analyses, variation in the dependent variable, selling price of the bulls, was considered to be due to variation in seven independent variables. In order to assess the influence of each of the independent variables, after other variables had been considered, the order of incorporation into a regression model was based on the practical sequence of these variables in evaluating performance. This order was: (1) weight off test, (2) average daily gain on full feed, (3) age at the end of test, (4) lifetime weight per day of age, (5) average daily gain from birth to weaning, (6) adjusted average daily gain from birth to weaning, and (7) age at weaning. The correlations and regression coefficients and the relative importance of these variables are shown in Table 3.

The seven performance traits explained 60.4 percent of the variation in the selling price of performance tested bulls. Weight off test alone explained 28.6 percent of the variation in the selling price whereas average daily gain on full feed only added 11.0 percent to the explanation of the variation.

Jamison et al. (1971) reported that lifetime average daily gain alone explained 30.5 percent of the variation in spring bulls, but only 16.0 percent in fall bulls. Marlowe (1969), working with data from the Virginia BCIA, reported that the most important criteria in beef bull selection was type.

The least-squares estimates of the environmental effects on the sale price record of performance tested bulls are listed in Tables 4

TABLE 3

CORRELATIONS AND REGRESSION COEFFICIENTS AND RELATIVE IMPORTANCE OF SEVERAL VARIABLES ON SALE PRICE

Variable[a]	Partial Reg. Coef. and Std. Dev., $	Simple Corr. Coef.	ΔR^2	Rank[b]
Weight off test	.76 ± .05**	.54	.286	1
A. D. G. - Full Feed	109.90 ± 12.29**	.32	.110	2
Age at end of test	.66 ± .09**	.27	.072	3
Lifetime W/day of age	241.41 ± 36.19**	.25	.064	4
A. D. G. (Br. to Wn.)	151.71 ± 30.81**	.20	.039	5
A. A. D. G. (Br. to Wn.)	142.92 ± 31.75**	.18	.031	6
Age at weaning	-0.24 ± .23	-0.04	.002	7

[a]Each variable was fitted singularly in separate analysis.

[b]Based on the size of R^2.

**P<.01.

through 10 from Analyses I, II, III, and IV, which are presented in Tables 4, 6, 8 and 10, respectively. The corresponding analyses of variance are listed in Tables 5 through 11 for Analyses I, II, III and IV which are presented in Tables 5, 7, 9, and 11, respectively.

Grade at weaning had a significant effect ($P<.01$) on the selling price of performance tested bulls. Bulls grading average fancy at weaning, on the average, sold from $194.44 more than bulls grading low choice. However, when weaning grade alone was included in the model the R^2 value was only .024. Although the differences between grade at weaning on selling price was significant very little if any variation was explained.

Final type grade had a significant effect ($P<.01$) on the selling price of performance tested bulls. These data indicate that bulls grading low choice at the end of the test sold for $474.94 less than bulls grading average fancy. When final type grade was included the R^2 value was only .168. These findings are not in agreement with those as reported by Brown (1971) who reported that bulls with higher type scores tended to sell for higher prices.

In Analysis III final type grade was included as a discrete variable with age at the end of the test and lifetime-weight-per-day-of-age as continuous independent variables. Final type grade had a significant effect on the selling price of performance tested bulls. Bulls grading average fancy within the realm of these data, sold on the average for $382.43 more than bulls grading low choice. When selling price was regressed on age at the end of the test, these data indicate that on the average for each increase in days of age above the mean,

TABLE 4

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE
RECEIVED OF PERFORMANCE TESTED BULLS
ANALYSIS I

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Weaning)		
Low Choice	127	494.99
Avg. Choice	274	507.91
Choice	240	513.10
Low Fancy	37	596.07
Avg. Fancy	10	689.43

[a]Estimates are deviations from the overall adjusted means when equal number exist per subclass. The overall arithmetic mean of average price per bull is $560.30.

TABLE 5

ANALYSIS OF VARIANCE OF SALE PRICE OF PERFORMANCE TESTED BULLS
ANALYSIS I

Source	Degrees of Freedom	Mean Square Avg. Price Per Bull
Grade of calf at weaning	4	124293.98**
Residual	643	32076.20
R^2		.024

**P<.01.

TABLE 6

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE
RECEIVED OF PERFORMANCE TESTED BULLS
ANALYSIS II

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	72	372.03
Avg. Choice	289	416.21
Choice	282	528.75
Low Fancy	43	637.54
Avg. Fancy	2	846.07

[a]Estimates are deviations from the overall adjusted means when equal numbers exist per subclass. The overall arithmetic mean of average price per bull is $560.30.

TABLE 7

ANALYSIS OF VARIANCE OF SALE PRICE OF PERFORMANCE TESTED BULLS
ANALYSIS II

Source	Degrees of Freedom	Mean Square Avg. Price Per Bull
Grade of bull (Final)	4	889303.04**
Residual	643	27317.20
R^2		.168

**P<.01.

TABLE 8

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE
RECEIVED OF PERFORMANCE TESTED BULLS
ANALYSIS III

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	72	416.80
Avg. Choice	289	446.33
Choice	282	528.36
Low Fancy	43	610.78
Avg. Fancy	2	799.23
Regression of Y on:		
Age at end of test		1.53
Lifetime W/day of age		527.94

[a]Estimates are deviations from the overall adjusted means when equal numbers exist per subclass. The overall arithmetic mean of average price per bull is $560.30.

TABLE 9

ANALYSIS OF VARIANCE OF SALE PRICE OF PERFORMANCE TESTED BULLS
ANALYSIS III

Source	Degrees of Freedom	Mean Square Avg. Price Per Bull
Grade (Final)	4	451252.34**
Regression of Y on:		
Age at end of test	1	5026859.60**
Lifetime W/day of age	1	3780036.10**
Residual	641	18742.10
R^2		.431

**P<.01.

TABLE 10

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE
RECEIVED OF PERFORMANCE TESTED BULLS
ANALYSIS IV

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	72	417.19
Avg. Choice	289	449.44
Choice	282	530.86
Low Fancy	43	509.66
Avg. Fancy	2	793.07
Regression of Y on:		
Weight off test		.71
Lifetime W/day of age		175.88

[a]Estimates are deviations from the overall adjusted means when equal numbers exist per subclass. The overall arithmetic mean of average price per bull is $560.30.

TABLE 11

ANALYSIS OF VARIANCE OF SALE PRICE OF PERFORMANCE TESTED BULLS
ANALYSIS IV

Source	Degrees of Freedom	Mean Square Avg. Price Per Bull ($)
Grade (Final)	4	444737.54**
Regression of Y on:		
Weight off test	1	5166459.80**
Lifetime W/day of age	1	669093.69**
Residual	641	18524.30
R^2		.438

**P<.01.

that selling price increase $1.53. Lifetime-weight per day of age was also a significant (P<.01) source of variation. These data indicate that on the average for each unit of increase in lifetime-weight-per-day-of-age that selling price increased $527.94. These findings indicate that those individuals buying Breeders' Performance Tested bulls were concerned with final type grade, age at the end of the test as well as lifetime-weight per day of age.

These findings are in general agreement with those reported by Jamison et al. (1971), who postulated that buyers tended to place more emphasis on size and maturity than on individual performance.

Final type grade in Analysis II had a significant (P<.01) effect on the selling price received of performance tested bulls. Weight off test as well as lifetime-weight per day of age when included as a continuous variable had a significant effect (P<.01) on the prices received for the sale of performance tested bulls. The R^2 value of .438 indicates the variation that was accounted for by the inclusion of these independent variables. These data indicate that buyers of performance tested bulls were interested in the individual performance data presented in the catalog but tended to let conformation, size as described by weight and age influence them in their final decision.

CHAPTER V

SUMMARY

Lifetime performance and sale records of 688 purebred, Angus, Hereford and Polled Hereford bulls, developed on breeder's farms and consigned to the Tennessee Breeders' Performance Tested Bull Sales during the 6-year period (1966-1971) were utilized in this study. In order to be eligible for these sales, a bull had to have minimum requirements with reference to growth rate from birth to weaning, lifetime-weight per day of age, as type grades at weaning and at the end of the post-weaning test. All bulls were full fed for a period of 98 days.

The objective of this study was to ascertain the most important factor or factors influencing the selling price of bulls sold in performance tested sales.

A preliminary analyses on a within-year-sale location by breed indicated no apparent difference between breeds for any of the traits studied. In the final analyses, variation in the dependent variable, selling price of the bulls, was considered to be due to variation in seven independent variables. In order to assess the influence of each of the independent variables, after other variables had been considered, the order of incorporation into a regression model was based on the practical sequence of these variables in evaluating performance. This order was: (1) weight off test, (2) average daily gain on full feed, (3) age at the end of test, (4) lifetime weight per day of age, (5) average daily gain from birth to weaning, (6) adjusted average daily gain from birth to weaning, and (7) age at weaning.

The seven performance traits explained 60.4 percent of the variation in the selling price of performance tested bulls. Weight off test alone explained 28.6 percent of the variation in the selling price whereas average daily gain on full feed added only 11.0 percent to the explanation of the variation.

Grade at weaning had a significant effect ($P<.01$) on the selling price of performance tested bulls. Bulls grading average fancy at weaning, on the average, sold from $194.44 more than bulls grading low choice. However, when weaning grade alone was included in the model the R^2 value was only .024. Although the differences between grade at weaning on selling price was significant very little if any variation was explained.

Final type grade had a significant effect ($P<.01$) on the selling price of performance tested bulls. These data indicate that bulls grading low choice at the end of the test sold for $474.94 less than bulls grading average fancy. When final type grade was included the R^2 value was only .168.

In Analysis III final type grade was included as a discrete variable with age at the end of the test and lifetime-weight-per-day-of-age as continuous independent variables. Final type grade had a significant effect on the selling price of performance tested bulls. Bulls grading average fancy within the range of these data, sold on the average for $382.43 more than bulls grading low choice. When selling price was regressed on age at the end of the test, these data indicate that on the average for each increase in days of age above the mean, that

selling price increased $1.53. Lifetime weight per day of age was also a significant (P<.01) source of variation. These data indicate that on the average for each unit of increase in lifetime-weight-per-day-of-age that selling price increased $527.94. These findings indicate that those individuals buying Breeders' Performance Tested bulls were concerned with final type grade, age at the end of the test as well as lifetime-weight-per-day-of-age.

Final type grade in Analysis IV had a significant (P<.01) effect on the selling price received of performance tested bulls. Weight off test as well as lifetime weight per day of age when included as a continuous variable had a significant effect (P<.01) on the prices received for the sale of performance tested bulls. The R^2 value of .438 indicates the variation that was accounted for by the inclusion of these independent variables. These data indicate that buyers of performance tested bulls were interested in the individual performance data presented in the catalog but tended to let conformation, size as described by weight and age influence them in their final decision.

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APPENDIX

TABLE 12

CORRELATIONS AMONG CERTAIN VARIABLES OF HEREFORD BULLS STUDIED[a]

		2	3	4	5	6	7	8
1.	Age at weaning	-.21	-.28	-.10	.08	.28	-.03	-.26
2.	Average daily gain		.91	-.04	.19	-.28	.27	.55
3.	Adj. average daily gain			-.13	.16	-.27	.23	.50
4.	Avg. daily gain on full feed				.42	.13	.40	.32
5.	Wt. off test					.57	.53	.30
6.	Age off test						.10	.56
7.	Sale price							.45
8.	Lifetime wt./day of age							

[a]Correlations calculated on a within-year-sale location basis.

TABLE 13

CORRELATIONS AND REGRESSION COEFFICIENTS AND RELATIVE IMPORTANCE OF SEVERAL VARIABLES ON SALE PRICE OF HEREFORD BULLS

Variable[a]	Partial Reg. Coef. and Std. Dev., $	Simple Corr. Coef.	ΔR^2	Rank[b]
Weight off test	1.00 ± .15	.53	.280	1
Lifetime W/day of age	519.63 ± 94.75	.45	.200	2
A. D. G. - Full Feed	140.72 ± 29.74	.40	.157	3
A. D. G. - (Br. to Wn.)	257.08 ± 84.17	.27	.072	4
A. A. D. G. - (Br. to Wn.)	228.68 ± 89.34	.23	.052	5
Age at end of test	.37 ± .33	.10	.010	6
Age at weaning	-.16 ± .56	-.03	.0007	7

[a]Each variable was fitted singularly in separate analysis.

[b]Based on the size of R^2.

*P<.05.

**P<.01.

TABLE 14

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE RECEIVED
FOR HEREFORD PERFORMANCE TESTED BULLS

	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Weaning)		
Low Choice	34	410.97
Avg. Choice	54	425.52
Choice	40	441.74
Low Fancy	5	487.10
Avg. Fancy	2	860.57

[a]Estimates are deviations from the overall adjusted means when equal number exist per subclass. The overall arithmetic mean of average price per bull is $525.18.

TABLE 15

ANALYSIS OF VARIANCE OF SALE PRICE OF HEREFORD PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Square Avg. Price Per Bull
Grade of calf at weaning	4	90720.57
Residual	117	39072.60
R^2		.074

TABLE 16

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE RECEIVED FOR HEREFORD PERFORMANCE TESTED BULLS

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	11	308.69
Avg. Choice	58	319.33
Choice	57	478.48
Low Fancy	8	581.08
Avg. Fancy	1	938.02

[a]Estimates are deviations from the overall adjusted means when equal number exist per subclass. The overall arithmetic mean of average price per bull is $525.18.

TABLE 17

ANALYSIS OF VARIANCE OF SALE PRICE OF HEREFORD PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Square Avg. Price Per Bull
Grade of Bulls (Final)	4	288579.43**
Residual	117	32308.20
R^2		.23

**P<.01.

TABLE 18

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE RECEIVED
FOR HEREFORD PERFORMANCE TESTED BULLS

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	11	381.55
Avg. Choice	58	392.28
Choice	57	501.03
Low Fancy	8	588.26
Avg. Fancy	1	762.78
Regression of Y on:		
Age at end of test		1.63
Lifetime W/day of age		714.78

[a]Estimates are deviations from the overall adjusted means when equal number exist per subclass. The overall arithmetic mean of average price per bull is $525.18.

TABLE 19

ANALYSIS OF VARIANCE OF SALE PRICE OF HEREFORD PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Square Avg. Price Per Bull
Grade (Final)	4	123753.23**
Regression of Y on:		
Age at end of test	1	607283.36**
Lifetime W/day of age	1	1165765.20**
Residual	115	22334.30
R^2		.479

**P<.01.

TABLE 20

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE RECEIVED
FOR HEREFORD PERFORMANCE TESTED BULLS

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	11	382.71
Avg. Choice	58	395.21
Choice	57	496.85
Low Fancy	8	590.38
Avg. Fancy	1	760.79
Regression of Y on:		
Weight off test		.68
Lifetime W/day of age		311.66

[a]Estimates are deviations from the overall adjusted means when equal number exist per subclass. The overall arithmetic mean of average price per bull is $525.18.

TABLE 21

ANALYSIS OF VARIANCE OF SALE PRICE OF HEREFORD PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Square Avg. Price Per Bull
Grade (Final)	4	113948.56**
Regression of Y on:		
Weight off test	1	535424.10**
Lifetime W/day of age	1	296775.94**
Residual	115	22959.20
R^2		.465

**P<.01.

TABLE 22

CORRELATIONS AMONG CERTAIN VARIABLES OF ANGUS BULLS STUDIED[a]

	2	3	4	5	6	7	8
1. Age at weaning	-.12	-.12	-.11	.06	.07	-.06	-.01
2. Average daily gain		.90	-.15	.13	-.06	.09	.29
3. Adj. average daily gain			-.16	.08	-.11	.08	.29
4. Avg. daily gain on full feed				.30	.10	.37	.25
5. Wt. off test					.84	.55	-.18
6. Age off test						.35	-.66
7. Sale price							.11
8. Lifetime wt./day of age							

[a]Correlations calculated on a within-year-sale location basis.

TABLE 23

CORRELATIONS AND REGRESSION COEFFICIENTS AND RELATIVE IMPORTANCE OF SEVERAL VARIABLES ON SALE PRICE OF ANGUS BULLS

Variable[a]	Partial Reg. Coef. and Std. Dev., $	Simple Corr. Coef.	ΔR^2	Rank[b]
Weight off test	.74 ± .06	.55	.298	1
A. D. G. - Full Feed	122.19 ± 16.54	.37	.136	2
Age at end of test	.78 ± .11	.35	.123	3
Lifetime W/day of age	107.45 ± 51.11	.11	.013	4
Age at weaning	-.32 ± .31	-.06	.003	5
A. A. D. G. (Br. to Wn.)	69.07 ± 43.92	.08	.007	6
A. D. G. (Br. to Wn.)	71.95 ± 43.80	.09	.008	7

[a]Each variable was fitted singularly in separate analysis.

[b]Based on the size of R^2.

*P<.05.

**P<.01.

TABLE 24

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE
OF ANGUS PERFORMANCE TESTED BULLS

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Weaning)		
Low Choice	59	520.42
Avg. Choice	143	530.07
Choice	134	524.42
Low Fancy	23	614.52
Avg. Fancy	4	650.46

[a]Estimates are deviations from the overall adjusted means when equal numbers exist per subclass. The overall arithmetic mean of average price per bull is $567.98.

TABLE 25

ANALYSIS OF VARIANCE OF SALE PRICE OF ANGUS PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Squares Avg. Price Per Bull
Grade of calf at weaning	4	52734.31
Residual	345	30600.90
R^2		.020

TABLE 26

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE
OF ANGUS PERFORMANCE TESTED BULLS

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	39	448.20
Avg. Choice	143	452.68
Choice	153	557.01
Low Fancy	27	644.68
Avg. Fancy	1	737.06

[a]Estimates are deviations from the overall adjusted means when equal numbers exist per subclass. The overall arithmetic mean of average price per bull is $567.98.

TABLE 27

ANALYSIS OF VARIANCE OF SALE PRICE OF ANGUS PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Squares Avg. Price Per Bull
Grade of Bulls (Final)	4	364166.14**
Residual	345	26990.10
R^2		.135

**P<.01.

TABLE 28

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE
OF ANGUS PERFORMANCE TESTED BULLS

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	39	444.04
Avg. Choice	143	455.04
Choice	153	531.43
Low Fancy	27	614.79
Avg. Fancy	1	794.60
Regression of Y on:		
Age at end of test		1.58
Lifetime W/day of age		487.00

[a]Estimates are deviations from the overall adjusted means when equal numbers exist per subclass. The overall arithmetic mean of average price per bull is $567.98.

TABLE 29

ANALYSIS OF VARIANCE OF SALE PRICE OF ANGUS PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Squares Avg. Price Per Bull
Grade of bulls (Final)	4	224481.66**
Regression of Y on:		
Age at end of test	1	3019879.50**
Lifetime W/day of age	1	224481.66**
Residual	343	18330.60
R^2		.416

**P<.01.

TABLE 30

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE
OF ANGUS PERFORMANCE TESTED BULLS

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	39	143.43
Avg. Choice	143	453.68
Choice	153	532.50
Low Fancy	27	611.55
Avg. Fancy	1	798.74
Regression of Y on :		
Weight off test		.75
Lifetime W/day of age		128.14

[a]Estimates are deviations from the overall adjusted means when equal numbers exist per subclass. The overall arithmetic mean of average price per bull is $567.98.

TABLE 31

ANALYSIS OF VARIANCE OF SALE PRICE OF ANGUS PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Squares Avg. Price Per Bull
Grade (Final)	4	227412.12**
Regression of Y on:		
Weight off test	1	3141517.00**
Lifetime W/day of age	1	169286.30**
Residual	343	17976.00
R^2		.427

**P<.01.

TABLE 32

CORRELATIONS AMONG CERTAIN VARIABLES OF POLLED HEREFORD BULLS STUDIED[a]

	2	3	4	5	6	7	8
1. Age at weaning	-.18	-.21	-.31	.10	.28	-.08	-.25
2. Average daily gain		.91	-.01	.21	-.11	.34	.44
3. Adj. average daily gain			.05	.12	-.19	.33	.45
4. Avg. daily gain on full feed				.21	.01	.21	.25
5. Wt. off test					.74	.58	.10
6. Age off test						.25	-.56
7. Sale price							.34
8. Lifetime wt./day of age							

[a]Correlations calculated on a within-year-sale location basis.

TABLE 33

CORRELATIONS AND REGRESSION COEFFICIENTS AND RELATIVE IMPORTANCE OF SEVERAL VARIABLES ON SALE PRICE OF POLLED HEREFORD BULLS

Variable[a]	Partial Ref. Coef. and Std. Dev., $	Simple Corr. Coef.	ΔR^2	Rank[b]
Weight off test	.60 ± .07	.58	.330	1
Lifetime W/day of age	228.74 ± 48.76	.34	.115	2
A. D. G. (Br. to Wn.)	186.00 ± 39.73	.34	.114	3
A. A. D. G. (Br. to Wn.)	182.39 ± 40.14	.33	.108	4
Age at end of test	.49 ± .15	.25	.062	5
A. D. G. - Full feed	53.67 ± 18.84	.21	.046	6
Age at weaning	-.39 ± .37	-.08	.007	7

[a]Each variable was fitted singularly in separate analysis.

[b]Based on the size of R^2.

*P<.05.

**P<.01.

TABLE 34

LEAST-SQUARES ETIMATES[a] OF SALE PRICE RECEIVED
OF POLLED HEREFORD PERFORMANCE TESTED BULLS

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Weaning)		
Low Choice	34	497.22
Avg. Choice	72	524.99
Choice	65	520.17
Low Fancy	9	610.23
Avg.Fancy	4	589.39

[a]Estimates are deviations from the overall adjusted mean when equal numbers exist per subclass. The overall arithmetic mean of average price per bulls is $548.40.

TABLE 35

ANALYSIS OF VARIANCE OF SALE PRICE OF POLLED HEREFORD PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Square Avg. Price Per Bull
Grade of calf (Weaning)	4	22413.54
Residual	167	20298.90
R^2		.03

TABLE 36

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE RECEIVED
OF POLLED HEREFORD PERFORMANCE TESTED BULLS

Variable	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	20	379.16
Avg. Choice	86	490.32
Choice	70	556.75
Low Fancy	8	767.37

[a]Estimates are deviations from the overall adjusted mean when equal numbers exist per subclass. The overall arithmetic mean of average price per bull is $548.40.

TABLE 37

ANALYSIS OF VARIANCE OF SALE PRICE OF POLLED HEREFORD PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Square Avg. Price Per Bull
Grade of Bull (Final)	3	295061.37**
Residual	168	15442.70
R^2		.254

**P<.01.

TABLE 38

LEAST-SQUARES ESTIMATES[a] OF SALE PRICE RECEIVED
OF POLLED HEREFORD PERFORMANCE TESTED BULLS

Variable	No. of Animals	Avg. Price Received Pre Bull ($)
Grade (Final)		
Low Choice	20	432.65
Avg. Choice	86	505.83
Choice	70	556.42
Low Fancy	8	698.72
Regression of Y on:		
Age at end of test		1.07
Lifetime W/day of age		379.00

[a]Estimates are deviations from the overall adjusted mean when equal numbers exist per subclass. The overall arithmetic mean of average price per bulls is $548.40.

TABLE 39

ANALYSIS OF VARIANCE OF SALE PRICE OF POLLED HEREFORD PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Squares Avg. Price Per Bull
Grade of bull (Final)	3	129929.21**
Regression of Y on:		
Age at end of test	1	672470.60**
Lifetime W/day of age	1	688245.19**
Residual	166	10444.9
R^2		.502

**P<.01.

TABLE 40

LEAST-SQUARES ETIMATES[a] OF SALE PRICE RECEIVED
OF POLLED HEREFORD PERFORMANCE TESTED BULLS

Variables	No. of Animals	Avg. Price Received Per Bull ($)
Grade (Final)		
Low Choice	20	431.11
Avg. Choice	86	508.44
Choice	70	558.56
Low Fancy	8	695.49
Regression of Y on:		
Weight off test		.60
Lifetime W/day of age		143.11

[a]Estimates are deviations from the overall adjusted means when equal numbers exist per subclass. The overall arithmetic mean of average price per bull is $548.40.

TABLE 41

ANALYSIS OF VARIANCE OF SALE PRICE OF POLLED HEREFORD PERFORMANCE TESTED BULLS

Source	Degrees of Freedom	Mean Squares Avg. Price Per Bull
Grade of bull (Final)	3	129748.70**
Regression of Y on:		
Weight off test	1	740197.20**
Lifetime W/day of age	1	147779.12**
Residual		10036.90
R^2		.521

**P<.01.

VITA

Harry Dott Bryan was born March 29, 1939 in Sevier County, Tennessee. He graduated from Buckingham Central High School at Buckingham, Virginia in 1957. He then farmed for four years in partnership with his father and brother.

In September of 1961 he entered Virginia Polytechnic Institute to study Agriculture and received his B. S. Degree in Animal Science June of 1965.

After graduating from college he was employed by Southern States Cooperative in Winchester, Virginia for a period of one year.

In May 1966, he was employed as Assistant County Agent in Morgan County, Tennessee and is currently serving as Assistant Extension Agent in youth work.

Mr. Bryan enrolled in the University of Tennessee Graduate School to attain a Master's degree in Animal Husbandry which he expects to receive in June, 1972.

Mr. Bryan was married in 1958 to the former Laura Whitehead of Blount County, Tennessee. They have two children, Janet Sue, age 12, and Harry Dott, Jr., age 7.