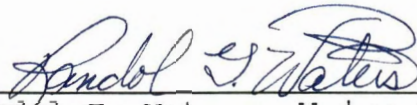


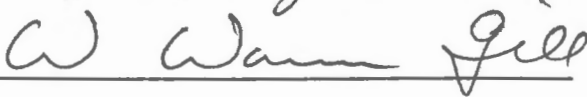
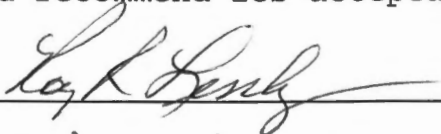
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Selection Criteria Used when
Purchasing Bulls at the Breeders
Performance Tested Bull Sale

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Thomas Bruce Steelman

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ABSTRACT

The purpose of this study was to determine the selection criteria buyers use for purchasing performance tested bulls at the Breeders Performance Tested Bull Sale. Various criteria were examined including: trait selection, perception of the effectiveness of the performance program, perception of individuals purchasing bulls in relation to the buyer's demographic locations, and buyer characteristics.

To facilitate the purpose of this study, the following specific objectives were developed:

1. To develop an average profile of the individuals who commonly purchase performance tested bulls.
2. To determine most common selection criteria used by buyers when purchasing bulls and the relationships of those criteria to selected buyer demographic characteristics.
3. To determine buyers' perceptions of the quality of the performance program and its relationship to selected buyer demographic characteristics.

This was a descriptive/correlational study which was Ex Post Facto in nature. Data were collected using a researcher developed questionnaire. The questionnaire was field tested to determine content validity and reliability

and appropriate adjustments were made prior to mailing to respondents.

Findings

The majority of respondents felt that the test records provided to them on the day of the sale were "useful". A large percentage of the respondents indicated their bulls were "productive breeders" with only a few respondents experiencing calving problems. When asked why they selected the Breeder Performance Tested Performance Sale, the greatest majority selected the sale due to its reputation.

Most respondents were satisfied with the bull they purchased and the performance tested bull program. They responded positively to those questions seeking their satisfaction with the program. Their responses included; "may return to the sale to purchased an additional bull", "contributed positively to the genetic improvement of their herd" and "would recommend the sale to others". In regard to the respondents positive reply to the various independent variables concerning "satisfaction with the sale" it can be concluded that the overall satisfaction with the performance program is very positive.

The dependent variables were four computed scale scores (sale factors, general information, descriptive information,

and performance information) based upon respondent's perceptions' of the importance of various kinds of selection criteria. Scores for each set of factors were arranged in a Lickert type scale ranging from one, being "very important", and five being "very unimportant". The respondent had the opportunity to determine the degree of importance of each selection criteria.

Respondents categorized the perceived importance of the various selection criteria provided to each potential buyer on sale day. The "descriptive" category received the highest rating while "disposition" was selected as the most important selection criterion within the category.

"Performance Information" followed very closely. It should be noted that birth weight was selected as the single most important selection criterion (in all groups). The category of "General Information" followed next with "breed" ranking as the most important criterion in this group. "Sale Factors" followed closely behind with "reputation of sale" ranked as the most important criterion in this category.

There is no reason to conclude that there is a relationship between respondents' "satisfaction with the sale", "level of education", "management practices employed by the buyer upon arrival to their farm", "participating in bull lease program", "farming status", or, "method of marketing", and their perceived importance of any of the

four kinds of selection criteria provided to them about the bull. There was a statistically significant relationship between "type of producer" and their perceptions of the importance of "sale factors" and "general information".

Implications

The Breeder's Performance Tested Bull Sale has made a tremendous impact of the availability of genetically superior breeding sires in Tennessee. The selection criteria utilized by individuals is the primary strategy for selecting a superior breeding sire. The data compiled in this study reveals those criteria deemed important by the respondent. It is apparent that some of the data provided to the potential buyer are unclear in meaning to them. Perhaps potential buyers are unfamiliar with available performance data or unclear about how to utilize a combination of all available data to select a breeding sire.

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CHAPTER I

INTRODUCTION AND PROBLEMS

I. Introduction

The Breeders Performance Tested Bull Sale was located at the Ellington Agricultural Center in Nashville, Tennessee. In 1992, the location of the performance tested bull sale changed from Nashville to Murfreesboro. Annually, this is the location where qualifying bulls are brought together at the end of their on-the-farm 140-day full feed test and sold to attending producers in a public auction forum. In 1989 the period in which the bulls were on their full feed test was changed to a 112-day period. According to Kirkpatrick, (1993) this practice was changed for two reasons; 1) reduce the overall condition of the bull at sale time and 2) to reduce overall feed costs.

Consignors of these bulls must have participated in the Tennessee Beef Cattle Improvement Program or in a breed association performance program where the entire herd is annually performance tested. Each bull selected by the consignor must meet stringent qualifications throughout its development. The consignor has a vast array of performance data compiled from the bull's progeny and current performance data pertaining to the producer's herd.

II. Need for the Study

What are the attributing factors which warrant a producer's attendance, interest, and possible purchase of a performance tested bull? If this information can be determined, perhaps the current procedures used in offering performance individuals for sale can be altered if the results of this study determine a problem exists.

III. Purpose of the Study

The purpose of this study was to determine the selection criteria buyers use for purchasing performance tested bulls at the Breeders Performance Tested Bull Sale. Various criteria were examined including: trait selection, perception of the effectiveness of the performance program, perception of individuals purchasing bulls in relation to the buyer's demographic locations, and buyer characteristics.

The performance data collected from each individual bull allows breeders the opportunity to select superior individuals which will improve the genetic worth of their herds. The performance data developed for each animal allows potential buyers the opportunity to identify the aspects of a desirable or undesirable heritable trait. These traits which make up the bull's breeding value (value

as a parent) are the essence of the future progeny of an individual.

To facilitate the purpose of this study, the following specific objectives have been developed:

1. To develop an average profile of the individuals who commonly purchase performance tested bulls.
2. To determine most common selection criteria used by buyers when purchasing bulls and the relationships of those criteria to selected buyer demographic characteristics.
3. To determine buyers' perceptions of the quality of the performance program and its relationship to selected buyer demographic characteristics.

IV. Limitations of the Study

This study examines attitudes of individuals who purchased performance tested bulls through a breeder performance tested program over a 10 year time frame. Findings are limited to those self reported perceptions.

IV. Definitions of Terms

112 or 140 day average daily gain - the period of time which the individual bull is being tested, after which his rate of gain is adjusted by using the number

of days on test.

Birth weight - the actual weight of the individual at birth

Weight per day of age - the gain of the individual referred to as gain per day from birth to a designated period of time

Pedigree - the record of ancestry

Consignor - person or persons who consign the individual to the test

Expected Progeny Difference - Kirkpatrick (1989) defined "Expected progeny difference (E.P.D.) as a prediction of how future progeny of an individual would be expected to perform in a particular trait compared to other animals in that breed." He added that, "E.P.D.'s are expressed in plus or minus pounds of growth traits (birth, weaning, and yearling), and also in pounds for milk production."

CHAPTER II

RATIONALE FOR THE STUDY THROUGH A REVIEW OF LITERATURE

I. Introduction

Since the beginning of human existence, man has tried to find explanations for what motivates people to do what they do. After years of research, Ajzen and Fishbein (Meussling, 1987) concluded that a person's attitude has a consistently strong relation to his or her behavior when it is directed at the same target and when it involves the same action. In general, a person can be motivated when attitudes are directed at a single target, need or desire.

Beef cattle performance programs are an established means for buyers to select "test station program participants" according to the animal's performance during the trial period. A study conducted by Baker (1967) revealed that performance testing programs can be traced back to the early 1930's when the first research was initiated by the United States Department of Agriculture (U.S.D.A.) at the United States Range Livestock Research Station in Miles City, Montana. With the establishment of this research station, several important programs were developed. In 1941, the first central test station was established at Balmorhea, Texas. Between 1950 and 1955,

several State Extension Beef Cattle Improvement (B.C.I.) Programs were established. Baker (1967) also reported one of the first associations to be founded in response to this movement was the Beef Cattle Improvement Association in Virginia. As the B.C.I. programs strengthened, other associations became interested and joined the progress such as the American National Cattlemens Association. Other programs emerging from the first performance testing movement were the various breed registries.

II. Performance Testing in Tennessee

In Tennessee, the beef cattle improvement program began in 1956. At this time, plans were being made to develop the first bull sale. It was not until 1958, that the first performance bull program was conducted. From 1958 until 1966, performance bull sales were held throughout the state. According to William P. Tyrell, (1990) Extension Animal Science Leader in the late 60's early 70's, the bull sales were held at the various locations for the convenience of potential buyers.

In 1987, the Performance Tested Bull Sale was held at the Ellington Agricultural Center in Nashville. The sale remained at this site until 1992. This sale offered to the public, two year old bulls which were raised on the breeder's farm. The Nashville program established its name

from its early history with those producers which the program represents, the "On the Farm Breeder's Performance Tested Bull Program".

Haley Jamison, (1990) Extension leader in Animal Science in the late 70's and early 80's stated, "the greatest contribution for the improvement of the beef cattle in Tennessee was the Breeders Performance Bull Program".

The Nashville bull performance program continued through the years as the only program of its kind until 1972. In 1972, a similar program began in Brentwood, Tennessee on the Anderson farm. This program differed from the Nashville sale in that, the bulls began their test at much younger ages, 12-15 months. These bulls were also consigned to the Anderson farm where they participated in a 140-day performance test. This program grouped individuals in a test environment where a large number of variables could be controlled. This type of grouping reduced environmental effects, therefore, genetic differences between each individual could be estimated. The Anderson Farm program was the early beginning of The University of Tennessee Performance Tested Bull Program held at the Springhill Experiment Station. This Performance Tested Program differs from the Nashville Test Program due to the test environment. Bulls remain on location at the Springhill Experiment Station while individual breeders retain their bull on their own farm during the 112 day

performance period for the Breeders Performance Tested Bull program. Both Jamison (1990) and Tyrell (1990) agreed, that the early day beef producer purchasing a performance bull wanted "good bulls" but were unwilling or unable to pay for them. Jamison and Tyrell also agreed that, the majority of these producers were more interested in "cow fresheners" (a bull of unknown quality for breeding) than quality performance animals.

III. Contemporary Performance Testing Programs

Today, Jamison and Tyrell view the "modern" bull buyer as performance test minded. These producers demand quality performance tested bulls and their purchase price reflects the level of quality.

Presently, beef producers also have the option of purchasing bulls from purebred breeders who participate in breed registry performance programs. Producers enroll their herds in performance programs, thus establishing performance data for their entire herd. Performance data can then be compiled to estimate breeding values (value as a parent) of individual bulls offered to the public. The data collected concerning heritable traits are relatively new and somewhat hypothetical. Purebred producers and beef professionals who work with these probability data are very familiar with the concepts. Commercial producers who are slower to accept

change or progress, may not be as familiar with them. While determining the meaning of these data is relatively simple, and genetic improvement can be tremendously enhanced with each selection, some producers may be slow in utilizing the data. These data are valuable for bull selection and determining values of expected performance of a bull's progeny. The cattle industry will utilize these types of data more aggressively in the future. Other animal industries, such as the swine industry, are establishing this, base-line data in determining performance qualities of potential herd sires.

IV. Producer Attitudes About Performance Testing

Baker (1967) indicated the development of the beef cattle performance programs was influenced by the attitudes of fellow cattlemen within the industry. Baker also stated that the attitudes evolved through four periods. The first attitude emphasized the need of selecting sires for improvement of genetics within herds, thus benefitting the total population of beef cattle. Within this time period, purebred cattle producers were established.

The second period emphasized the need for genetically superior livestock which could be marketed at a younger age due to more efficient gaining characteristics. The third period brought interest in concrete data for comparing the

performance of selected individuals by "weight per day of age". This approach met with vast controversy, due to the fact that no one in the industry could prove that this trait was significantly related to performance. Through the years this trait has been proven to be a very important factor in developing faster gaining and efficient gaining animals.

The fourth and current period according to Baker (1967), viewed the yield of trimmed retail cuts at a given age to be a very important component in establishing the value of a beef animal in relation to it's rate-of-gain capability.

A beef producer's attitude toward trait selection is perhaps one of the most important factors when selecting a breeding animal. Potential buyers place an emphasis on particular traits of a bull. The buyer's knowledge of highly heritable traits can significantly improve numerous characteristics related to the herd. These characteristics will; improve rate of gain, increase pounds of marketable product, and overall herd performance, leading to a more efficient and profitable operation.

V. Selection of Bulls Based Upon Performance

In a study initiated in 1942 at the Texas Agricultural Experiment Station in Balmorhea, Texas in 1942 by Patterson, Jones, Bayles, and Turnbough, it was concluded that

selection based on the performance of an animal should be a superior method for improving rate of gain in beef cattle. When selecting bulls from central bull stations, producers have realized the importance of the data collected. This information collected from bulls is a working estimate of the bulls' ability to pass desirable traits to their offspring. Kapp and Clark (1978) concluded that heredity plays a very important role in determining the gains of beef animals in a feed gain environment. Their study questioned the practice of testing calves for gaining ability. As a result of this study, they concluded that selection can be made more accurately by comparative feeding tests of expected herd sires. Jamison (1971) reported that standards used by breeders for the purpose of selection varies. His study indicated that buyers rely on different types of performance data, and they look for different aspects when physically viewing an individual animal. The performance Tested Bull Sale at the Ames Plantation Experiment Station revealed different standards for evaluating performance tested bulls. Producers purchasing fall bulls at two years of age tended to place more emphasis on size and maturity over performance data. Those who purchased spring-born calves placed more emphasis on individual performance. Jamison's (1971) study revealed the different attitudes of producers in selecting breeding animals. The knowledge of

the producer regarding how to apply available data is an important factor in evaluation and selection.

VI. The Role of Test Stations

Performance test stations have become an important and well established part of the beef industry. According to Jenkins (1972), test stations have three main purposes: 1) individual animal or trait evaluation; 2) between-herd comparisons; and, 3) the education of producers and breeders. The bull performance program accepts bulls from breeders across the state, after which the bulls are placed in a test environment for a specific period of time. At the end of the test, results are compiled in a booklet and made available to the producers attending the sale forum. This information can then be used in the bull selection process. Morris Dixon, past president of the Beef Improvement Assessment Station was quoted as saying (cited in Jenkins, 1972), "We have got to remember that the main purpose of bull test stations is to test the bulls and select better breeding animals for our herds."

Performance testing offers producers the chance to compare differences among an animal's heritable traits. The test station offers the producers several advantages over the traditional means of bull selection. According to Eller

(1987), certain advantages help draw the buyer to a station sale. He stated several advantages which producers consider. These include: 1) stringent requirements on bulls being consigned; 2) bulls being selected are known to be the top end of the test; 3) each bull being evaluated for breeding soundness; and, 4) test bulls belong to a pool of genetic superiority.

According to Ensminger (1978), the rate of improvement in herd, breed, and population is dependent on: 1) the percentage of observed differences between animals that is due to heredity (heritability); 2) the difference between selected individuals and the average of the herd or group from which they came; and, 3) the genetic association among traits upon which selection is based.

A producer makes the selection after reviewing available data, physical observation, and information supplied by the various breed associations in their sire summary. By studying this information, a producer should be able to select an animal to correct any weaknesses of the herd and/or be able to increase the total pounds of marketable product.

VII. Studies Concerning Traits and Definition of Terms

Heredity, as defined in Webster's New World Dictionary (1980) is, "the transmission of characteristics from parent

to offspring by means of genes in the chromosomes; b) the tendency of offspring to resemble parents or ancestors through such transmission; or, 2) all the characteristics inherited genetically by an individual.

A "trait", defined by Webster's (1980), is "a distinguishing quality or characteristic.

Heritability, according to Neel (1990), is the amount of variation or difference in a trait, usually expressed as percentage.

Examples of heritable traits include:

<u>Trait</u>	<u>Heritability Percentage</u>
Birth Weight	40
Weaning Weight	30
Feedlot Gain	45
Efficiency of Gain	40
Yearling Weight	60

If a trait is highly heritable, herd progress can be achieved when this particular trait is used during the selection process.

Buyers present at the 1989 Tennessee Performance Tested Bull Sale were presented information concerning the performance of each animal and the expected progeny difference of relative traits. The traits listed in the publication included:

- Adjusted 205 weight
- 112 day average daily gain

- Adjusted 365 day weight
- Birth weight
- Age
- Weight
- Adjusted 205 day ratio
- General information concerning consignor,
breed, identification number, and pedigree

Accuracy, which is included in combination with E.P.D.'s, defined by Kirkpatrick (1989), "is an expression of reliability of the E.P.D. and can range from 0.0 to 1.0. The higher the score for accuracy, the more reliable the E.P.D.

Francoise, Vogt, and Nolan (1973) reported data which were collected from participants in the Hawaii Beef Cattle Improvement Association. These data were used to estimate heritabilities, genetic, and phenotypic conclusions involving weaning weight per day of age, weaning conformation score, yearling weight per day of age, average daily gain from weaning to yearling age, and yearling conformation score. Their study revealed that estimated data pooled from across sexes and breeds were highly correlated and ranged from 0.44 to 0.81. This relatively high correlation revealed that immediate rate of genetic change can be expected from selection using any one of the previously mentioned traits.

Michelson and Paisley (1979) concluded that scrotal circumference is one criterion for determining breeding soundness. In their study, they suggested that bulls with a small scrotal circumference are most likely to be unsatisfactory breeders.

Burfening, Kress, Friedrich, and Vaniman (1979) concluded that calving difficulty is a major source of economic loss to the cow/calf producer.

Herderson and Quaas (1976) concluded that progeny of an individual is a very important factor in selection, especially when the trait cannot be observed. Therefore, one must study the traits of an individual's ancestors in order to determine the effectiveness of each trait.

Nelson, MacDonald, and Drewry (1971) defined "adjusted weight" as, "the weight of a calf standardized for differences which are not heritable, such as age at weighing, age of dam, and sex of calf. Actual weaning weights are adjusted to estimate what a calf would have weighted at 205 days of age if it's dam had been mature. Yearling weights are adjusted to 365 days of age by combining the adjusted 205-day weight and postweaning average daily gain."

VIII. Summary

Efficiency and profitability are the bottom lines in the cow-calf industry. Producing a quality product as efficiently as possible, while minimizing costs will maximize profitability. Several factors are important in developing a successful beef cattle operation. Factors which contribute to this outcome are generated by management decisions throughout the reproduction cycle. Selection of genetically superior animals can dramatically improve the performance of a cow herd.

A buyer has a lot of variables in mind when selecting a potential herd sire. Phenotype (visual appearance) and genotype (genetic makeup) are combined, to select the one individual which will serve as a herd sire. Several traits can be utilized during the selection process to identify animals which will contribute more desirable traits while eliminating undesirable traits. In utilizing the selection technique, a vast amount of genetic improvement can be achieved to maximize profits.

Previous studies have reviewed the various criteria which are utilized in the selection process. Jamison (1971) determined that factors such as individual performance, size, maturity, and overall performance play a significant role in the selection process.

CHAPTER III

PROCEDURES AND METHODOLOGY

I. Introduction

This was a descriptive/correlational study which was Ex Post Facto in nature. Data were collected using a researcher developed questionnaire. The questionnaire was field tested to determine content validity and reliability and appropriate adjustments were made prior to mailing to respondents.

II. Sample and Population

The sampling frame for this study was a validated list of 549 buyers who purchased performance tested bulls over a 10 year period from 1982 to 1992 from the Breeders Performance Bull Sale. The validated list of buyers was secured from David Kirkpatrick, Beef Cattle Breeding Specialist with The University of Tennessee. Respondents to be surveyed for the study were selected by utilizing a simple random sampling technique. In this way, every person in the sampling frame had an equal chance of being selected to participate in the study. A sample size of 252 was selected for the study. According to McCall (1980) this

sample size is more than adequate for a 95 percent confidence in conclusions when attempting to generalize to a population of 549.

These 549 buyers were located throughout the state of Tennessee and adjoining states. These buyers have been offered a variety of breeds at each performance sale over the past 10 years. Those breeds represented include: Angus, Polled Hereford, Simmental, International Hereford, Hereford, Shorthorn, Brahman, and Red Poll.

III. Design

This was a descriptive/correlational study which was Ex Post Facto in nature. A control group was not utilized. Data were collected utilizing a researcher developed survey designed to measure specific dependent variables and their relationships to selected independent variables.

The survey was developed under close scrutiny to minimize threats which could jeopardize the study. In a descriptive/correlational study, threats can be present which may impact the validity of the study. Pilot testing and validation processes were used to minimize threats wherever possible.

IV. Instrumentation

The instrument used in this study was a modified version of the "1989 performance tested bull buyer survey" developed by Kenneth Ambrose (1989). Changes were made to improve the validity of the questionnaire and to insert necessary questions to broaden the depth of the study.

The questionnaire consisted of 38 questions collecting data concerning attitudes toward the bull test program, criteria used in bull selection and characteristics of the individuals purchasing performance tested bulls.

The questionnaire represented a combination of nominally, ordinal, and interval scaled measures. The questions were open ended, close ended with order choices and close ended with unordered choices.

Likert type attitudinal scales were utilized in developing some measures. The questionnaire was designed to be easy for individuals to complete while maintaining a high level of reliability.

A panel was utilized to review the questionnaire prior to its administration and to check its face and content validity. A pilot test was utilized to check the questionnaires face validity. A review of the data from these tests was required to assure the questionnaire supplied necessary information to complete the study.

The instrument was printed on bond paper utilizing all available design techniques to insure face validity. To insure adequate response, the type was large, clear print.

The questionnaire was mailed to a random sample of 252 buyers who participated in the Tennessee performance tested bull sale over the past ten years. In the first mailing, the questionnaire was sent with a cover letter explaining the intent of the study, confidentiality of the study, and the researchers' appreciation for their assistance. A self-addressed stamped envelope was included. After the first week, reminder postcards were sent to those individuals who had not responded to the questionnaire. After the third week, only 51 percent had responded, therefore additional cover letters and questionnaires were sent to non-respondents. Those questionnaires returned after the third mailing were viewed as late respondents. An analysis of differences between early and late respondents was utilized in an effort to increase generalization since late respondents were considered to be similar to non respondents (Goldhor, 1972). An analysis failed to produce any substantive differences. Therefore, the researchers assumed that responses from this sample were generalizable to the population from which it was drawn.

V. Identification Of Variables

The first objective was to develop an average profile of the individuals who commonly purchases a performance tested bull. Data collected for this objective were intervally and nominally scaled. The data were collected from respondents by using open ended questions and close ended with unordered choice questions. Data compiled to accomplish this objective included:

- usefulness of test records;
- health problems with purchased bull;
- productivity of purchased bull;
- experience of calving problems;
- why select Breeders Performance Tested Bull Sale;
- distance from the Ellington Agriculture Center and Murfreesboro sale sites;
- did bull contribute to genetic development of herd;
- would you return to sale or recommend sale to other;
- sale factors;
- general information;
- descriptive information;
- performance information;
- age;
- gender;
- level of education;
- major source of income;
- farming status;

- method used to market calves;
- years in cattle business;
- number of acres of permanent/rented pasture;
- source of information about sale;
- source of educational information; and,
- Extension contacts.

The second objective was to determine the most common selection criteria used by buyers when purchasing bulls and their relationships to buyer demographic characteristics. The independent variables were; current farming status, method of marketing calves, bull participation in bull lease program, type of producer, management practices employed by buyer upon arrival to farm, level of education, and satisfaction with sale.

Listed in figure I are the selection criteria utilized in the study. The dependent variables were four computed scale scores (sale factors, general information, descriptive information, and performance information) based upon respondent's perceptions' of the importance of various kinds of selection criteria. Scores for each set of factors were arranged in a Lickert type scale ranging from one, being "very important", and five being "very unimportant". The respondent had the opportunity to determine the degree of importance of each selection criteria.

SELECTION CRITERIA	
breed	birth weight
adjusted 205 day weight	birth weight EPD
scrotal circumference	pedigree
yearling weight EPD	age
breeder or consignor	weight sale day
visual appearance	weight off test
disposition	milk EPD
112 day average daily gain	frame score
weaning weight EPD	timing of sale
weight per day of age	reputation of the sale
adjusted 365 day weight	convenience of selection
EPD accuracy estimate	fat thickness
adjusted 205 day weight ratio	location of sale

Figure 1. Selection Criteria Used to Construct Dependent Variables

Perceived importance scores for each of these criteria were summed and averaged to calculate four different scale scores based upon whether the item related to "sale factors", "general factors about the bull", "descriptive information about the bull", or "performance information about the bull". These intervally scaled variables were treated as dependent variables in objective two.

Selection criteria grouped under sale factors included:

- convenience of selection on sale day;
- location of sale;
- timing of sale; and,
- reputation of sale.

Selection criteria grouped under general information included:

- weight of bull on sale day;
- breed;

- pedigree; and,
- breeder or consignor.

Selection criteria grouped under descriptive information included:

- age;
- fat thickness;
- disposition;
- frame score;
- scrotal circumference;
- visual appearance; and,
- weight off test.

Selection criteria grouped under performance information included:

- birth weight;
- birth weight EPD;
- 112 day average daily gain;
- weight per day of age;
- adjusted 365 day weight;
- adjusted 205 day weight;
- adjusted 205 day weight ratio;
- weaning weight EPD;
- milk EPD;
- yearling weight EPD; and,
- EPD accuracy estimate.

The third and final objective was to determine the buyers' perceptions of the quality of the performance

program and its relationship to the buyer's demographic characteristics. The dependent variable in this analysis was simply the respondent's perceived satisfaction with the bull.

Listed in Figure 2 are selected demographic characteristics utilized to examine the respondents' satisfaction with their performance tested bull.

Demographic Characteristics

Management Practices employed by buyer
 Type of producer
 Bull participant in bull lease program
 Level of education
 Current farming status
 Method used to market majority of calves

Figure 2. Selected Demographic Characteristics Used to Determine Respondents Satisfaction with Performance Tested Bull.

Listed in Figure 3 are the names of sources of information about the sale, contacts from the Extension Service and other demographic characteristics utilized to examine the respondents satisfaction with their performance tested bull.

Characteristics

Number of sources of information

Number of bulls purchased

Age

Gender

Number of Extension beef meetings attended

Number of Extension beef demonstrations

Number of visits to Extension Office

Number of phone calls to Extension Office

Number of farm visits received from Extension Agent

Number of Extension Newsletters and letters received

Figure 3. Extension contacts, number of sources where sale information was obtained, and other demographic characteristics to examine respondents satisfaction with purchased bull.

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) release 4.0 which is available on the IBM 3081 mainframe computer at The University of Tennessee Computing Center (SPSS Inc. 1990). Means, standard deviations, percentages, and frequencies were used to describe respondents regarding specific variables and develop the demographic profile for objective one.

Since the dependent variables measured for objective two were intervally scaled and moderately correlated with one another (ie. four computed selection criterion scores), multivariate techniques were employed to test the significance of relationships between them and selected independent variables. The inferential test of significance employed for objective two when testing the relationship between the dependent variables and a dichotomous nominally

scaled independent variable was Hotellings T^2 . Wilkes Lambda was employed when testing the relationships between the dependent variables and a polychotomous nominally scaled independent variable. In instances where the multivariate test was significant, follow-up univariate analysis of variance (f test) was employed to further test the relationships.

The dependent variable studied in objective three was a single interally scaled measure (ie. respondent's satisfaction with the bull). Therefore, appropriate univariate inferential tests were employed. Relationships with nominally scaled independent variables were tested using the univariate analysis of variance (f test). Relationships between the dependent variable and interally scaled independent variables were described using pearsonnian correlation coefficients.

In all cases, the commonly used .05 alpha level was set a prior as a basis for rejection of the null hypotheses.

Chapter IV

PRESENTATION AND DISCUSSION OF DATA

I. Introduction

Questionnaires were mailed to 252 individuals who had purchased bulls from the Breeder's Performance Tested Bull Sale. Of this total, 50 were returned due to incorrect mailing addresses, 30 were returned as unusable (person retired, deceased, etc.), while 133 were classified as usable responses. The total usable response rate was 53 percent. An analysis of differences between early and late respondents failed to produce any substantive differences and since late respondents were considered to be similar to non-respondents (Goldhor, 1972) the researchers assumed that responses from this sample were generalizable to the population from which it was drawn.

The data were analyzed and organized according to the objectives of this study which are:

1. To develop an average profile of the individuals who commonly purchase performance tested bulls;
2. To determine most common selection criteria used by buyers when purchasing bulls and the relationships of those criteria to selected buyer demographic characteristics; and,

3. To determine buyers' perceptions of the quality of the performance tested bull program and the relationship of those perceptions to selected buyer demographic characteristics.

II. Demographic Profile of Respondents

Objective number one was to develop a demographic profile of the individuals purchasing performance tested bulls. The data in the next seven tables were used to develop this profile. The next two tables describe general characteristics of the respondents.

As reported in Table I, 124 (96.9 percent) were male while the remaining four (3.1 percent) were female. Regarding their level of education, seven (5.5 percent) received less than high school education, 37 (29.1 percent) were high school graduates, while 31 (24.4 percent) had completed some college or technical training, and 52 (40.9 percent) were college graduates or higher.

A beef enterprise was the major source of farm income for 102 (85.7 percent) respondents while swine ventures were identified by two (1.7 percent). Three respondents (2.5 percent) stated that row crops were their major source of

Table I. Nominally Scaled Demographic
Characteristics of Respondents

VARIABLE	RESPONDENTS	
	NUMBER*	PERCENT
RESPONSE		
GENDER		
MALE	124	96.9
FEMALE	4	3.1
TOTAL	128	100.0
LEVEL OF EDUCATION		
LESS THAN HIGH SCHOOL	7	5.5
HIGH SCHOOL GRADUATE	37	29.1
SOME COLLEGE OR TECHNICAL TRAINING	31	24.4
COLLEGE GRADUATE OR HIGHER	52	40.9
TOTAL	127	100.0
MAJOR SOURCE OF FARM INCOME		
BEEF	102	85.7
SWINE	2	1.7
ROW CROP	3	2.5
OTHER	12	10.1
TOTAL	119	100.0
CURRENT FARMING STATUS		
FULL TIME	46	37.7
PART TIME	57	46.7
RETIRED	19	15.6
TOTAL	122	100.0

TABLE I. (Continued)

VARIABLE	$\bar{x}$	PERCENT
MARKET MAJORITY OF CALVES		
AUCTION	67	57.8
DIRECT ON FARM	21	18.1
VIDEO SALE	3	2.6
FEEDER CALF SALE	19	16.4
PACKER	2	1.7
OTHER SALE	4	3.4
TOTAL	116	100.0
DISTANCE FROM SALE SITE		
NASHVILLE		
0 - 50 MILES	25	26.0
51 - 100 MILES	36	37.5
101 - 150 MILES	22	22.9
151 - 200 MILES	7	7.3
OVER 200 MILES	6	6.3
TOTAL	96	100.0
MURFREESBORO		
0 - 50 MILES	5	18.5
51 - 100 MILES	14	51.9
101 - 150 MILES	3	11.1
151 - 200 MILES	4	14.8
OVER 200 MILES	1	3.7
TOTAL	27	100.0

* All totals do not sum to 133 due to respondents not answering some questions.

income while 12 (10.1 percent) relied on other enterprises for their major source of income.

Forty-six (37.7 percent) respondents were employed full time on their farms while 57 (46.7 percent) were identified as part time. Nineteen (15.6 percent) respondents classified themselves as retired.

Respondents were asked to indicate how they most frequently marketed their calves. The majority of respondents, 67 individuals (57.8 percent) marketed the majority of their calves through an auction system while 21 (18.1 percent) preferred to market their calves directly off the farm. Three (2.6 percent) identified they predominately used video sales while 19 (16.4 percent) utilized feeder calf sales. Two (1.7) indicated they sold directly to the packer and 4 (3.4 percent) utilized other techniques to market their calves.

Since the location of the performance tested bull sale changed from Nashville to Murfreesboro in 1992, data was collected regarding distances traveled by respondents to purchase their bulls from both locations. As reported in Table I, for those purchasing bulls at the Nashville site, 25 (26.0 percent) traveled from 0 to 50 miles, while 36 (37.5 percent) traveled from 51 to 100 miles to the sale. Twenty-two (22.9 percent) traveled from 101 to 150 miles, 7 (7.3 percent) traveled from 151 to 200 miles, and the remaining 6 (6.3 percent) traveled more than 200 miles.

Also reported in Table 1, for those purchasing bull at the Murfreesboro site, 5 (18.5 percent) traveled from 0 to 50 miles, while 14 (51.9 percent) traveled from 51 to 100 miles to the sale. Three (11.1 percent) traveled from 101 to 150 miles, 4 (14.8 percent) traveled from 151 to 200 miles, and the remaining 1 (3.7 percent) traveled more than 200 miles. It should be noted that the vast majority of those purchasing bulls at both sites traveled under 150 miles.

Table II reports additional respondent characteristics. As reported in Table II, the average age of respondents was 56.69 (s.d. 12.79). The average number of years in the cattle business was 27.89 years (s.d. 13.11). They reported owning an average of 249.70 (s.d. 280.22) acres of pasture and they rented an average of 64.34 (s.d. 157.77) additional acres of pasture.

Table II. Intervally Scaled Demographic
Characteristics of Respondents

VARIABLE	NUMBER*	$\bar{x}$	S.D.
AGE	126	56.69	12.79
YEARS IN CATTLE BUSINESS	122	27.89	13.11
ACRES OF PERMANENT PASTURE	125	249.70	280.22
ACRES OF RENTED PASTURE	96	64.34	157.77

* All totals do not sum to 133 due to respondents not answering some questions.

Respondents were also asked to identify sources from which they received information about the sale. As reported

in Table III, the vast majority (72.7 percent) indicated they received information from catalogs sent to them by Extension specialists. However, other frequently sighted sources included "Extension News Articles" (54.7 percent), "Extension Newsletters" (54.7 percent), and "commercial magazines" (37 percent). Additional sources of information are also reported in Table III.

Respondents were also asked to identify sources of educational information in general. As reported in Table IV, ninety-nine respondents (79.8 percent) received educational information from Extension Service sources. Sixty-one (49.2 percent) received information from the state cattlemen association, while 67 (54 percent) indicated they received educational information from other producers. Sixty-three (50.8 percent) respondents gained information from breed associations while four (3.2 percent) individuals received information from other sources.

Table V reports the average number of Extension contacts per individual, and standard deviations for various kinds of contacts producers had with the Agricultural Extension Service. Attendance at Extension beef meeting were reported by 113 respondents. The average number of meetings attended by each respondent was 2.84 (s.d. = 10.24). Extension beef demonstrations were attended by 106 individuals with a mean of 1.63 attended (s.d. = 5.04) per

TABLE III. SOURCES OF INFORMATION ABOUT SALE

SOURCE	YES		NO	
	NUMBER*	PERCENT	NUMBER*	PERCENT
EXTENSION NEW ARTICLES	70	54.7	58	45.3
EXTENSION RADIO PROGRAM	12	9.4	116	90.6
EXTENSION TV CABLE PROGRAM	2	1.6	125	98.4
EXTENSION NEWSLETTER	70	54.7	58	45.3
EXTENSION MEETING	29	22.7	99	77.3
VISIT FROM AGENT	27	21.1	101	78.9
VISIT TO EXTENSION OFFICE	29	22.7	99	77.3
PHONE CALL FROM AGENT	37	28.9	91	71.1
PHONE CALLS TO EXTENSION OFFICE	22	17.3	105	82.7
CATALOG FROM EXTENSION SPECIALISTS	93	72.7	35	27.3
COMMERCIAL MAGAZINE	47	37.0	80	63.0
OTHER MEANS OF INFORMATION ABOUT SALE	11	8.7	116	87.2

* All totals do not sum to 133 due to respondents not answering some questions

TABLE IV. Sources of Educational Information

SOURCE	YES		NO	
	NUMBER	PERCENT	NUMBER	PERCENT
EXTENSION SERVICE	99	79.8	25	20.2
STATE CATTLEMEN ASSOCIATION	61	49.2	63	50.8
INDIVIDUAL PRODUCER	67	54.0	57	46.0
BREED ASSOCIATION	63	50.8	61	49.2
OTHER	4	3.2	120	96.8

TABLE V. Agricultural Extension Service Contacts

CONTACTS	NUMBER	$\bar{x}$	S.D.
EXTENSION BEEF MEETINGS ATTENDED	113	2.84	10.24
EXTENSION BEEF DEMONSTRATIONS ATTENDED	106	1.63	5.04
VISITS TO EXTENSION OFFICE	109	4.03	10.32
PHONE CALLS TO EXTENSION OFFICE	113	3.91	5.50
PHONE CALLS FROM EXTENSION OFFICE	105	2.33	4.62
FARM VISITS FROM AGENT	107	1.83	4.46
EXTENSION NEWSLETTERS & LETTERS RECEIVED	109	7.19	7.70

* All totals do not sum to 133 due to respondents not answering some questions.

individual. Visits to Extension offices were reported by 109 respondents with a mean of 4.03 (s.d. = 10.32). One hundred thirteen individuals reported placing an average of 3.91 (s.d. = 5.50) phone calls to Extension Offices, while 105 individuals reported receiving an average of 2.33 phone calls from Extension Offices (s.d. = 4.62). Farm visits were reported by 107 respondents with a mean number per responded of 1.83 (s.d. = 4.46). One hundred nine individuals received Extension newsletters and individual letters. Each respondent received an average of 7.19 such letters (s.d. = 7.70).

Respondents were asked specific questions regarding their perceived satisfaction with the Performance Tested Bull Sale. Table VI reports their answers to some of those questions. As reported in Table VI, 126 (96.2 percent) indicated they believed the test records provided to them on the day of the sale were "useful". Only 17 (12.8 percent) reported having any health problems with their bulls. One hundred-twenty (94.5 percent) indicated their bulls were "productive breeders" and only 20 (16.1 percent) reported having any calving problems. When asked why they selected this sale, 27 (22.5 percent) indicated they selected the sale because of "convenience", 65 (54.2 percent) because of its "reputation", 7 (5.8 percent) because of the "advertisement", and 21 (17.5 percent) indicated they

TABLE VI. Respondents Perception of Sale

SOURCE	NUMBER*	PERCENT
TEST RECORDS USEFUL		
YES	126	96.2
NO	5	3.8
TOTAL	131	100.0
HAD HEALTH PROBLEMS		
YES	17	12.8
NO	116	87.2
TOTAL	133	100.0
A PRODUCTIVE BREEDER		
YES	120	94.5
NO	7	5.5
TOTAL	127	100.0
HAD CALVING PROBLEMS		
YES	20	16.1
NO	104	83.9
TOTAL	124	100.0
WHY SELECT OUR SALE		
CONVENIENCE	27	22.5
REPUTATION	65	54.2
ADVERTISEMENT	7	5.8
OTHER	21	17.5
TOTAL	120	100.0

TABLE VI. (Continued)

SOURCE	NUMBER	PERCENT
CONTRIBUTE TO GENETIC DEVELOPMENT		
YES	113	90.4
NO	12	9.6
TOTAL	125	100.0
WOULD YOU RETURN TO OUR SALE		
DEFINITELY WOULD RETURN	77	58.3
MAY RETURN	53	40.2
DEFINITELY WOULD NOT RETURN	2	1.5
TOTAL	132	100.0
WOULD YOU RECOMMEND OUR SALE TO OTHERS		
YES	126	97.7
NO	3	2.3
TOTAL	129	100.0

* All totals do not sum to 133 due to respondents not answering some questions.

selected the sale for "some other reason". One hundred thirteen (90.4 percent) indicated they believed the bull(s) they purchased had "contributed to the genetic development of their herds". When asked, 77 (58.3 percent) indicated they "would definitely" return. Only 2 (1.5 percent) indicated they "definitely would not return" to the Performance Tested Bull Sale. Further, 126 (97.7 percent) indicated they would "recommend the sale to others" while only three (2.3 percent) indicated they would "not recommend the sale to others".

Table VII reports the perceived importance of the various selection criteria provided to each buyer on sale day.

The criteria were categorized into four groups on respondents surveys and they were asked to rate each criterion's importance in making a bull selection by rating it from "1" (very important) to "5" (very unimportant). These groups included; sale factors, general information, descriptive information and performance information. The "overall" means reported in Table VII reflect the average perceived importance for all criteria in that respective group. The "descriptive" category received the highest rating with a computed average of 1.57 (s.d. = .40). The "descriptive" group contained selection criteria dealing with phenotypic characteristics such as; age of bull, fat thickness, disposition, frame score, scrotal circumference, visual appearance and weight off test. Within this category, "disposition" was selected as the most important selection criteria with a mean of 1.30 (s.d. = .51).

"Performance Information" followed "descriptive information" very closely with an overall computed importance score of 1.58 (s.d. = .43). The criteria in this group dealt primarily with performance data which could be

TABLE VII. PERCEIVED IMPORTANCE OF SELECTION CRITERIA

SELECTION CRITERIA INDIVIDUAL ITEM	NUMBER**	$\bar{x}^*$	S.D.
SALE FACTORS			
CONVENIENCE OF SELECTION	120	1.98	1.00
LOCATION OF SALE	122	2.03	.93
TIMING OF SALE	118	2.13	.94
REPUTATION OF SALE	121	1.54	.72
COMPUTED SCORE	117	1.94	.63
GENERAL INFORMATION			
WEIGHT OF BULL ON SALE DAY	119	1.77	.78
BREED	124	1.34	.62
PEDIGREE	121	1.90	1.00
BREEDER OR CONSIGNOR	118	2.22	1.1
COMPUTED SCORE	115	1.81	.69
DESCRIPTIVE			
AGE	123	1.50	.63
FAT THICKNESS	120	1.95	.78
DISPOSITION	122	1.30	.51
FRAME SCORE	123	1.41	.59
SCROTAL CIRCUMFERENCE	120	1.55	.74
VISUAL APPEARANCE	120	1.46	.59
WEIGHT OFF TEST	119	1.75	.67
COMPUTED SCORE	114	1.57	.40

TABLE VII. (Continued)

SELECTION CRITERIA INDIVIDUAL ITEM	NUMBER	$\bar{x}$	S.D.
PERFORMANCE INFORMATION			
BIRTH WEIGHT	123	1.28	.48
BIRTH WEIGHT EPD	121	1.46	.70
112 DAY AVERAGE DAILY GAIN	118	1.59	.53
WEIGHT PER DAY OF AGE	116	1.57	.56
ADJUSTED 365 DAY WEIGHT	118	1.59	.57
ADJUSTED 205 DAY WEIGHT	118	1.59	.66
ADJUSTED 205 DAY WEIGHT RATIO	110	1.82	.69
WEANING WEIGHT EPD	119	1.45	.65
MILK EPD	119	1.45	.69
YEARLING WEIGHT EPD	115	1.62	.68
EPD ACCURACY ESTIMATE	114	1.66	.75
COMPUTED SCORE	107	1.58	.43

* The values ranged from "1" (very important) to "5" (very unimportant) on a Likert-type rating scale.

** All totals do not sum to 133 due to respondents not answering some questions.

linked to certain heritable traits. Criteria included in this group were; birth weight, birth weight EPD, 112 day average daily gain, weight per day of age, adjusted 365 day weight, adjusted 205 day weight, adjusted 205 day weight ratio, weaning weight EPD, milk EPD, yearling weight EPD and EPD accuracy estimate. It should be noted that birth weight was selected as the single most important selection criteria (in all groups) with a mean 1.28 (s.d. = .48). Other criteria in this group receiving relatively high ratings were "112 day average daily gain" with a mean of 1.59 (s.d.

= .53) and "weight per day of age" with a mean of 1.57 (s.d. = .56).

The category of "general information" followed next in relation to its mean score with an overall mean of 1.81 (s.d. = .69). The criteria in this group included "weight of bull on sale day", "breed", "pedigree" and "breeder or consignor". The criteria in this group dealt primary with specific characteristics regarding the bull's composition. "Breed" was perceived to be the most important criteria in this group with a mean score of 1.34 (s.d. = .62).

"Sale factors" followed closely behind "General Information" with an overall computed mean score of 1.94 (s.d. = .63). This category included criteria about the sale itself. Criteria in this category included; convenience of selection, location of sale, timing of sale, and reputation of sale. The criteria which was selected as the most important in this category was "reputation of sale" a mean of 1.54 (s.d. = .72).

III. Common Selection Criteria And Their Relationship To Demographic Characteristics

Objective two was to determine the most common selection criteria used by buyers when purchasing bulls and the relationship of those criteria to selected buyer demographic characteristics. Data reported in the next seven tables relate to this objective.

Satisfaction With Sale

Table VIII describes the effect of respondents satisfaction with the sale upon their perceived importance of sale factors, general information, descriptive information and performance information about the bull. The independent variable in this analysis was "satisfaction with the sale". Respondents were sorted into two groups: those indicating they would definitely return to the sale, and those indicating they may return. (It should be noted at this time that a third response category of "Would definitely not return" was dropped from the study prior to analysis due to extremely low response in this category.)

The dependent variables in this analysis were four scale scores regarding respondent perceptions of the importance of various kinds of selection criteria provided to them about the bull prior to the sale. Scores for each set of factors could range from one being "very important" and five being "very unimportant". Since all four dependent variables were moderately correlated, a multivariate analysis was necessary to test the relationships between them and the independent variable. Based upon the data reported in Table VIII there is no reason to conclude that there is a relationship between respondents satisfaction with the sale and perceived importance of any of the four kinds of selection criteria provided to them about the bull.

TABLE VIII. MANOVA SUMMARY TABLE FOR THE EFFECT OF SATISFACTION WITH THE SALE UPON PERCEIVED IMPORTANCE OF SALE FACTORS, GENERAL INFORMATION, DESCRIPTIVE INFORMATION, AND PERFORMANCE INFORMATION.

SELECTION CRITERIA	GROUP*			
	RESPONDENTS WHO WOULD DEFINITELY RETURN N=55		RESPONDENTS WHO MAY RETURN N=40	
	$\bar{x}^{**}$	S.D.	$\bar{x}^{**}$	S.D.
SALE FACTORS	1.92	.68	2.07	.57
GENERAL INFORMATION	1.83	.64	1.81	.51
DESCRIPTIVE INFORMATION	1.51	.41	1.65	.43
PERFORMANCE	1.55	.42	1.57	.46

* $T^2 = .05$, $df = 4$, 90, $P = .31$

** The values ranged from "1" (very important) to "5" (very unimportant) on a Likert-type rating scale.

Education Level

Table IX describes the effect of respondents education level upon their perceived importance of the previously defined selection criteria. Education level was the independent variable. Respondents were sorted into four groups depending on their level of education: less than high school education, high school graduate, some college, and college graduate.

The dependent variables in this analysis were the same four scale scores used in the previous analysis. Again, since all four dependent variables were moderately correlated, a multivariate analysis was necessary to test

TABLE IX. MANOVA SUMMARY TABLE FOR THE EFFECT OF
EDUCATION LEVEL UPON PERCEIVED IMPORTANCE
OF SALE FACTORS, GENERAL INFORMATION,
DESCRIPTIVE INFORMATION AND PERFORMANCE
INFORMATION.

SELECTION CRITERIA			
GROUP*	NUMBER***	$\bar{x}^{**}$	S.D.
SALE FACTORS			
LESS THAN HIGH SCHOOL EDUCATION	4	1.56	.52
HIGH SCHOOL GRADUATE	24	1.92	.50
SOME COLLEGE	26	2.03	.78
COLLEGE GRADUATE	40	2.04	.62
GENERAL INFORMATION			
LESS THAN HIGH SCHOOL EDUCATION	4	1.50	.35
HIGH SCHOOL GRADUATE	24	1.85	.71
SOME COLLEGE	26	1.81	.56
COLLEGE GRADUATE	40	1.83	.58
DESCRIPTIVE INFORMATION			
LESS THAN HIGH SCHOOL EDUCATION	4	1.60	.47
HIGH SCHOOL GRADUATE	24	1.50	.45
SOME COLLEGE	26	1.53	.41
COLLEGE GRADUATE	40	1.63	.42

TABLE IX. (Continued)

SELECTION CRITERIA GROUP*	NUMBER	$\bar{x}^{**}$	S.D.
PERFORMANCE INFORMATION			
LESS THAN HIGH SCHOOL EDUCATION	4	1.36	.45
HIGH SCHOOL GRADUATE	24	1.47	.43
SOME COLLEGE	26	1.62	.44
COLLEGE GRADUATE	40	1.61	.42

* $\Lambda = .91$, $df = 12$, 230.47 , $p = .73$

** The values ranged from "1" (very important) to "5" (very unimportant) on a Likert-type rating scale.

*** All totals do not sum to 133 due to respondents not answering some questions

the relationship between them and the independent variable. Based upon the data reported in Table IX there is no reason to conclude that there is a relationship between respondents education level and perceived importance of any of the four kinds of selection criteria provided to them about the bull.

Bull Management Practices

Table X describes the effect of management practices employed by the buyer upon the arrival of the bull to their farm to previously defined selection criteria. The independent variable in this analysis was "management practices employed by the buyer upon the arrival of the bull to the buyers farm". Respondents were sorted into three groups: turned bull with cows immediately, isolated in a pen

TABLE X. MANOVA SUMMARY TABLE FOR THE EFFECT OF
MANAGEMENT PRACTICES EMPLOYED BY BUYER UPON
PERCEIVED IMPORTANCE OF SALE FACTORS, GENERAL
INFORMATION, DESCRIPTIVE INFORMATION AND
PERFORMANCE INFORMATION.

SELECTION CRITERIA GROUP	NUMBER**	$\bar{x}^{**}$	S.D.
SALE FACTORS			
TURNED BULL IN WITH COWS IMMEDIATELY	16	1.98	.60
ISOLATED IN A PEN/PASTURE BY ITSELF	60	2.02	.67
TURNED IN A PEN WITH OTHER BULLS	9	2.03	.42
GENERAL INFORMATION			
TURNED BULL IN WITH COWS IMMEDIATELY	16	2.06	.62
ISOLATED IN A PEN/PASTURE BY ITSELF	60	1.77	.61
TURNED IN A PEN WITH OTHER BULLS	9	1.75	.50
DESCRIPTIVE INFORMATION			
TURNED BULL IN WITH COWS IMMEDIATELY	16	1.70	.53
ISOLATED IN A PEN/PASTURE BY ITSELF	60	1.57	.41
TURNED IN A PEN WITH OTHER BULLS	9	1.43	.39

Table X. (Continued)

SELECTION CRITERIA GROUP*		NUMBER	$\bar{x}$	S.D.
PERFORMANCE INFORMATION				
TURNED BULL IN WITH COWS IMMEDIATELY		16	1.59	.49
ISOLATED IN A PEN/PASTURE BY ITSELF		60	1.55	.42
TURNED IN A PEN WITH OTHER BULLS		9	1.43	.43
* Lambda = .93, df = 8 , 158, p = .71				
** The values ranged from "1" (very important) to "5" (very unimportant) on a Likert-type rating scale.				
** All totals do not sum to 133 due to respondents not answering some questions				

or pasture by itself, and turned in a pen with other bulls.

The dependent variables in this analysis were four scale scores regarding respondent perceptions of the importance of various kinds of selection criteria provided to them about the bull prior to the sale. Based upon the data reported in Table X there is no reason to conclude that there is a relationship between respondent's management practices employed upon arrival to their farms and their perceived importance of any of the four kinds of selection criteria provided to them about the bull.

Type of Producer

Table XI describes the effect of "type of producer" upon perceived importance of the previously defined selection criteria. "Type of producer" was the independent

TABLE XI. SUMMARY TABLE FOR THE EFFECT OF TYPE OF PRODUCER UPON PERCEIVED IMPORTANCE OF SALE FACTORS, GENERAL INFORMATION, DESCRIPTIVE INFORMATION, AND PERFORMANCE INFORMATION

SELECTION CRITERIA	GROUP*			
	PUREBRED N = 18**		COMMERCIAL N = 72**	
	$\bar{x}^{***}$	S.D.	$\bar{x}^{***}$	S.D.
SALE FACTORS****	2.31	.76	1.91	.60
GENERAL INFORMATION*****	1.56	.43	1.87	.63
DESCRIPTIVE INFORMATION	1.66	.50	1.53	.39
PERFORMANCE INFORMATION	1.60	.49	1.55	.41

* $T^2 = .19$, $df = 4$, 85 , $p = .005$

** All totals do not sum to 133 due to respondents not answering some questions

*** The values ranged from "1" (very important) to "5" (very unimportant) on a Likert-type rating scale.

**** Univariate $f = 5.77$, $p = .02$

***** Univariate $f = 4.07$, $p = .05$

variable. Respondents classified themselves as either "Purebred" or "Commercial" producers. Based upon data reported in Table XI, one would conclude that respondent's perceived importance of the four groups of selection criteria is dependent upon the type of producer. Since the multivariate test was significant it was appropriate to follow up the multivariate test with univariate analysis to further describe the relationship (SPSS, 1990, p 221). An analysis of the univariate statistics indicated that significant difference existed between type of producer and their perceptions of the importance of "sale factors" and

"general information". Specifically, commercial breeders perceive sale factors to be more important than do purebred breeders. Further, purebred breeders perceive the general information about the bull to be more important than do commercial breeders. However, regarding perceived importance of descriptive information and performance information there is no significant difference between commercial and purebred breeders.

Participating In Bull Lease Program

Table XII describes the effect of bull participation in bull lease program upon perceived importance of the previously defined selection criteria. The independent variable in this analysis was "participation in a bull lease program". Respondents were grouped into two groups, those respondents using a bull enrolled in a bull lease program and those who were not using a leased bull.

The dependent variables in this analysis were four scale scores regarding respondent perceptions of the importance of various kinds of selection criteria provided to them about the bull prior to the sale. Since all four dependent variables were moderately correlated, a multivariate analysis was necessary to test the relationship between them and the independent variable. Based upon the data reported in Table XII there is no reason to conclude

TABLE XII. MANOVA SUMMARY TABLE FOR THE EFFECT OF BULL PARTICIPATION IN BULL LEASE PROGRAM UPON PERCEIVED IMPORTANCE OF SALE FACTORS, GENERAL INFORMATION, DESCRIPTIVE INFORMATION, AND PERFORMANCE INFORMATION.

SELECTION CRITERIA	GROUP*			
	YES		NO	
	$\bar{x}^{**}$	S.D.	$\bar{x}^{**}$	S.D.
SALE FACTORS	1.96	.60	1.98	.65
GENERAL INFORMATION	1.54	.34	1.85	.61
DESCRIPTIVE INFORMATION	1.51	.25	1.58	.44
PERFORMANCE INFORMATION	1.66	.47	1.57	.43

* $T^2 = .05$, $df = 4$, 89, $p = .50$

** The values ranged from "1" (very important) to "5" (very unimportant) on a Lickert-type scale.

that there is a relationship between respondent participation in bull lease program and perceived importance of any of the four kinds of selection criteria provided to them about the bull.

Farming Status

Table XIII describes the effect of current farming status upon perceived importance of the previously defined selection criteria. The independent variable in this analysis was "current farming status". Respondents were grouped into three groups: full time, part time, and retired.

The dependent variables in this analysis were four scale scores regarding respondent perceptions of the importance of various kinds of selection criteria provided

TABLE XIII. MANOVA SUMMARY TABLE FOR THE EFFECT OF CURRENT FARMING STATUS UPON PERCEIVED IMPORTANCE OF SALE FACTORS, GENERAL INFORMATION, DESCRIPTIVE INFORMATION AND PERFORMANCE INFORMATION.

SELECTION CRITERIA GROUP*	NUMBER***	$\bar{x}^{**}$	S.D.
SALE FACTOR			
FULL TIME	34	1.93	.64
PART TIME	44	1.98	.71
RETIRED	11	2.16	.48
GENERAL INFORMATION			
FULL TIME	34	1.71	.51
PART TIME	44	1.90	.67
RETIRED	11	1.80	.55
DESCRIPTIVE INFORMATION			
FULL TIME	34	1.59	.39
PART TIME	44	1.58	.44
RETIRED	11	1.53	.50
PERFORMANCE INFORMATION			
FULL TIME	34	1.51	.39
PART TIME	44	1.55	.45
RETIRED	11	1.66	.51

* Lambda = .94, df = 8, 166, p = .68

** The values ranged from "1" (very important) to "5" (very unimportant) on a Likert-type rating scale.

*** All totals do not sum to 133 due to respondents not answering some questions.

to them about the bull prior to the sale. Since all four dependent variables were moderately correlated, a multivariate analysis was necessary to test the relationship between them and the independent variable. Based upon the data reported in Table XIII there is no reason to conclude that there is a relationship between respondents' farming status and perceived importance of any of the four kinds of selection criteria provided to them about the bull.

Method of Marketing

Table XIV describes the effect of method of marketing calves upon perceived importance of the previously defined selection criteria. The independent variable in this analysis was "method of marketing calves". Respondents were grouped into five groups depending on their method of marketing: auction, direct on farm, video sale, feeder calf, and packer.

The dependent variables in this analysis were four scale scores regarding respondent perceptions of the importance of various kinds of selection criteria provided to them about the bull prior to the sale. Since all four dependent variables were moderately correlated, a multivariate analysis was necessary to test the relationship between them and the independent variable. Based upon the data reported in Table XIV there is no reason to conclude

TABLE XIV. MANOVA SUMMARY TABLE FOR THE EFFECT OF METHOD OF MARKETING CALVES UPON PERCEIVED IMPORTANCE OF SALE FACTOR, GENERAL INFORMATION, DESCRIPTIVE INFORMATION, AND PERFORMANCE INFORMATION.

SELECTION CRITERIA GROUP*	NUMBER***	$\bar{x}^{**}$	S.D.
SALE FACTOR			
AUCTION	53	1.94	.68
DIRECT ON FARM	17	2.07	.69
VIDEO SALE	2	2.75	.70
PACKER	2	1.50	.35
OTHER	3	2.33	.14
GENERAL INFORMATION			
AUCTION	53	1.83	.59
DIRECT ON FARM	17	1.82	.56
VIDEO SALE	2	2.63	.18
FEEDER CALF	10	2.08	.54
FEEDER CALF	10	1.98	.81
PACKER	2	1.50	.35
OTHER	3	1.25	.25
DESCRIPTIVE INFORMATION			
AUCTION	53	1.62	.41
DIRECT ON FARM	17	1.44	.50
VIDEO SALE	2	1.50	.50
FEEDER SALE	10	1.47	.43
PACKER	2	1.57	.20
OTHER	3	1.57	.38

Table XIV. (Continued)

SELECTION CRITERIA GROUP*	NUMBER	$\bar{x}^{**}$	S.D.
PERFORMANCE INFORMATION			
AUCTION	53	1.58	.43
DIRECT ON FARM	17	1.46	.45
VIDEO SALE	2	1.59	.19
FEEDER SALE	10	1.50	.50
PACKER	2	1.36	.39
OTHER	3	1.55	.36

* $\Lambda = .79$, $df = 20, 259$, $p = .54$

** The values ranged from "1" (very important) to "5" (very unimportant) on a Likert-type rating scale.

*** All totals do not sum to 133 due to respondents not answering some questions.

that there is a relationship between respondents' method of marketing calves and perceived importance of any of the four kinds of selection criteria provided to them about the bull.

III. Perceived Quality of Performance Tested Bulls and its Relationship to Demographic Characteristics

The third and final objective of the study was to determine buyers' perceptions of the quality of the performance program and its relationship to selected buyer characteristics. Data in Tables XV and XVI are presented in support of the accomplishment of this objective. The dependent variable studied in this analysis was respondents' satisfaction with their performance tested bulls. Satisfaction was measured with a Likert type scale from "1"

(very satisfied) to "5" (very dissatisfied). Independent variables studied in this analysis were "management practices employed by buyers", "type of producer", "participation in the bull lease program", "level of education", "current farming status", method of marketing calves", "number of information sources used to learn about the sale", "number of bulls purchased", "age", "gender", "number of Extension beef meetings attended", number of Extension beef demonstrations attended", "number of visits to the Extension office", "number of phone calls to and from the Extension office", "number of farm visits from the Extension agent", and "number of newsletter/letters received".

Table XV reports the relationship of the nominally scaled independent variables to respondents satisfaction with their bulls. Based on data reported Table XV, there is no reason to conclude that "management practices employed by buyer", "type of producer", "bull participation in a bull lease program", "level of education", "current farming status", or "method by which the majority of calves were marketed" are significantly related to respondents' satisfaction with their bulls.

Table XV. THE RELATIONSHIP OF SELECTED DEMOGRAPHIC CHARACTERISTICS TO RESPONDENTS SATISFACTION WITH THE BULL.

CHARACTERISTIC GROUP	NUMBER*	$\bar{x}$	f	p
MANAGEMENT PRACTICES EMPLOYED BY BUYER			.27	.76
TURNED BULL IN WITH COWS IMMEDIATELY	25	1.68		
ISOLATED BULL IN PEN OR PASTURE	82	1.57		
TURNED IN PEN WITH OTHER BULLS	11	1.45		
TYPE OF PRODUCER			1.55	.22
PUREBRED	23	1.39		
COMMERCIAL	99	1.65		
BULL PARTICIPANT ON BULL LEASE PROGRAM			.31	.82
YES	11	1.45		
NO	118	1.61		

TABLE XV. (Continued)

CHARACTERISTIC GROUP	NUMBER*	$\bar{x}$	f	p
LEVEL OF EDUCATION			.31	.82
LESS THAN HIGH SCHOOL	7	1.29		
HIGH SCHOOL GRADUATE	37	1.62		
SOME COLLEGE OR TECHNICAL SCHOOL	31	1.61		
COLLEGE GRADUATE OR MORE	51	1.63		
CURRENT FARMING STATUS			.64	.53
FULL TIME FARMER	46	1.48		
PART TIME FARMER	56	1.61		
RETIRED	19	1.74		

Table XV. (Continued)

CHARACTERISTIC GROUP	NUMBER*	$\bar{x}$	f	p
MARKET MAJORITY OF CALVES			.50	.78
AUCTION	67	1.64		
DIRECT ON FARM	21	1.67		
VIDEO	3	1.00		
FEEDER CALF SALE	19	1.47		
PACKER	2	2.00		
OTHER	3	1.30		

* All totals do not sum to 133 due to respondents not answering some questions.

Table XVI reports the relationships of the intervally scaled independent variables with respondents' satisfaction with their bulls. Since both independent and dependent variables were intervally scaled, Pearsonian Correlation Coefficients were used to describe the relationships. In order to better understand the magnitude of these relationships Davis's suggested method was utilized. According to Davis (1971), correlations of .01 to .09 are "negligible", while correlations of .10 to .29 are "low". Correlations of .30 to .49 are "moderate", correlations of .50 to .69 are "substantial", correlations of .70 to .99 are "very High", and correlations of 1.0 are "perfect".

As reported in Table XVI, the relationships between satisfaction and any of the studied independent variables ranged from "low" to "negligible". The single independent variable explaining the largest amount of variance in buyer satisfaction was the "number of phone calls the buyer made to the Extension Office" ($r = .21$). However, it only accounted for approximately four percent of the variance in buyer satisfaction. Based upon the data in table XVI, it was concluded that very little of the variance in buyer satisfaction with their bulls is explainable by the variables analyzed in this study.

TABLE XVI. THE RELATIONSHIP OF THE NUMBER OF SOURCES OF INFORMATION ABOUT THE SALE, NUMBER OF BULLS PURCHASED, AGE, YEARS IN CATTLE BUSINESS, NUMBER OF EXTENSION BEEF MEETINGS ATTENDED, NUMBER OF EXTENSION BEEF DEMONSTRATIONS ATTENDED, NUMBER OF VISITS TO THE EXTENSION OFFICE, NUMBER OF PHONE CALLS TO THE EXTENSION OFFICE, NUMBER OF PHONE CALLS FROM THE EXTENSION AGENT, NUMBER OF FARM VISITS RECEIVED FROM EXTENSION AGENT AND NUMBER OF EXTENSION NEWSLETTERS AND LETTERS RECEIVED TO RESPONDENTS SATISFACTION WITH THE BULL.

CHARACTERISTICS	r	r ²
NUMBER OF SOURCES OF INFORMATION	.12	.01
NUMBER OF BULLS PURCHASED	.12	.01
AGE	<.01	<.01
YEARS IN CATTLE BUSINESS	.01	<.01
NUMBER OF EXTENSION BEEF MEETING ATTENDED	.14	.02
NUMBER OF EXTENSION BEEF DEMONSTRATIONS	.13	.02
NUMBER OF VISITS TO EXTENSION TO EXTENSION OFFICE	.13	.02
NUMBER OF PHONE CALLS TO EXTENSION OFFICE	.21	.04
NUMBER OF PHONE CALLS FROM THE EXTENSION OFFICE	.16	.03
NUMBER OF FARM VISITS RECEIVED FROM EXTENSION AGENT	.17	.03
NUMBER OF EXTENSION NEWSLETTERS AND LETTERS RECEIVED	.12	.01

CHAPTER V

SUMMARY OF MAJOR FINDINGS

The primary purpose of Chapter V is to present a general overview of the need, purpose, and methodology of the study, and to discuss major findings, conclusions, and recommendations for improvement.

I. Need for the Study

The Breeder's Performance Tested Bull Program has a prestigious history of offering to the public genetically superior bulls. This program depends on the reputation and honesty of the breeder to provide accurate and exact performance data for each bull. These data are then used in combination with phenotypic characteristics to select a bull to obtain maximum productivity.

The performance data collected from each individual bull while on test allows breeders the opportunity to select superior individuals which will improve the genetic worth of their herds. The performance data developed for each animal allow potential buyers the opportunity to identify the aspects of a desirable or undesirable heritable trait. These traits which make up the bull's breeding value (value

as a parent) are the essence of the future progeny of an individual.

This study examined various criteria including: trait selection, perception of the effectiveness of the performance program, perception of individuals purchasing bulls in relation to the buyer's demographic locations, and buyer characteristics.

II. Purpose and Objectives of the Study

The purpose of this study was to determine the selection criteria buyers use for purchasing performance tested bulls at the Breeders Performance Tested Bull Sale.

To facilitate the purpose of this study, the following specific objectives have been developed:

1. To develop an average profile of the individuals who commonly purchase performance tested bulls.
2. To determine most common selection criteria used by buyers when purchasing bulls and the relationships of those criteria to selected buyer demographic characteristics.
3. To determine buyers' perceptions of the quality of the performance program and its relationship to selected buyer demographic characteristics.

III. Review of Literature

The review of literature attempted to examine the various segments of performance programs which contributes to the selection of genetically superior breeding animals.

Tennessee cattle producers are annually seeking breeding animals (males and females) to utilize their improved genetic heredity to improve the producers productivity. The beef cattle performance programs were established as a means for cattlemen to select program participants in contrast to the bull's performance while on a specific test period.

In Tennessee, the beef cattle improvement program began in 1956. At this time, plans were being made to develop the first bull sale. In 1958 the first performance tested bull sale was conducted. After this phase performance bull sales were held throughout the state. According to William P. Tyrell, (1990) the bull sales were held at various locations for the convenience of potential buyers. In 1987, the Breeders Performance Tested Bull Sale was held at the Ellington Agricultural Center in Nashville and remained at this site until 1992 when it was moved to Murfreesboro. This sale offers to the public, two year old bull which were raised on the breeder's farm. This sale differs from The University of Tennessee Performance Program held at the Springhill Experiment Station, due to the fact at

Springfield the bulls are placed "on location" while on their 112 day performance trial.

Today, Jamison and Tyrell view the "modern" bull buyer as performance tested minded. These producers demand quality performance tested bulls and their purchased price reflects the level of quality.

Purebred cattle breeders enroll their herd in a breed registry performance program for the purpose of establishing performance data for their entire herd. These data can then be used to estimate breeding values (value as a parent) of individual bulls offered to the public. The information developed from these programs can tremendously enhance genetic improvement with each selection.

A beef producer's attitude toward trait selection is perhaps one of the most important factors when selecting a breeding animal. Frequently, potential buyers are depending on a single trait and often overlooks highly heritable traits which can improve productivity to a greater extent. The buyer's knowledge of highly heritable traits can significantly improve numerous characteristics related to one's herd. These characteristics will improve rate of gain, increase pounds of marketable product, and overall herd performance, leading to a more efficient and profitable operation.

In a study conducted at the Texas Agricultural Experiment Station in Balmorhea, Texas in 1942 by Patterson,

Jones, Bayles, and Turnbough, it was concluded that selection based on the performance of an animal should be a superior method for improving rate of gain in beef cattle. It is a well established fact that information collected from bulls in a performance environment is a working estimate of the bull's ability to pass desirable traits to its offspring.

According to Jenkins (1972), test stations have three main purposes: 1) individual animal or trait evaluation; 2) between-herd comparisons; and, 3) the education of producers and breeders.

Breeders enroll bulls in a test environment for a specific period of time. At the end of the test, results are compiled in a booklet and made available to the potential buyers attending the sale. The information compiled in the booklet is utilized by the potential buyer in the bull selection process. Morris Dixon, past president of the Beef improvement Assessment Station was quoted as saying (cited in Jenkins, 1972), "We have got to remember that the main purpose of bull test stations is to test the bulls and select better breeding animals for our herds."

Efficiency and profitability are the bottom lines in the cow-calf industry. A buyer has a lot of variables in mind when selecting a potential herd sire. Phenotype (visual appearance) and genotype (genetic makeup) are

combined, to select the one individual which will serve as a herd sire.

IV. Methodology

Identification of the Population

The sampling frame for this study was a validated list of 549 buyers who purchased performance tested bulls over a 10 year period from 1982 to 1992 from the Breeders Performance Bull Sale. The validated list of buyers was secured from David Kirkpatrick, Beef Cattle Breeding Specialist with The University of Tennessee. Respondents to be surveyed for the study were selected by utilizing a simple random sampling technique. In this way, every person in the sampling frame had an equal chance of being selected to participate in the study. A sample size of 252 was selected for the study. According to McCall (1980) this sample size is more than adequate for a 95 percent confidence when attempting to generalize to a population of 549.

Questionnaire were mailed to 252 individuals who had purchased bulls from the Breeder's Performance Tested Bull Sale. Of this total, 50 were returned due to incorrect mailing addresses, 30 were returned as unusable (person retired, deceased, etc.), while 133 were classified as usable responses. The total usable response rate was 53

percent. An analysis of differences between early and late respondents failed to produce any substantive differences and since late respondents were considered to be similar to non respondents (Goldhor,1972) the researchers assumed that responses from this sample were generalizable to the population from which it was drawn.

Instrumentation

The instrument used in this study was a modified version of the "1989 performance tested bull buyer survey" developed by Kenneth Ambrose (1989). Changes were made to improve the validity of the questionnaire and to insert necessary questions to broaden the depth of the study.

The questionnaire consisted of 38 questions collecting data concerning attitudes toward the bull test program, criteria used in bull selection and characteristics of the individuals purchasing performance tested bulls.

The questionnaire represented a combination of nominally, ordinally, and intervally scaled measures. The questions were open ended, close ended with order choices and close ended with unordered choices.

A Likert type attitudinal scales were utilized in developing some measures. The questionnaire was designed to be easy for individuals to complete while maintaining a high level of reliability.

A panel was utilized to review the questionnaire prior to its administration and to check its face and content validity. A pilot test was utilized to check the questionnaires face validity. A review of the data from these tests was required to assure the questionnaire supplied necessary information to complete the study.

Data Analysis

Data analysis was performed using the Statistical Package for the Social Scientist (SPSS Release 4.1) which is available on the IBM 3081 mainframe computer at the University of Tennessee Computing Center. Appropriate descriptive and inferential statistics were used in reporting findings.

V. Major Findings

In regard to major dependent variables studied, very little was learned regarding differences across the levels of most of the independent variables. Only the "kind of producer" explained any substantive difference in perceived importance of the selection criteria. However, the overall information compiled by the study will be useful in determining areas needing improvement.

The first objective was to develop an average profile of the individuals who commonly purchases a performance

tested bull. A majority of the individuals purchasing bulls from the performance program were males. Fifty-two (40.9 percent) were college graduates or higher, while thirty-one (24.4 percent) attended some college or technical training. Therefore, most individuals purchasing bulls from the performance program received some degree of advanced training. For this reason one should assume that these individuals relied on a broad range of selection criteria when selecting a herd sire. One would speculate that data based on performance characteristics to achieve genetically superior breeding animals would be a primary objective of these individuals.

A majority of the respondents relied on beef enterprises as their major source of farm income while 57 (46.7 percent) were employed part time on their farms. The most common identified method of marketing their calves was through an auction system with 67 respondents (57.8 percent). The researcher found that 87 percent of those buying bulls at the Nashville site traveled 150 miles or less to purchase their bulls. Further, more than 70 percent of those purchasing bulls at the Murfreesboro site traveled 100 miles or less. Therefore one would conclude that both sales are somewhat "regional" in nature. The researcher would also like to mention that the data obtained concerning the Murfreesboro site represents sale information concerning one year. While the Nashville site is responsible for the

remaining nine years. It would be interesting to compare this data to future data obtained from the Murfreesboro location.

The researcher found that the respondents average age was 56.69 while the average years of experience they reported being in the cattle business was 27.89 years. The average acres of rented pasture was 64.34.

The majority (72.7 percent) indicated they received information about the sale from catalogs sent to them by the Extension Specialist. This was surprising to the researcher due to the fact that 50 questionnaires (19.8 percent) were returned due to incorrect mailing address.

The researcher found that the average number of Extension beef meetings attended by each respondent was 2.84 while 106 individuals attended beef demonstrations with an average of 1.63. Visits to Extension offices were reported by 109 respondents with a mean of 4.03 (s.d. = 10.32). One hundred thirteen individuals reported placing an average of 3.91 (s.d. = 5.50) phone calls to Extension Offices, while 105 individuals reported receiving an average of 2.33 phone calls from Extension Offices (s.d. = 4.62). Farm visits were reported by 107 respondents with a mean number per responded of 1.83 (s.d. = 4.46). One hundred nine individuals received Extension newsletters and individual letters. Each respondent received an average of 7.19 such letters (s.d. = 7.70).

The researcher found that a majority of respondents (96.2 percent) felt that the test records provided to them on the day of the sale were "useful". A large percentage of the respondents (94.5 percent) indicated their bulls were "productive breeders" with only a limited number (16.1 percent) reported having any calving problems. When asked why they selected the Breeder Performance Tested Performance Sale, the greatest majority (54.2 percent) selected the sale due to its reputation.

In determining the respondents satisfaction with the sale, 77 (58.3 percent) indicated they " would definitely return" while a majority (97.7 percent) indicated they would "recommend the sale to others". One hundred thirteen (90.4 percent) indicated they believed the bull(s) they purchased had "contributed positively to the genetic development of their herds". The study revealed that a majority of respondents were satisfied with the bull they purchased. Overall, it was concluded that respondents were very positive about the sale.

Respondents were asked to indicate their perceived importance of the various selection criteria provided to each potential buyer on sale day. The "descriptive" category received the highest rating with a computed average of 1.57. Within this category, "disposition" was selected as the most important selection criterion with a mean of 1.30. "Performance information" followed very closely with

an overall computed importance score of 1.58. It should be noted that birth weight was selected as the single most important selection criterion (in all groups) with a mean of 1.28. The category of "general information" followed next with an overall mean of 1.81. "Breed" was perceived to be the most important criterion in this group with a mean score of 1.34. "Sale factors" followed closely behind with an overall computed score of 1.94. The criterion selected as the most important in this category was "reputation of sale" with a mean of 1.54.

The researcher was somewhat surprised that "descriptive criteria" such as age of bull, fat thickness, disposition, frame score, scrotal circumference, visual appearance and weight off test were perceived as the most important criteria. A limited number of these criteria are related to highly heritable traits. If a producer is looking for criteria which will intensify certain genetic advancements, others should be considered. It is difficult to place a priority on criteria's such as "disposition" or "birth weight" and expect significant genetic improvement in the producers' herd. It is the opinion of the researcher that if an individual is committed to attend a performance tested bull sale in hope to improve the genetic merit of one's herd, a combination of selection criteria should be utilized to select a herd sire. Although "birth weight and "disposition" are important criteria, other characteristics

should be utilized as the most important criteria. Performance data such as "weight per day of age" and "adjusted 205 day weight" can be used to make greater genetic advancements when selecting a herd sire. The researcher realizes that it is important to select an animal which has the phenotypic characteristics to ensure calving ease and a safe environment for the producer and family (disposition of bull). However, these should not be perceived as more important than performance data.

Objective two was to determine the most common selection criteria used by buyers when purchasing bulls and the relationship of those criteria to selected buyer demographic characteristics. There is no reason to conclude that there is a relationship between respondents' "satisfaction with the sale", "level of education", "management practices employed by the buyer upon arrival to their farm", "participating in bull lease program", "farming status", or, "method of marketing", and their perceived importance of any of the four kinds of selection criteria provided to them about the bull. There is a statistical significant relationship between "type of producer" and their perceptions of the importance of "sale factors" and "general information". Specifically, commercial breeders perceive sale factors to be more important than do purebred breeders. Further, purebred breeders perceive the general information about the bull to be more important than do

commercial breeders. This difference is expected since purebred breeders should be more concerned with criteria such as "breed", "pedigree", and "breeder or consignor".

The third and final objective of the study was to determine buyers' perceptions of the quality of the performance program and its relationship to selected buyer characteristics. There is no reason to conclude that "management practices employed by buyer", "type of producer", "bull participation in a bull lease program", "level of education", "current farming status", or "method by which the majority of calves were marketed" are significantly related to respondents' satisfaction with their bulls. The single independent variable explaining the largest amount of variance in buyer satisfaction was the "number of phone calls the buyer made to the Extension Office" ($r = .21$). However, it only accounted for approximately four percent of the variance in buyer satisfaction. Based upon the data in table XVI, it is concluded that very little of the variance in buyer satisfaction with their bulls is explainable by the variables analyzed in this study.

VI. Implications

The Breeder's Performance Tested Bull Sale has made a tremendous impact of the availability of genetically

superior breeding sires in Tennessee. Regardless of any other findings, it should be noted that data compiled from this study substantiate producers' high levels of satisfaction with this sale. However, the selection criteria utilized by individuals is the primary strategy for selecting superior breeding sires. Data compiled in this study reveal those criteria deemed important by respondents. Respondents basically perceive all criteria to be important. Although these may seem at first, to be logical and correct perceptions, one must wonder about the logic of perceiving "sale factors" to be almost as important as "performance data". As mentioned earlier, the relative importance of each group of criteria was "descriptive criteria", "performance criteria", "general information", and "sale factors" (from most to least important), respectively. However, less than four tenths of a point (on a five point scale) separated the most and least important groups. This is probably indicative of the fact that many respondents don't truly understand the meaning of such important selection criteria as those found in the "performance" category or "descriptive" category. The fact that respondents perceive "descriptive criteria" more important than "performance criteria", and "birth weight" as the single most important selection criterion, further indicates a need to better understand these data if their goal is to improve the genetic potential of their herds.

VII. Recommendations for Sale Improvement

- 1) To expect any change in buyers, regarding selection criteria used, it would be beneficial to provide additional educational sessions to review the fundamental use of selection criteria in combination with phenotypic and genetic characteristics. Annually, the Beef Specialists at The University of Tennessee sponsor educational workshops across the state to stress the importance of genetic improvement. Extension Specialists and county agricultural agents will need to continue their work in this area.
- 2) It would also be advantageous to the performance program to increase its publicity efforts. Relaying information to past buyers could aid in effectively reaching the targeted audience. The researcher feels that communication from local Extension personnel to past buyers at the county level would increase the attendance and participation of performance tested bull sales. The use of mass media (newspaper, commercial magazine, radio) should be continued to notify potential buyers of upcoming sales. It should also be stressed to County Extension Agents across the

state to continue to emphasize the importance of publicizing upcoming performance bull sales.

- 3) Summaries of additional program improvement suggestions provided by respondents are included in appendices B and C.

VIII. Recommendations for Further Study

- 1) Further study would be in order to determine whether buyers truly understand the importance of performance criteria as a means of selecting sires to increase their herds genetic potential.
- 2) This study should be replicated during the next 4 to 5 years to determine whether buyers' perceptions of the relative importance of performance data has changed.

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APPENDICES

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APPENDIX A

(First Mailing)

P.O. Box 44
Pikeville, TN 37367
March 27, 1993

Dear Sir,

Over the past decade, the Tennessee Beef Cattle Improvement Association in cooperation with the University of Tennessee Agricultural Extension Service, has sponsored the **Breeder's Performance Tested Bull Sale**. In 1992, the Breeders Performance Tested Bull Sale was moved to Murfreesboro, TN. The Beef Improvement Association and the Agricultural Extension Service has sponsored this sale for the public in hopes of providing superior bulls to improve overall performance of beef cattle herds. During the past 10 years an estimated 600 individuals have purchased bulls from the Tennessee breeder's Performance Tested Bull Sale.

The Extension Service and The Beef Cattle Improvement Association want to make sure that this sale meets the needs of Tennessee's Beef producers. Therefore, we would like to know what you think about the sale and the animal(s) you've purchased. Sale records indicate that you have purchased a performance bull from this sale with the past 10 years. **Please take the few minutes necessary to complete the attached questionnaire and return it to us in the postage paid envelope.** You will notice that the questionnaire has a number in the upper right corner. This number is simply a means of following up non-respondents to assure that we have made every effort to provide you a chance to respond. All responses are strictly voluntary and totally confidential. Your name will never be linked to your responses and only grouped data will be presented in our final report.

Please return your questionnaire to us even if you choose not to respond so that we can remove you from our

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March 27, 1993

follow-up list and not bother you again. **Your response will help Extension and the Beef Cattle Improvement Association continue to provide an effective bull sale as a source of herd bulls for area beef cattle producers.** We would greatly appreciate your straight forward comments about our bull sale program.

Thank you for your assistance. Please don't hesitate to call one of us at 615-447-2451 if you have any questions or additional comments you would like to share with us about the Breeder's Performance Bull Sale.

Sincerely,

T. Bruce Steelman
Assistant Extension Agent
Adult Agriculture

Dr. James B. Neel
Professor & Extension Leader
Extension Animal Science-Beef,
Sheep and Horse

(Second Mailing)

P.O. Box 44
Pikeville, TN 37367
April 30, 1993

Dear Sir,

Four weeks ago, you were sent a survey to offer your comments concerning the Breeder's Performance Tested Bull Sale. If you have already completed the original survey, we appreciate your assistance in helping us evaluate the **Breeder's Performance Tested Bull Sale. If you have already participated in the study**, please **disregard** the enclosed survey. If you **have not** had the opportunity to participate in the study, **please** fill out the enclosed survey and return it in the postage paid envelop.

The Extension Service and the Beef Cattle Improvement Association want to make sure that you have every possible opportunity to participate in the study. Your comments are crucial for us to gather credible and unbiased data which we can make an accurate determination on the effectiveness of the Breeders Performance Bull Sale.

Sale records indicate that you purchased a performance tested bull from this sale within the past 10 years. **Please take the few minutes necessary to complete the attached questionnaire and return it to us in the postage paid envelope.** You will notice that the questionnaire has a number in the upper right corner. This number is simply a means of following up non-respondents to assure that we have made every effort to provide you a chance to respond. All responses are strictly voluntary and totally confidential. Your name will **never** be linked to your responses and only grouped data will be presented in our final report.

Page 2
April 30, 1993

Please return your questionnaire to us even if you choose not to respond so that we can remove you from our follow-up list and not bother you again. **Your response will help Extension and the Beef Cattle Improvement Association continue to provide an effective bull sale as a source of herd bulls for area beef cattle producers.** We would greatly appreciate your straight forward comments about our bull sale program.

Thank you for your assistance. Please don't hesitate to call one of us at 615-447-2451 if you have any questions or additional comments you would like to share with us about the Breeder's Performance Bull Sale.

Sincerely,

T. Bruce Steelman
Assistant Extension Agent
Adult Agriculture

Dr. James B. Neel
Professor & Extension Leader
Extension Animal Science-Beef,
Sheep and Horse

BREEDERS PERFORMANCE TESTED BULL SALE SURVEY

Section I. Your response to the following questions will be very helpful to us in evaluating the effectiveness of the Breeders Performance Tested Bull Program. In responding to these questions please think about the characteristics you considered while selecting your performance tested bull.

1a. Were the bull test records given to you on sale day organized in an uncomplicated, clear and useful manner so that they were helpful to you?

- a. Yes
- b. No

1b. If you answered NO to question one, please state why you feel these records were not helpful in the selection process?

2. Have you experienced any health problems with the bull(s) purchased at the Breeders Performance Tested Bull Sale?

- a. Yes
- b. No

If Yes, please indicate what kind(s) of health problems: _____

3. Was the bull you purchased at the Breeders Performance Tested Bull Sale a productive breeder?

- a. Yes
- b. No

4. Have you experienced any calving problems associated with the Breeders Performance Tested bull?

- a. Yes
- b. No

5. Why did you select the Breeders Performance Tested Bull Sale to purchase a herd sire? (Please circle the one best response.)

- a. Convenience
- b. Reputation
- c. Advertisement
- d. Other (please specify) _____

6a. At which sale site did you most recently purchase a performance tested bull?

- a. Ellington Agricultural Center (Nashville)
- b. Tennessee Livestock Center (Murfreesboro)

6b. What is the distance from your farm to the sale site where you most recently purchased a performance tested bull?

- a) 0 To 50 Miles
- b) 51 To 100 Miles
- c) 101 To 150 Miles
- d) 151 To 200 Miles
- e) More Than 200 Miles

PERFORMANCE INFORMATION

	Very Important		Unsure	Very Unimportant	
p) Birth Weight	VI	MI	U	MU	VU
q) Birth Weight EPD	VI	MI	U	MU	VU
r) 112 Day Average Daily Gain	VI	MI	U	MU	VU
s) Weight Per Day Age	VI	MI	U	MU	VU
t) Adjusted 365 Day Weight	VI	MI	U	MU	VU
u) Adjusted 205 Day Weight	VI	MI	U	MU	VU
v) Adjusted 205 Day Weight Ratio	VI	MI	U	MU	VU
w) Weaning Weight EPD	VI	MI	U	MU	VU
x) Milk EPD	VI	MI	U	MU	VU
y) Yearling Weight EPD	VI	MI	U	MU	VU
z) EPD Accuracy Estimate	VI	MI	U	MU	VU

12. Considering all of the above factors, please list the **ONE most important factor** used in your decision to purchase a performance tested bull. _____

13. After purchasing your bull what did you do with it upon arrival at your farm? (Select the **ONE best answer**.)

- a. Turned the bull in with cows immediately upon arrival
- b. Isolated it in a pen or pasture by itself
- c. Turned it in a pen with other bulls
- d. Other (Specify): _____

14a. Do you provide **supplemental feed** for your bulls at any time throughout the year?

- a. Yes
- b. No

14b. If you said YES to the above question, when do you provide supplemental feed for your bulls? (Circle **ALL** which apply.)

- a. Upon arrival to your farm
- b. Before breeding season
- c. During breeding season
- d. After breeding season
- e. Other (Specify): _____

15. How many females do you **annually expose** to your **most recently purchased** performance tested bull?

_____ (number of females annually exposed)

16. In what **month** are the **majority** of your calves born? (Circle the **ONE best answer**.)

- | | |
|-------------|--------------|
| a. January | g. July |
| b. February | h. August |
| c. March | i. September |
| d. April | j. October |
| e. May | k. November |
| f. June | l. December |

17. How many **breeding** bulls do you own? _____

18. How many bulls have you **purchased at Performance Tested Bull Sales**? _____

7. Did the bull(s) you purchased contribute positively to the genetic development of your herd?
 - a. Yes
 - b. No
8. How satisfied are you with the bull you purchased from the Breeders Performance Tested Bull Sale?
 - a. Very Satisfied
 - b. Somewhat Satisfied
 - c. Undecided
 - d. Somewhat Dissatisfied
 - e. Very Dissatisfied
9. Would you return to the Breeders Performance Tested Bull Sale to purchase another bull?
 - a. Would Definitely Return
 - b. May Return
 - c. Definitely Would NOT Return
10. Would you recommend the Breeders Performance Tested Bull Sale to other producers?
 - a. Yes
 - b. No
11. Following are several groups of factors producers may consider when purchasing breeding stock. How important was each of these factors in your decision to purchase a Performance Tested Bull for your herd? (Please circle your response indicating that the factor was Very Important, Moderately Important, you are Unsure (about its importance), Moderately Unimportant, or Very Unimportant.

SALE FACTORS

- a) Convenience of Selection (Sale Day)
- b) Location of Sale
- c) Timing of Sale
- d) Reputation of Sale

Very Important		Unsure	Very Unimportant	
VI	MI	U	MU	VU
VI	MI	U	MU	VU
VI	MI	U	MU	VU
VI	MI	U	MU	VU

GENERAL INFORMATION

e) Weight of bull on Sale Day
f) Breed
g) Pedigree
h) Breeder or Consignor

VI	MI	U	MU	VU
VI	MI	U	MU	VU
VI	MI	U	MU	VU
VI	MI	U	MU	VU

DESCRIPTIVE

- i) Age
- j) Fat Thickness
- k) Disposition
- l) Frame Score
- m) Scrotal Circumference
- n) Visual Appearance
- o) Weight Off Test

[illegible]

19. Are you a predominantly a purebred or commercial producer?
- a. Purebred
 - b. Commercial
20. Were any of the bulls you purchased at the Breeders Performance Tested Bull Sale used in a Bull Lease Program?
- a. Yes
 - b. No
21. Approximately how many steers and heifers were raised to weaning in your last calf crop?
- _____ (number of steers) _____ (number of heifers)
22. What was the approximate average weight of calves sold at weaning from your last calf crop?
- _____ lbs. (av. wt. of steer calves) _____ lbs. (av. wt. of heifer calves)
23. What is the predominant breed in your cow herd? _____
24. If crossbred females are used, please indicate the different breeds which make up the cross?
- _____

Section II. We also need to know a little about you in order to better understand what kinds of producers are purchasing our Breeders Performance Tested Bulls.

1. As of your last birthday, what was your age? _____
2. What is your sex?
- a. Male
 - b. Female
3. What is your county of residence? _____
4. What is your level of education? (Circle the ONE best answer.)
- a. Less Than High School
 - b. High School Graduate
 - c. Some College or Technical School
 - d. College Graduate or More
5. What is your major source of farm income?
- a. Beef
 - b. Swine
 - c. Row Crops
 - d. Small Grains
 - e. Other (Please specify): _____
6. What is your current farming status?
- a. Full-Time Farmer
 - b. Part-Time Farmer
 - c. Retired

7. How do you market the majority of your calves?
- a. Auction Market
 - b. Direct on Farm
 - c. Video Sale
 - d. Feeder Calf Sale
 - e. Packer
 - f. Other (Please specify): _____
8. How many years have you been in the cattle business? _____
9. How many acres do you currently have in:
- a. Permanent Pasture _____
 - b. Rented Pasture _____
10. What criticisms do you have of the Breeders Performance Tested Bull Program and Sale?
11. What are your suggestions for improvement?

Section III. Please identify the method(s) in which you received **current and reliable information** about the Breeders Performance Tested Bull Sales. (Circle the appropriate response regarding each potential source of information.)

- | | | |
|--|-----|----|
| 1. a. Extension Newspaper Articles | Yes | No |
| b. Extension Radio Programs | Yes | No |
| c. Extension TV, Cable Show | Yes | No |
| d. Extension Newsletter | Yes | No |
| e. Extension Meetings | Yes | No |
| f. Visit From Extension Agent | Yes | No |
| g. Visit to the Extension Office | Yes | No |
| h. Telephone Calls to Extension Office | Yes | No |
| i. Telephone Calls from Extension Office | Yes | No |
| j. Catalog Sent From State Extension Specialists | Yes | No |
| k. Commercial Magazine | Yes | No |
| l. Other, (Please specify): _____ | | |

2. Have you ever obtained any kind of educational information from the following sources?

a. Extension Service	Yes	No
b. State Cattlemen's Association	Yes	No
c. Individual Livestock Producer	Yes	No
d. Breed Association	Yes	No
e. Other, (Please specify): _____		

3. During the past year, approximately how many of each of the following contacts have you had with the local county Agricultural Extension Service in relation to your beef cattle enterprise? (Please estimate number of contacts.)

a. Number of Extension Beef Cattle Meetings Attended	_____
b. Number of Extension Beef Cattle Demonstrations Observed	_____
c. Number of Visits Made to Extension Office	_____
d. Number of Telephone Calls Made to Extension Office	_____
e. Number of Telephone Calls Received From Extension Office	_____
f. Number of Farm Visits Received From Extension Agent	_____
g. Number of Extension Newsletters and Letters Received	_____

**Thank You Very Much
For Your Assistance**

Place your survey in the attached postage-paid envelope and drop it in the mail.

APPENDIX B

OILBERT

1922-1923

SUGGESTED PROGRAM IMPROVEMENTS BY RESPONDENTS

The respondents were asked to indicate any changes which could be made to improve the Breeders Performance Tested Bull Sale. The following is a accumulation of those responses.

A limited number of the respondents were dissatisfied about relocating the sale to Murfreesboro. The respondents expressed a desire to relocate the sale to the original location. Their responses included:

"Move back to Ellington"

"Liked Ellington better"

Other respondents were quite pleased with the sale and offered these suggestions:

"Keep up the good work"

"Sales are quite adequate"

"Excellent program, keep up the good work"

"Liked Murfreesboro location"

Several respondents wanted to extend, cancel or include an additional sale. These respondents suggested:

"Possibility of third sale"

"Move sale date"

"Move sale closer and have sales at Murfreesboro and Knoxville"

"Need sale in West Tennessee"

Several respondents expressed the need for additional performance data on bulls to be sold. These responses ranged from verifying current data to expand the data currently available, these responses included:

"Keep breeder's honest - breeding, age, creep, and nurse cows"

"Udder scores of dams"

"Birth of bull assisted or unassisted"

"Give EPD's on sire and dam"

"Carcass data or EPD should be listed"

"Weights verified - birth weight and age"

"Average daily gain broken down into components"

"Cull bulls in lower percent of primary traits"

"More accuracy on birth weight"

Numerous respondents expressed general suggestions for improvement:

"Get better bulls"

"Grow instead of fatten"

"More area for seating and visibility"

"Closer supervision"

"More variety of breeds"

"Provide pasture tested bulls not on full feed"

"Publicize with radio with more communication in general"

"Desire catalogs prior to sale"

"Improve selection"

"Sell younger bulls"

"Prefer two year old bulls"

"More seating, list of haulers, and free coffee"

"Improve number and quality"

All of the comments concerning program improvements fell into one of the preceding groupings. The researcher was very appreciative of the honest input provided by respondents in this section.

APPENDIX C

SUGGESTED PROGRAM CRITICISMS BY RESPONDENTS

The respondents were asked to indicate their criticisms with the Breeders Performance Tested Bull Sale. The following is a assortment of their criticisms.

Several respondents indicated their dissatisfaction with the sale in general:

"Sale day on weekday"

"Being moved from Nashville"

"Sale arena too small"

"Closer supervision to detect genetic defects"

"Easier to compare if all fed at test station"

"Not often enough"

"Move sale to a saturday"

"Later in day"

"More time to review animals"

"Sale too early in winter"

"Date is a personal conflict"

"Never know sale date"

"Do not receive catalog"

"Need more bulls"

"Auctioneer always starts at a high dollar amount and eventually lowers his bid"

"Wait until sale is over to load bulls"

Numerous respondents indicated that it would be beneficial to modify the type and quality of bulls being offered to the public:

"Do not like deposition of non haltered bulls"

"Bulls too fat and tender"

"More angus, shy away from exotics"

"Very few breeds"

"Dr. Jamison's bulls were 100% quality and they could move, breed, and eat under normal conditions."

"Bulls after Jamison were poor doers".

"Question breeder accuracy"

"Too fat"

"Dishonest breeder"

"Desire halter broke bulls"

"Desire older bulls"

"Some breed are not represented"

"Concerned with bull soundness, too fat, and being credited by University of Tennessee"

"Show signs of show bulls"

"Are EPD's based on honest and accurate information"

"Records on calving ease are hard to understand"

"Too much emphasis on bull after weaning"

"Frame scores not available and bulls weighing over a ton are not weighed"

Again the researcher appreciates the honest input of the respondents in this category.

APPENDIX D

RESPONDENTS REASON FOR SELECTING THE BREEDERS PERFORMANCE
TESTED BULL SALE TO PURCHASE A BULL

The respondents were asked to indicate why they selected the Breeders Performance Tested Bull Sale to purchase a bull. The following is a collection of those responses:

"Ability to select bulls based on performance records"

"Good luck with past bulls"

"Wanted a good bull"

"Herd improvement"

"Reliable source of performance background"

"High pedigree Polled bull"

"Selected at producer's farm prior to sale"

"Better genetics to improve herd"

"Source of quality bulls"

"Clyde Lane"

"Popular pedigree"

"Place to purchase good bull"

"Quality"

"Good selection to choose from"

"Select from several breeder's at one time"

Again the researcher appreciates the honest input of the respondents in this category.

VITA

Thomas Bruce Steelman was born on February 1, 1962 to Thomas Morgan Steelman and Verna Mae Steelman of Lynchburg Tennessee. He attended Moore County High School where he was very active in 4-H, Boy Scouts, and football. While in 4-H he exhibited livestock and participated in various projects such as home grounds, beef, and leadership. He also achieved the classification of Eagle Scout in Boy Scouts. In football, he achieved various honors as "All District", "All Conference", "All Midstate Checklist", and "All State". He graduated Moore County High School in June of 1980.

He entered Middle Tennessee State University, in Murfreesboro in the fall of 1980, while majoring in Animal Science. While in college he was the first student manager of the Middle Tennessee Livestock Pavilion. He also participated on the Middle Tennessee Livestock Judging Team placing second high individual in the sheep division at the 1983 NATCA Judging Conference.

He was employed by the Agricultural Extension Service in Bledsoe County on September 1, 1985, as an Assistant Extension Agent with Adult Agriculture responsibility. He began his graduate studies in January, 1988 when he enrolled in the Extension Winter School at the University of Tennessee.

He married Sara Williams Steelman on January 7, 1989. On February 11, 1993 to the enchantment of their parents, Mr. and Mrs. Thomas Morgan Steelman and Mr. and Mrs. Charles Henry Williams they were blessed with a son Thomas Charles Steelman.