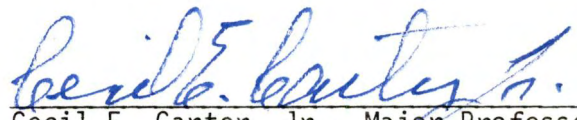


To the Graduate Council:

I am submitting herewith a thesis written by Barry B. Cooper entitled "The Development of the Tennessee 4-H and FFA Junior Market Hog Program and a Study of the West Tennessee Show and Sale for 1979, 1983, and 1985." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Agriculture Extension.



Cecil E. Carter, Jr., Major Professor

We have read this thesis and
recommend its acceptance:



Accepted for the Council:



Vice Provost and
Dean of the Graduate School

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a Master's degree at The University of Tennessee, Knoxville, I agree that the Library shall make it available to borrowers under rules of the Library. Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgment of source is made.

Permission for extensive quotation from or reproduction of this thesis may be granted by my major professor, or in his absence, by the Head of Interlibrary Services when, in the opinion of either, the proposed use of the material is for scholarly purposes. Any copying or use of the material in this thesis for financial gain shall not be allowed without my written permission.

Signature Barry B. Cooper
Date Feb 1986

THE DEVELOPMENT OF THE TENNESSEE 4-H AND FFA JUNIOR MARKET HOG
PROGRAM AND A STUDY OF THE WEST TENNESSEE SHOW AND
SALE FOR 1979, 1983, AND 1985

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

Barry B. Cooper
March 1986

AG-VET-MED.

Thesis

86

.C666

DEDICATION

To my mother Jane whom I can always count on

ACKNOWLEDGMENTS

The author wishes to express his sincere appreciation and many thanks to the following persons:

To Dr. M. Lloyd Downen, Dean of The University of Tennessee Agriculture Extension Service for granting me study leave.

To the late Dr. Robert S. Dotson for counseling, advising, and assistance during the preparation phase of this study.

To Dr. Cecil E. Carter, Jr., for serving as major professor and for his interest and advice.

To Dr. F. B. Masincupp for serving as professor and for his time spent in counseling, advising, and assistance in the collection and summarization of the data, and for his friendship.

To Dr. Robert R. Shrode for his time, advice, and for his friendship during the manuscript preparation.

To Dr. William Sanders for his help in the statistical portion of this study.

To Mr. James O'Neal for his assistance during the preparation phase of this study.

To my family and to special friends for their support and encouragement.

To my wife Vickie for her support and assistance during this study.

ABSTRACT

This study was concerned with the development of the Tennessee 4-H and FFA Junior Market Hog Show and Sale, and to analyze selected production data from the Trenton (West Tennessee) show and sale for 1979, 1983, and 1985.

The 4-H Swine Program in Tennessee dates back to 1917. The Extension Service and a local bank in Madison County developed a pig club in which young boys participated. In 1979 the Best Overall Exhibitor Program came into being to recognize total production performance of market swine over a given feeding period. Currently four area shows are held each spring and one state show in the fall. As many as 2,000 hogs have been exhibited yearly.

The largest number of participants was in 1983. Starting weight and number of days on test remained the same except in 1985 when the pigs were 16 pounds heavier and on feed for five fewer days. Average daily gain was approximately 1.5 pounds per head per day for all three years. However, average daily gain differed significantly ($P < .05$) among the three sources of pigs with sale purchased and home grown pigs being superior to farm purchased pigs.

From 1979 to 1985 the numbers of hogs grading gold (US No. 1) has increased steadily. Consequently, those hogs grading blue (US No. 2) and red (US No. 3) has decreased.

These data clearly indicate that better hogs are being selected for show and that 4-H and FFA members are following recommended practices to achieve greater swine production goals.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
II. REVIEW OF LITERATURE	6
Classifying Swine by Grade	6
Feeder Pig Grades	7
Performance of Various Grades	8
Factors Affecting Pig Performance	10
III. METHODS AND MATERIALS	15
Data Collection	15
Rules and Regulations	16
Statistical Analysis	17
IV. RESULTS AND DISCUSSION	18
Number of Pigs Exhibited	18
Weights and Days on Feed of Pigs Exhibited	19
Yearly Differences in Average Daily Gain	20
Source Differences in Average Daily Gain	21
Market Grades by Years	24
V. RECOMMENDATIONS	26
VI. SUMMARY	28
LITERATURE CITED	30
VITA	34

LIST OF TABLES

TABLE	PAGE
1. Number of Pigs by Year	18
2. Weights and Days on Feed by Year	20
3. Average Daily Gain of All Pigs by Years	21
4. Average Daily Gain by Source of Pig for 1983 and 1985 . . .	22
5. Number and Percent of Hogs Grading Gold (1), Blue (2), and Red (3) by Years	24

CHAPTER I

INTRODUCTION

The arrival of pigs on American soil is attributed to the expedition of Hernando de Soto, who anchored off the coast of Florida on May 25, 1539. With him, he brought thirteen sows, which he turned loose in the woods. At his death, some three years later, his holdings included over 700 hogs. "The father of the pork industry," as de Soto is referred to by Miller (1976) in "Pigs in America—Columbus to Confinement," was the one to introduce and disperse the first herd of hogs in this country.

As more people came to the new world, hog production flourished. The greatest of the hog-raising colonies was Pennsylvania. By the early 1600's, the hog population reached "several thousand" (Tennessee Extension Review, 1919). America was a rural nation at the turn of the century. A government and states had been established, but most people still lived in rural areas.

In 1903 Seaman A. Knapp established the first USDA Office of Farmer's Cooperative Demonstration Work in Texas (Wessel, 1982). After Knapp's death he was replaced by his son, Bradford Knapp, who maintained a close working relationship with land-grant colleges. Due in part to Knapp's diplomacy, the climate for gaining congressional support for a cooperative venture involving the USDA, land-grant colleges and county government was at its peak in 1914 (Wessel, 1982).

The passing of the Smith-Lever Act in 1914 provided the financial support to establish the new Cooperative Extension Service.

Extension grew and flourished during the dismal years after 1914 and was a testament to firm roots (Wessel, 1982). Since then, the work of providing practical information and encouraging the adoption of such information in meeting individual and social needs has been closely under the supervision of state universities or colleges of agriculture cooperating with the USDA (Herrington, 1938).

The attempt to get America's youth involved originated in 1907. In the beginning, the youth program was not aimed at educating boys and girls. Youth club work in the South was seen as a means of breaking the one-crop cotton economy that many agricultural leaders felt was the inhibiting economic factor in Southern life. Corn was the first break in the cycle. The boys' and girls' clubs proved to be a successful means of reaching the larger goal of project expansion (Wessel, 1982).

With the success of corn clubs, it was not surprising that the formation of livestock clubs began shortly thereafter. Under the leadership of W. H. Miller, superintendent of Oktibbeha County Schools in Mississippi, and the land-grant college, pig clubs were started in 1909. Young men under eighteen were invited to enter a pig growing contest using instructions from the land-grant college with prizes and cash awarded for the most successful effort. This local program caught the attention of P. O. Garner, the state agent for boys' demonstration work. A federally sponsored regional program followed.

The federal government also sponsored other pig clubs throughout the South and sent a detailed plan to all states for their use (Wessel, 1982).

The year 1910 marked the beginning of club work for boys and girls in Tennessee. Corn clubs were the first to be established by W. W. Campbell, who was the first demonstration agent employed in Tennessee (Herrington, 1938). Over the years, the program began to associate itself with livestock and livestock production. Today 4-H'ers can take part in swine, beef, sheep, horse and other projects. Much has been accomplished, though few efforts have been made to record the history of such projects.

The earliest documented reference to pig club work in Tennessee began on August 17, 1917, in Madison County, Tennessee. Due to a cooperative effort between Peoples Savings Bank and the Division of Extension, twenty Duroc gilts were delivered to the bank to be placed with twenty boys for pig club work (Tennessee Extension Review, 1919).

An interview with Bill Tyrrell, former Extension Animal Husbandry department head, revealed that in 1946, after the close of World War II, the director of the swine program was John Robinson. At that time, no money was available for competition. Mr. Robinson, aided by his brother-in-law, a state legislator, managed to raise the funds from the Tennessee Department of Agriculture. Annual 4-H Swine Shows were established in Memphis, Nashville, and Knoxville (Tyrrell, 1985).

"One of the longest running 4-H projects in Tennessee has been swine," stated James G. O'Neal, Professor and Leader, Animal Science, Swine Section of The University of Tennessee. O'Neal was in charge of the Tennessee Market Hog Program from 1964-1985. According to O'Neal:

The Junior Market Hog Show has changed over the years. It has moved locations, changed names—even the hogs themselves have changed. The show used to be held at the old Knoxville Union Stockyard. Slowly, the shows grew and spread to each district in Tennessee. One purpose was to develop boys and girls through responsibility. They were encouraged to keep records, learn proper feeding techniques, selection, marketing and competition. At some shows the volume reached almost 2,000 head per year.

A new concept came into being in 1979. This was called the Best Overall Exhibitor, or BOE. The BOE is an index devised by Professor Frank Masincupp of the Animal Science Staff in the Research and Teaching Department at The University of Tennessee. The BOE was initiated for basically two reasons: (1) to recognize 4-H and FFA swine project participants based on the total performance of their hogs at home and at the show, and (2) to replace the Pork Production Programs which require backfat and feed efficiency records. The BOE is based primarily on average daily gain (ADG) and USDA grades. Class placing is also included but does not weigh heavily in the total (Masincupp, 1979).

The main purposes of this study were to establish a brief history of the 4-H and FFA Market Hog Show and Sale in Tennessee and to analyze selected production data from the Trenton (West Tennessee) sale site for 1979, 1983, and 1985.

Prior to the present writing, no other study has been done documenting the development of the Tennessee 4-H Market Hog Program nor had any data been analyzed from the Trenton (West Tennessee) Show and Sale. The show had established itself as providing opportunity to demonstrate recommended production and management practices. This study will enable agents, leaders and others associated with the swine industry to improve the Market Hog Program and to do a better job in teaching swine management.

CHAPTER II

REVIEW OF LITERATURE

Classifying Swine by Grade

A system of classifying and grading market hogs was formulated by the United States Department of Agriculture (USDA) in 1918 for use by the livestock market reporting service (USDA, 1970). The system was developed with the cooperation and assistance of many interested agencies and represented the most generally accepted market groupings at that time. After meetings with producers, animal husbandmen, market representatives, and slaughterers in 1928 and 1929, revisions were made which were dictated by changes in production and marketing conditions, and tentative standards issued in 1930. Further revisions were incorporated into the tentative standards (USDA, 1940).

The USDA proposed new standards for grades of slaughter barrows and gilts in 1949. Field testing, discussion and demonstration of the standards resulted in slight revisions prior to adoption as the official United States standards for grades of slaughter barrows and gilts, effective September 12, 1952 (USDA, 1952).

The official standards were amended in July, 1955, by changing the grade designations Choice No. 1, Choice No. 2, and Choice No. 3 to U.S. No. 1, U.S. No. 2, and U.S. No. 3, respectively (USDA, 1955). On July 1, 1968, the official standards were again revised to coordinate them with the revised pork carcass standards. The minimum backfat thickness requirement for U.S. No. 1 grade was eliminated,

and a new U.S. No. 1 grade was established to identify properly the superior pork carcasses then being produced. The former No. 1, No. 2, and No. 3 grades were renamed No. 2, No. 3, and No. 4, respectively. The former Medium and Cull grades were combined and renamed U.S. utility (USDA, 1968).

As producers continued to improve market hogs the grading system was changed once more in 1985. The new grades will simplify the application of standards, reflect more accurately actual yield of lean cuts and more evenly distribute carcasses among several grades. The new grades are based on backfat thickness, with an adjustment for superior or inferior muscling. The 1985 standards are: US No. 1, US No. 2, US No. 3, US No. 4 and US utility (USDA, 1985). However, it must be noted these standards were not in effect at the time this study was conducted.

Feeder Pig Grades

In 1940, tentative standards for grades of feeder pigs were developed and published by the USDA (USDA, 1940). Official standards for grades of feeder pigs were proposed by the USDA in 1965. Slight revisions were made in the proposed standards before they were adopted as the official United States Standards for Grades of Feeder Pigs, effective January 1, 1966 (USDA, 1966).

On April 1, 1969, the official standards were revised to coordinate them with the pork carcass and slaughter swine standards that were revised in 1968. In this revision a new No. 1 grade was established to identify the superior feeder pigs then being produced.

The former No. 1, No. 2, and No. 3 grades were renamed No. 2, No. 3, and No. 4, respectively. The Medium grade was renamed U.S. Utility, and the section on application of standards was revised to define more clearly the grade-determining factors and clarify their use in determining grades (USDA, 1969).

The official standards for slaughter barrows, gilts, and feeder pigs developed by the USDA provide for segregation first according to use, slaughter or feeder, then as to class, which is determined by sex and condition, and then as to grade, which is determined by the apparent relative excellence and desirability of the animal for its intended use.

Performance of Various Grades

Feeder pig buyers have tended to associate improved performance with higher grade of feeder pigs, but little research has been conducted to evaluate rate of growth, feed efficiency, and carcass data of the various feeder pig grades (Tracy, 1972). Brooks (1984) conducted feeding trials on graded US No. 1, US No. 2, and US No. 3 feeder pigs falling into three body types: type 1—shorter, more compact pigs; type 2—average for the grade; and type 3—longer, taller pigs. Average daily gains were reported ranging from 1.58 pounds per head per day for the grade 2, type 3 pigs, to 1.48 pounds per day in the grade 1, type 1, pigs. In both trials the longer, taller pigs tended to have the best performance. However, it must be noted that when all trials were combined no significant differences in average daily gain could be documented.

Thrasher et al. (1965) selected pigs from sales of graded feeder pigs in Louisiana in order to study the performance and carcass traits of pigs classified in four grades. These grades were similar to those in the USDA grading standards as described at that time. Pigs grading AA (the highest grade) and A (U.S. No. 2) as feeders produced carcasses and wholesale cuts which were acceptable in meatiness and quality. On the other hand, most of the pigs graded BA (U.S. No. 3) and AC (U.S. No. 4) as feeders produced carcasses and wholesale cuts which were unacceptable to most retailers and consumers due to small amount of lean and excessive fat content. Average daily gains by the four grades, AA, A, BA, and AC were 1.77, 1.64, 1.49, and 1.47 pounds, respectively.

Results of a study conducted by Thrasher et al. (1968) found no significant differences in the rate of gain of feeder pigs graded AA (U.S. No. 1 and Top U.S. No. 2), A (U.S. No. 2), BA1 (U.S. No. 3) and BA2 (low U.S. No. 3 and U.S. No. 4). Average daily gains reported for the four grades were 1.60, 1.65, 1.64, and 1.67 pounds, respectively.

Research conducted by Tracy (1972) involved the random selection of 20 pigs, weighing 40-50 pounds, from each of three graded pens: mixed U.S. No. 1 and U.S. No. 2, U.S. No. 3 and U.S. No. 4. The pigs were de-wormed, sprayed for external parasites and fed a 16% protein wheat-supplement ration for 105 days. Average daily gains, during the 105-day finishing period, of pigs graded U.S. No. 1-2, U.S. No. 3 and U.S. No. 4 at weaning (40-50 pounds)

were 1.67, 1.68, and 1.74, respectively. The pigs which were graded U.S. No. 4 as feeders were fatter, slightly shorter, less muscular and graded lower at slaughter than did the pigs graded higher, that is, U.S. No. 1 through U.S. No. 3.

The averages of backfat thickness of the three feeder grade groups, U.S. No. 1-2, U.S. No. 3, and U.S. No. 4 were 1.30, 1.33, and 1.53 inches, respectively. The leaner (U.S. No. 1 through U.S. No. 3) pigs were more efficient feed convertors than were the fatter U.S. No. 4 pigs.

Factors Affecting Pig Performance

1. Selection. Selection is one method the animal breeder has for livestock improvement. However, its effectiveness depends on the heritability of the traits subjected to selection, that is, the extent to which variation in those traits is transmitted from parent to offspring. Several workers have investigated the heritability of growth rate in swine. The Danish reported an estimate of 24% from their test stations (Nordskog et al., 1944). Whatley (1942) concluded that 30-40% of the variance in 180-day weight was of genetic origin in Poland China pigs. Whatley and Nelson (1942) estimated the heritability of 180-day weight in Durocs to be 23%. Comstock et al. (1942) pointed out that 180-day weight includes weaning weight and is probably subject to greater environmental variation than is post-weaning growth rate. Baker et al. (1943) concluded that the influence of heredity on growth increases in importance up to about 112 days of age and decreases thereafter.

2. Feeding Levels

Feeding by Headley (1946) demonstrated the obvious fact that there is a rather high correlation between the average amount of nutrients fed per day and daily gain of pigs.

The effect of limited rations in comparison with full feeding has been investigated by many experiment stations as cited by Morrison (1936). Some variation as to the amount of feed required per pound of gain exists in results reported by various stations when limited and full feeding have been compared.

Feeding trials using four systems were tested over twenty years by Nevada workers (Headley, 1946). All pigs were divided into four classes: (1) pasture with no extra protein, (2) pasture with extra protein, (3) dry lot without extra protein, and (4) dry lot with extra protein. The pigs in class 2 made the most rapid gain and those in class 3 made the least rapid gain at any given feeding level.

3. Effects of Mixing Pigs During the Growing-Finishing Period

Teague and Grifo (1961) reported that mixing pigs during the growing-finishing period decreased feed efficiency but did not affect rate of gain. Jensen et al. (1969) found that mixing pigs at weaning had less effect on daily gains and feed efficiency than did mixing pigs from different litters four weeks after weaning. The experiments of Bryant and Eubank (1972) and of Dantzer (1972) showed that growth rate is related to social rank and fighting when pigs are on a limited-feeding program.

Muehling (1969), Meyer and Fossen (1971), and Jensen (1971) reviewed several studies on the effect of pen space and number of pigs per pen. It was clear that crowding pigs by providing less than 8 square feet per market hog reduced growth. Additional stresses such as poor ventilation, improper temperature, humidity and closed buildings, can reduce pig performance.

4. Effect of Source of Pigs

Approximately one-fifth of the market hogs slaughtered in the U.S. come from units finishing purchased feeder pigs (Van Arsdall, 1978). Movement of feeder pigs through public markets exposes them to numerous diseases and other stresses. Transportation of animals results in tissue shrinkage, even when they are transported a relatively short distance (Hails, 1978). In addition, movement of pigs often involves mingling, thereby creating fighting and other social stresses. Sherritt et al. (1974) concluded that mixing of pigs, in conjunction with other stresses, adversely affected pig growth.

Brumm et al. (1982) showed that pigs hauled from a distant market as compared to pigs from local sources gained more slowly for the first 13 days after arrival. Local source pigs (LS) gained .19 kg per head per day. This approached significance as compared to distant market pigs. From purchase to intermediate weighing, local source pigs gained faster than the distant market pigs. Average daily feed intake for the initial 13 days post arrival was greater for the local source pigs compared to the distant market pigs.

Pigs purchased from distant feeder pig markets and trucked for 15 to 24 hours had more severe scours than pigs from one-owner source trucked only 3 to 5 hours. In addition, the distant market feeder pigs had an earlier peak in the severity of scours. Health treatments were also greater for the distant market pigs. Research in one trial indicated a greater death loss of distant market pigs due to heart attack, salmonella, haemophilus pleuro-pneumonia and pneumonia (Brumm et al., 1982).

Poorer initial performance and higher incidence of health treatments for the distant market pigs compared to the local source pigs are: (1) the possibility of a climate effect, (2) mixing and sorting of distant market pigs from an unknown management and genetic background whereas the local source pigs came from a known genetic pool and known management practices, (3) the amount of time the distant market pigs were trucked and were without feed and water. The local source pigs were without water only 5 hours while distant market pigs were without feed and water for 23 hours. It was observed that upon arrival, the distant market pigs appeared to have increased water consumption. The combination of travel and unavailable water for pigs produces stress.

Webster et al. (1984) evaluated blood serum parameters in stressed feeder pigs. Two groups of pigs were tested: (1) non-fasted and transported 2.4 km, and (2) fasted and transported 564 km. Blood serum samples were collected from 20 animals in each group, initially and after treatment. The long distance effect could be

divided into dehydrational and metabolic areas. Water loss produced significant increases in: sodium, chloride, total protein, albumin, globulin and phosphorus. The metabolic effect produced an increase in blood urea nitrogen and a decrease in glucose and calcium. The serum changes in the short distance, non-fasted pigs (control) also indicate a water loss response. The observed metabolic changes did not occur. A different environment and co-mingling caused these responses it is speculated. Performance data were collected for 42 days to determine changes resulting from treatment. Control pigs gained faster during the first two weeks, but this advantage was eliminated by 28 days. Average daily gain overall was the same for both treatment groups. The control pigs were more efficient at the end of the test (2.72 vs. 2.83).

Trials by Jesse et al. (1984) were carried out to evaluate the effects of various management practices while at the auction on feeder pig weight loss and subsequent performance. Treatment during a simulated feeder pig market stay included: (1) withholding feed and water, (2) water only and (3) providing feed and water. All groups were then hauled 564 km overnight following the market stay. Also tested were pigs from a no-market-simulation (post-weaning pig not fasted or transported a long distance). At the end of three six-week trials accumulative performance was not affected by treatment except for trial two during which the treatment four (no-market simulation) pigs' daily gain was poorer (less than .05) than all other treatments. Available feed and water only decreased the total percentage of shrink in all trials.

CHAPTER III

METHODS AND MATERIALS

Various information sources were utilized in this developmental study of the Tennessee 4-H Market Hog Show and Sale and a study of the Trenton (West Tennessee) Show and Sale for 1979, 1983, and 1985.

Data Collection

The study was based on information obtained in interviews with show personnel and studies of available records in the Extension Swine Section as well as interviews with former Department Heads, County Extension Leaders, and Swine Specialists in Tennessee.

Data were obtained on performance of 913 pigs entered in the District I 4-H and FFA Market Hog Show in 1979, 1983, and 1985. These data included source of pigs: (1) home grown, (2) purchased from farm, and (3) feeder pig sale; type of entry, single or pen, date on test, weight on test, show weight, show date, grade, placing of pigs and each pig's index. Exhibitor data utilized were: exhibitor number, county, show location, show date, and number of pigs exhibited.

The index for each pig is a composite score to reflect the feedlot performance as well as show performance. Points are awarded to hogs which were above the show average for gain, grade, show placing, starting weight, and days on feed. This system provides a

reference for assessing individual pigs' performance relative to others in the show. The index used is as follows:

$$\text{Index} = 50 + 100 (I \text{ ADG} - \overline{\text{ADG}}) + \text{GP} + \text{PP};$$

I ADG = individual average daily gain;

ADG = average of average daily gains of all pigs in the show;

GP = market grade points awarded on basis of 5 for gold (USDA 1), and 3 for blue (USDA 2), and 1 for red (USDA 3);

PP = placing points awarded through first ten placings in each class, plus .1 for each pig in the class above 10. Grand Champion 5 points, Reserve Champion 3 points.

Rules and Regulations

All hogs entered must be project animals that have been owned and fed by the exhibitor for at least 90 days. A longer period is recommended. This feeding period was conducted from mid-December to mid-March of 1979, 1983, and 1985.

All hogs must be individually weighed and tagged at least 90 days prior to the district show. Special Allflex plastic tags must be used. Tags and necessary procedures are available through the county extension office or vocational agricultural instructor.

Each exhibitor may enter nine (9) head. Four (4) hogs may be shown in the single classes and one (1) pen-of-five.

To be eligible to show: (1) single entries must weight 200 pounds or more and grade gold or blue; (2) pen-of-five must average

200 pounds or more, and grade gold, blue, or red. Each hog in the pen-of-five must meet the weight standard of 200 pounds or more.

Twelve hogs may be weighed and tagged, but only nine can be brought to the district show.

Statistical Analysis

The data were analyzed by the procedures in the Statistical Analysis System (SAS), including analysis of variance, Duncan's multiple range test, and Chi Square tests. In analysis of variance independent variables were source and year, and dependent variables were market grade and average daily gain. Chi Square was used to test differences in frequencies of grades from year to year.

CHAPTER IV

RESULTS AND DISCUSSION

Number of Pigs Exhibited

Participation in the District I 4-H and FFA Market Hog Show peaked in 1983 (Table 1). However, a relatively large number of swine have been exhibited each year at the District I show and sale. Some years had greater numbers due to fluctuations in market prices and the general farm economy. Another factor could be the presence or absence of 4-H leaders in the various counties doing full-time youth work. Also, greater numbers of swine have traditionally been produced in the western portion of Tennessee where Trenton, the site of the sale, is located and where large amounts of feed grain are produced.

Table 1. Number of Pigs by Year

Year	No. of Exhibitors	No. Pigs Per Exhibitor ¹	Total Number of Pigs
1979	34	5.05 a	172
1983	90	5.08 b	458
1985	57	4.96 c	283

¹Numbers followed by different letters are different ($P < .05$), according to Duncan's multiple range test.

The number of pigs exhibited per 4-H or FFA club member declined only slightly to 4.96 pigs in 1985 from 5.05 pigs per

exhibitor in 1979 (Table 1). Total number of pigs exhibited varied from year to year. This variation may be due in part to fluctuations in number of pigs which did not meet the minimum weight requirement, which was undoubtedly due to variations in seasonal effects such as weather. The harsh winter of 1985 contributed to the drop in numbers from 1983 to 1985. It should be noted that participation in the BOE Program was optional in 1979, therefore, the reason for the small number of entries that year.

Weights and Days on Feed of Pigs Exhibited

Starting weight, show weight and number of days on feed are criteria necessary for measuring pig performance. The extreme cold weather of 1985 shortened the feeding period to 85 days (from the minimum of 90 days). Since the pigs had an average show weight of 225 pounds (Table 2) in 1983 and 1985, the shortened feeding period probably accounted for some of the increase in starting weight (76 vs. 92 lbs) between the two years. It is doubtful, however, that five days could account for the difference in 16 pounds between the two years. Therefore, the exhibitors most likely selected heavier pigs in 1985. Exhibitors may have believed that a heavier pig would be less likely to fall short of the minimum weight requirement. Often, several days have been required for pigs to become accustomed to full feeding. This is especially true with respect to purchased pigs. Heavier pigs usually being more nearly mature, tend to possess more desirable conformation traits when considered for selection as show

animals. However, ending weights for 1983 and 1985 remained the same despite extremes in weather conditions for those two years.

Table 2. Weights and Days on Feed by Year

Year	Starting Weight	Show Weight	Days on Test
1979	79	219	91
1983	76	225	92
1985	92	225	85

Yearly Differences in Average Daily Gain

Average daily gain is an important criterion for determining the total performance of pigs entered in the 4-H and FFA Market Hog Show. The goal of every swine producer is to grow market hogs which are efficient. The BOE is a guide for youth to gauge how well their hogs have performed against others in the same show. By making use of the BOE records, youth and leaders alike are gaining production information which helps eliminate guesswork in production efficiency and preparation.

As indicated in previous studies reviewed in Chapter II, heredity, age, crowding and quality of ventilation affect the average daily gain of hogs (Muehling, 1969; Meyer and Fossen, 1971; Jensen, 1971). Various management techniques are employed by 4-H and FFA members. Some hogs are maintained outside with a minimum of shelter while others are maintained in confinement with less than adequate space. Still others may not receive enough feed or lack a complete

and balanced ration. The range in environment for these pigs during the 85-90 day finishing period is varied and undoubtedly affects performance. Show pigs which came from sales or other farms have had to establish social rank. Fighting has been observed when mixing pigs from different litters (Bryant and Eubank, 1972). As noted in Table 3, the difference in average daily gain between years was not significant due to the fact that good and poor production practices were employed.

Table 3. Average Daily Gain of All Pigs by Years

Year	Average Daily Gain of All Pigs
1979	1.52
1983	1.59
1985	1.52

Source Differences in Average Daily Gain

Table 4 shows average daily gain by source of feeder pig. There were no differences between home grown (source 1) and sale purchased pigs (source 3). Tennessee Agricultural Extension recommendations have suggested that farm purchased pigs will out perform sale pigs. These data do not support that. It should be noted, however, that these data were collected from exhibitors with a maximum of only nine pigs which is not indicative of the industry as a whole. Even though the source of pigs (farm purchased) gained only 1.45 pounds per day, they were not significantly different from

sale purchased pigs (source 3). Again it should be noted that these data may be biased due to the small sample per exhibitor and data collection over a longer period of time (greater total numbers) may yield different results. FFA and 4-H club members who must buy feeder pigs to develop for exhibition subject the pigs to additional stresses, such as that from shipment to handling. However, Thrasher (1968) found no significant differences in rates of gain of sale pigs graded US No. 1, US No. 2, US No. 3, US No. 4 which agreed with Tracy (1972). Of course, US No. 4 pigs are less desirable in conformation and grade lower at slaughter, so they would not be selected for show since the leaner (US No. 1 through US No. 3) pigs are more efficient feed converters than are US No. 4 pigs.

Table 4. Average Daily Gain by Source of Pig for 1983 and 1985

Source	Number	Average Daily Gain ¹
1	67	1.59 a
2	17	1.45 b
3	15	1.55 a,b

¹Means followed by different letters are different ($P < .05$), according to Duncan's multiple range test.

One possible advantage for 4-H and FFA members who purchase feeder pigs is the opportunity to utilize the talents of trained feeder pig graders. This is very helpful to those who have just begun a project or have little or no assistance in selecting project animals. Another advantage is the greater number of pigs available

for purchase. As many as 1,000 head have been graded US No. 1-2.

The buyer has a greater opportunity to sample a wider range of genetic material. Typically, several crossbreds (2-, 3- and 4-way) and pure-breds are assembled at any organized Tennessee feeder pig sale.

FFA or 4-H participants who select pig prospects from a farm have less genetic material from which to choose. However, more information on such pigs can be obtained including known management practices and known genetic background, as compared to sale purchased pigs.

Purchased pigs of any type must be handled carefully, especially during the first two weeks in the new situation. As reported in research by Hails (1978), periods during which shipped pigs are deprived of feed and water may be as long as 20 hours at organized sales, and tissue shrinkage has resulted when animals are transported a relatively short distance. Many feeder pigs in Tennessee are hauled as far as 100 miles before reaching the sale site. It has been shown that pigs hauled from a distant market, as compared to local-source pigs, gained more slowly during the first two weeks (Brumm et al., 1982). Additional medication required for distant-market pigs and greater death loss of such pigs can have an appreciable negative impact on the economics of an operation.

Tennessee climate with extreme short-term variation in weather has proved to be stressful on feeder pigs. FFA and 4-H members must take necessary steps to insure that their pigs are comfortable,

neither too hot nor too cold during transportation, must use a dry, draft-free vehicle and must allow pigs access to fresh, clean water at all times.

Market Grades by Years

The end product of a swine feeding operation is the market hog, and genetics and environment must be optimum to produce a desirable product. As FFA and 4-H members gain proficiency in swine management and feeding, more success can be expected. Since 1979 (the first year of the BOE), the number and percentage of hogs grading gold have increased appreciably (see Table 5). Conversely, numbers and percentages of hogs grading blue (US No. 2) and red (US No. 3) have decreased.

Table 5. Number and Percent of Hogs Grading Gold (1), Blue (2), and Red (3) by Years

Year	Gold	Blue	Red
1979	105 (61.05%)	60 (34.88%)	7 (4.07%)
1983	356 (77.73%)	94 (20.52%)	8 (1.75%)
1985	251 (88.69%)	27 (9.54%)	5 (1.77%)

The frequencies of gold, blue, and red grades are different ($P < .0001$), between years, according to a Chi Square test for independence of year and grade frequencies. From 1979 to 1985 an increase in the number of hogs grading gold is due to better selection of prospective pigs (type). Consequently, the opposite can be

observed in number of hogs which grade blue or red. Exhibitors are learning selection techniques and applying available technology during the feeding period.

CHAPTER V

RECOMMENDATIONS

Recommendations based upon this study have been divided into various categories: source of pigs, genetic selection, size of pig going on test, and total management practices such as housing, health, and feeding levels.

The goals of 4-H and FFA members involved in the junior market hog program are learning experiences and showing pride in the hogs they exhibit. Selection of the correct type market hog is the first step toward achieving their objectives. Youth have three sources from which to select pigs: home-grown pigs, pigs purchased directly from other farms, and the organized feeder pig sales in Tennessee. Data in this study indicate that the home-grown and sale-purchased pigs gain significantly better than farm-purchased pigs. One should note, however, that these data were compiled on a relatively small group of pigs and the stresses put on these pigs would still be less if they were purchased directly from a farm. If pigs are purchased directly from a farm, the 4-H or FFA member should still select thrifty pigs that would grade USDA 1. Since average daily gain is an important part of the BOE award and an important economic consideration, it is suggested that fast gaining pigs be utilized. Therefore, pigs that exhibit traits of cross-breeding are likely to gain faster as opposed to purebreds. Regardless of the pigs' genetic origin, 4-H and

FFA members must take steps to insure as little stress as possible on purchased pigs. Show prospects should be purchased 14 to 21 days prior to the weighing date (hogs must be on feed at least 90 days). This will allow the pigs to become accustomed to their new diet and to new surroundings.

Always select pigs which are sure to make the minimum weight requirement of 200 lbs. A heavier show prospect (90 lbs.) will only weigh 225 at the end of 90 days if it gained 1.5 lbs. per day. If the prospect gets sick or goes off feed or management is not optimal, they may not be heavy enough. This may apply especially to those who are involved in the project for the first time.

Always feed a complete balanced ration (grow, finish). Provide fresh clean water and allow adequate space per pig. Avoid respiratory problems by cutting down on dust (air exchange) and shelter the animals from the elements.

CHAPTER VI

SUMMARY

This study involved 913 pigs from the District I 4-H and FFA Market Hog Show and Sale for 1979, 1983, and 1985. Also included is a brief developmental study of the Junior Market Hog Program in Tennessee.

Pigs in this show were studied to determine average daily gain, days on feed, effect of source of pig on pig performance and numbers of hogs grading US No. 1, US No. 2, and US No. 3 upon arrival at the district show.

The 4-H swine program in Tennessee is one of the oldest livestock youth projects. It has grown from a joint endeavor by Extension and a bank in Madison County, Tennessee, in 1917. In 1979 the Best Overall Exhibitor (BOE) award was established to recognize total production performance of market swine over a specified feeding period. Four area shows are held each spring and one state show each fall.

Participation peaked in 1983 with 90 exhibitors showing 458 hogs. Starting weight and days on test remained constant except in 1985 when the pigs were 16 pounds heavier and on test for five fewer days. Average daily gain of all pigs was not significantly different between years, being approximately 1.5 pounds per head per day in all three years. However, average daily differed significantly ($P < .05$)

among the three sources of pigs with the sale-purchased and home-grown pigs being superior to farm-purchased pigs.

Numbers and percentages of hogs grading gold (US No. 1) have increased steadily from 1979 to 1985. Consequently, percentage of hogs grading blue (US No. 2) and red (US No. 3) have decreased. This is an indicator that recommended production practices have been employed.

LITERATURE CITED

LITERATURE CITED

- Baker, M. L., L. N. Hazel, and C. F. Reinmiller. 1943. The relative importance of heredity and environment in the growth of pigs of different ages. *Journal of Animal Science*, 2:3-13.
- Brooks, Earl D. 1984. The influence of grade and body type on the performance of purchased feeder pigs. Dissertation for Doctor of Philosophy, The University of Tennessee, Knoxville, Tennessee.
- Brumm, M. C., E. R. Peo, Jr., S. R. Lowry, and A. Hogg. 1982. Effect of source of pig, housing system and receiving diet on performance of purchased feeder pigs. *J. Anim. Sci.* 55:1264.
- Bryant, M. J., and R. Eubank. 1972. Effects of stocking and group size upon antagonistic behavior in grouping growing pigs. *Brit. Vet. J.* 128:64-70.
- Comstock, R. E., L. M. Winters, P. S. Jordan, and O. M. Kiser. 1942. Measures of growth rate for use in swine selection. *Journal of Agricultural Research*, 65:379-389.
- Hails, M. R. 1978. Transport stress in animals: A review. *Animal Regulations Stnd.* 1:289.
- Headley, F. B. 1945. Protein supplement in pig rations, Nevada Agricultural Experiment Station Bulletin 175.
- Headley, F. B. 1946. Effect of feeding level on daily gains of pigs. *J. Anim. Sci.* 5:251.
- Herrington, G. T. 1979. Brief History of 4-H Club Work in Tennessee. Mimeo.
- Jensen, A. H., G. R. Carlisle, B. H. Harmon, and D. H. Baker. 1969. Management and housing studies with growing-finishing swine. Department of Animal Science, University of Illinois, Bulletin 6546.
- Jesse, G. W., C. N. Weiss, H. J. Mayes, and G. M. Zinn. 1985. Effect of management while at the market on feeder pig shrinkage and subsequent performance. *J. Anim. Sci.* 61:85 (Abstr.).
- Masincupp, Frank B. 1979. The 4-H and FFA Swine Show Best Overall Exhibitor Program.
- Morrison, F. B. 1936. Feeds and feeding. 20th edition. Morrison Publishing Company, Ithaca, New York.

- Miller, Dale. 1976. Pigs in America—Columbus to confinement. National Hog Farmer, p. 36.
- Muehling, A. J. 1969. Swine housing and waste management. A research review. Department of Agricultural Engineering, University of Illinois. AE-873.
- Nordskog, A. W., R. E. Comstock, and L. M. Winters. 1944. Hereditary and environmental factors affecting growth rate in swine. J. Anim. Sci. 3:257.
- O'Neal, James G. 1983. Tennessee 4-H and FFA Market Hog Program. University of Tennessee Agriculture Extension Service. S.P. 151.
- O'Neal, James G. Personal Interview, April 23, 1985.
- Sheritt, G. W., H. B. Graves, J. K. Gobble, and V. E. Haglett. 1974. Effects of mixing pigs during the growing finishing period. J. Anim. Sci. 37:834.
- Teague, H. S., and A. P. Grifo. 1961. Movement and resorting of pigs during the growing-finishing period. Ohio Agriculture Experiment Station. Animal Science Mimeo, No. 124.
- Tennessee Extension Review. 1919. Division of Extension, Knoxville, Tennessee, Vol. 2, No. 19.
- Thrasher, D. M., C. J. Le Blanc, W. D. Simoneaux, Lee Bertrand, and A. D. Fitzgerald. 1968. Performance of graded feeder pigs purchased at Louisiana feeder pig sales. Louisiana Agriculture Experiment Station. A. A. Mimeo, Cir. 68-1.
- Thrasher, D. M., A. D. Fitzgerald, and A. M. Mullins. 1965. Performance of graded feeder pigs. Louisiana Agriculture Experiment Station. Animal Science Mimeo, Cir. 65-10.
- Tracy, James. 1972. Performance of feeder pigs of various grades. Master's Thesis, University of Tennessee, Knoxville, Tennessee.
- Tyrrell, Bill. Personal Interview, April 23, 1985.
- USDA Federal Register. 1985. 49:242.
- USDA Market Bulletin No. 51. 1971. USDA grades for slaughter swine and feeder pigs.
- USDA Circular No. 569. 1940. Market classes and grades of swine.

- Van Arsdale, R. N. 1978. Structural characteristics of the U.S. hog production industry. USDA Agricultural Economics Rep. No. 415.
- Webster, S. R., G. W. Jesse, and G. M. Zinn. 1984. Effect of transportation on serum parameters and subsequent performance in feeder pigs. J. Anim. Sci. 59:385 (Abstr.).
- Wessel, Thomas A., and Marilyn Wessel. 1982. 4-H: An American idea: 1900-1980, A history of 4-H. Chevy Chase, Maryland: National 4-H Council.
- Whatley, J. A., Jr. 1942. Influence of heredity and other factors on 180-day weight in Poland China swine. J. Agr. Res. 65:249-264.
- Whatley, J. A., Jr., and R. H. Nelson. 1942. Heritability of differences in 180-day weight and market score in Duroc swine. J. Anim. Sci. 1:70 (Abstr.).

VITA

A native of Sparta, Tennessee, Barry Bradley Cooper was born May 11, 1951. He attended elementary schools in that city and was graduated from Sparta-White County High School in June 1969. In August of 1972 he enrolled at Middle Tennessee State University and was graduated with a B.S. degree in Animal Science in 1975. In April of 1977 he accepted a position with The University of Tennessee Agriculture Extension Service as Assistant Extension Agent in Grundy County, Tennessee. After three years with the Extension Service he began work toward the Master's degree by participating in the Winter Short Course for County Agents. In April 1985 he enrolled in The University of Tennessee, Knoxville, full time to complete the Master's degree in Agriculture Extension Education and was graduated in March of 1986.

The author is a member of the National Association of County Agents, the American Quarter Horse Association, and the National Reining Horse Association.