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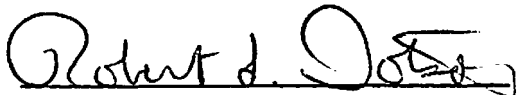
I am submitting herewith a dissertation written by Rural Allen Peace, entitled "Factors Associated with County Extension Agent Dairy Educational Program Effectiveness in Selected Tennessee Counties." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Education with a major in Curriculum and Instruction.


Major Professor

We have read this dissertation
and recommend its acceptance:





Accepted for the Council:


Vice Chancellor for
Graduate Studies and Research

FACTORS ASSOCIATED WITH COUNTY EXTENSION AGENT
DAIRY EDUCATIONAL PROGRAM EFFECTIVENESS
IN SELECTED TENNESSEE COUNTIES

A Dissertation
Presented to
the Graduate Council of
The University of Tennessee

In Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

by
Rural Allen Peace
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ABSTRACT

The major purpose of the study was to determine the association between Extension agents' effectiveness in conducting an Extension dairy educational program and their knowledge in dairying and related subjects. A second major purpose was to determine the association of agents' effectiveness scores and agents' knowledge scores with selected independent variables within the following four sub-groups: (1) agents' background and training, (2) agents' county situation, (3) agents' interest and attitudes, and (4) work related factors.

The study was limited to county Extension workers assigned the primary responsibility for the Extension dairy educational program in counties having at least \$750,000 income from dairying and/or at least 20 percent of the county farm income derived from dairying. Also, the agents must have attended a one-week intensive dairy in-service training program conducted in 1970. A total of 42 county Extension agents met this requirement and data from 41 agents were included in the study.

The agents' effectiveness rating was determined by people who were in position to know the quality of Extension dairy program conducted by each agent. Each agents' effectiveness was rated by a district supervisor, an associate district supervisor and by at least three Extension dairy specialists. A high degree of agreement among the different judges was shown by a very high positive correlation (ranging from .61 to .80) between the scores assigned by each of the seven judges and the average scores for all other judges.

A multiple-choice test was used to get a measure of agents' knowledge in dairying and related subjects. The test was developed by Extension specialists personnel and members of the teaching staff in the College of Agriculture of The University of Tennessee, under the direction and guidance of the researcher. The knowledge test was pre-tested to determine reliability. Twenty-six county Extension agents were used to pre-test the instrument. Using the split-half procedure the reliability was .84. This was judged to be adequate to achieve purposes of the study.

A rank order comparison technique was used to measure agents' interest in dairying and attitude toward working with the dairy clientele in the county. This interest and attitude scale gave a measure of agents' job satisfaction, agents' self-confidence, agents' perception of clientele receptiveness to Extension work, agents' personal interest in dairying, and importance of dairying in the county.

Other data were taken from Extension files, college transcripts and from Tennessee Extension Management Information System (TEMIS) printouts.

Stepwise regression was used to analyze the data. The statistics involved were: (1) the coefficient of correlation, r (used to test the null hypotheses), (2) the coefficient of multiple correlation, R , and (3) the coefficient of multiple determination, R^2 (the last two being used to determine the correlation between a dependent variable and two or more independent variables simultaneously). Also, limited

use was made of crosstabulation analysis to show more clearly the nature of some of the above relationships.

Findings from the testing of hypotheses indicated that:

(1) agents' effectiveness ratings and also agents' test scores on knowledge of dairying were inversely related to agents' tenure (both years in present position and years in Extension; (2) agents with higher effectiveness ratings also tended to have higher knowledge scores on dairying and related subjects; (3) the more effective agents spent more time on group and mass media teaching methods and also made more contacts with the dairy clientele than the less effective agents; (4) the more effective agents involved dairy specialists more in conducting their county dairy educational program; (5) agents' effectiveness ratings were positively associated with the amount of time agents spent in the office; (6) all other independent variables studied failed to be associated at a significant level with either agents' effectiveness ratings or agents' test scores.

Findings from the multiple correlation analysis indicated that:

(1) the most accurate predictors of agents' effectiveness ratings were number of years in present position (negatively), undergraduate grade point average, man-days devoted to dairy work with group and mass media methods, score on multiple-choice test and number of men Extension agents assigned to the county; (2) the most accurate predictor of agents' test scores were agents' effectiveness ratings, years in present position (negatively), income from dairying in the county and undergraduate grade point average.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
Statement of the Problem	3
Analysis of Major Factors	4
Effectiveness factors	4
Knowledge factors	4
County situation factors	5
Interest and attitude factors	5
Work related factors	5
Basic Assumptions	6
Scope and Limitations	7
Definitions of Terms	8
Importance of the Study	11
Hypotheses	13
Organization of the Study	13
II. REVIEW OF SELECTED RELATED LITERATURE	15
Criterion of Teaching Effectiveness	15
Learner achievement as a measure of successful	
teaching	17
Characteristics and traits as a measure of teaching	
effectiveness	18
Methods or procedures used by teachers as a measure of	
teaching success	21

CHAPTER	PAGE
Judgment of qualified people as a measure of	
teaching success	23
Methods of improving ratings	26
Research on Extension Teaching Effectiveness	28
Research Involving Subject-Matter Tests	35
Studies on Interests and Attitudes	37
Determining attitudes and interests	39
Rank order and paired comparison methods	40
III. METHODS AND PROCEDURES	41
Kinds and Sources of Data	41
Collection of Data	42
Choosing a Classification System	42
Rating Procedures	46
Score card rating method	47
Over-all rating method	47
Construction of Dairy Subject Matter Test	51
Validity	55
Reliability	56
Administering of the Questionnaires	57
Measuring the Interest and Attitudinal Factors	58
Treatment of the Data	58
IV. ANALYSIS AND DISCUSSION OF DATA	60
Introduction	60
Stepwise regression program	61
Testing the null hypothesis	62

CHAPTER

PAGE

Coefficient of Correlation	62
Multiple correlation of coefficient	63
Crosstabulation analysis	65
Determining the Relationship Between Selected Factors and the Effectiveness Rating of Extension Workers in Conducting the Extension Dairy Educational Program in Selected Tennessee Counties	65
Rating the effectiveness of county Extension agents working with the Extension Dairy Program in certain Tennessee counties	65
Relationship of selected background and training factors with effectiveness rating of agents in conducting the Extension Dairy Educational Program in certain Tennessee counties	67
Relationship of selected county situation factors with effectiveness rating of agents in conducting the Extension Dairy Education Program in certain Tennessee counties	70
Relationship of selected indicators of the relative interest and attitude of agents in dairying with effectiveness rating of agents in conducting the Extension Dairy Program in certain Tennessee counties	73

CHAPTER

PAGE

Relationship of selected work related variables with effectiveness rating of agents in conducting the Extension Dairy Educational Program in certain Tennessee counties	75
Relationship of multiple-choice test with effectiveness rating of agents in conducting the Extension Dairy Educational Program in selected Tennessee counties .	78
Scattergram showing agents' effectiveness rating scores in relation to number of years in Extension .	85
Some other observations regarding the relationship of significantly related independent variables . . .	93
Summary of findings related to effectiveness rating .	96
Determining the Relationship Between Selected Factors and the Score made on a Multiple-Choice Test in Dairying and Related Subjects by Extension Workers from Selected Tennessee Counties	102
Testing the competency, in dairying and related subjects, of Extension agents working with the Extension Dairy Program in selected Tennessee counties	103
Relationship of selected background and training factors with the multiple-choice test scores of agents working with the Extension Dairy Program in selected Tennessee counties	107

CHAPTER

PAGE

Relationship of selected county situation factors with the multiple-choice test scores of agents working with the Extension Dairy Program in selected Tennessee counties	110
Relationship of selected indicators of agent's interest and attitude concerning dairying with the multiple-choice test scores of agent working with the Extension Dairy Program in selected Tennessee counties	113
Relationship of selected work related factors with the multiple-choice test scores of agents working with the Extension Dairy Program in selected Tennessee counties	116
Relationship of the 12 sections of the multiple- choice test with the total multiple-choice test scores of agents working with the Extension Dairy Program in selected Tennessee counties	118
Relationship of selected factors from each of the sub- groups studied with the scores on the multiple-choice test by Extension agents from selected Tennessee counties	120
Summary of findings related to multiple-choice test scores of agents	122
V. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS	126
Introduction	126

CHAPTER	PAGE
Summary of Methods and Procedures Used	127
Limitations of the study	127
Effectiveness rating used	127
Development and use of the multiple-choice test . . .	128
Interest and attitude scale used	129
Data collection	129
Analysis of data used	130
Summary of Findings	132
Results regarding agents' effectiveness	132
Results regarding agents' knowledge	139
Conclusions	143
Recommendations	144
BIBLIOGRAPHY	148
APPENDICES	153
Appendix A	154
Appendix B	166
Appendix C	210
VITA	232

LIST OF TABLES

TABLE		PAGE
I.	Influence of Selected Background and Training Factors on the Effectiveness Rating of Agents Working with the Extension Dairy Educational Program in Selected Tennessee Counties	68
II.	Influence of Selected County Situation Factors Related to Dairying on the Effectiveness Rating of Agents Working with the Extension Dairy Educational Program in Certain Tennessee Counties	71
III.	Influence of Selected Interest and Attitude Factors on Agent's Effectiveness in Working with the Extension Dairy Educational Program in Selected Tennessee Counties	74
IV.	Influence of Selected Work Related Factors on the Effectiveness Rating of Agents Working with the Extension Dairy Educational Program in Selected Tennessee Counties	76
V.	Influence of Selected Test Factors on Effectiveness Rating of Agents Working with the Extension Dairy Educational Program in Selected Tennessee Counties . . .	80
VI.	Influence of Selected Factors on the Effectiveness Rating of Extension Agents Working with the Dairy Extension Program in Selected Tennessee Counties . . .	82

TABLE

PAGE

VII.	Relationship of Effectiveness Rating of Agents with Years in Extension	84
VIII.	Relationship of Effectiveness Rating of Agents by Years in Extension Controlled for Highest Degree Earned . .	87
IX.	Relationship of Effectiveness Rating of Agents by Years in Extension Controlling for Undergraduate Grade Point Average	88
X.	Relationship of Effectiveness Rating of Agents by Years in Extension Controlling for Scores on the Multiple- Choice Test	90
XI.	Relationship of Effectiveness Rating of Agents by Years in Extension Controlling for Time Spent by Dairy Specialist in the County	92
XII.	Relationship of Effectiveness Rating of Agents by Years in Extension Controlling for Dollars Income	94
XIII.	Low Individual Percentage Score, Mean Percentage Score and High Individual Percentage Score Made on the Twelve Sections of the Multiple-Choice Test and on the Total Test by Extension Agents Working with the Dairy Program in Selected Tennessee Counties	106
XIV.	Influence of Selected Background and Training Factors on the Multiple-Choice Test Scores of Agents Working with the Extension Dairy Program in Selected Tennessee Counties	108

TABLE

PAGE

XV.	Influence of Selected County Situation Factors on the Multiple-Choice Test Score of Agents Working with the Extension Dairy Program in Selected Tennessee Counties	111
XVI.	Influence of Selected Interest and Attitude Factors on the Multiple-Choice Test Scores of Agents Working with the Extension Dairy Program in Selected Tennessee Counties	114
XVII.	Influence of Selected Work Related Factors on the Multiple-Choice Test Scores of Agents Working with the Extension Dairy Program in Selected Tennessee Counties	117
XVIII.	Influence of Selected Sections of the Test on the Total Multiple-Choice Test Scores of Agents Working with the Extension Dairy Program in Selected Tennessee Counties	119
XIX.	Influence of Selected Factors on the Multiple-Choice Test Scores of Extension Agents Working with the Extension Dairy Program in Selected Tennessee Counties	121
XX.	Data on Background and Training Factors	210
XXI.	Data on County Situation Factors	212
XXII.	Data on Interests and Attitudes Factors	213
XXIII.	Scores on Multiple-Choice Test	214
XXIV.	Data on Work Related Factors	216

TABLE	PAGE
XXV. Effectiveness Rating Scores of Agents, on Conducting the Dairy Educational Program in Selected Tennessee Counties by District Supervisors, Associate Supervisors, and Dairy Specialists	221
XXVI. Minimum, Mean, Maximum and Range of the Factors Included in the Study	223
XXVII. Intercorrelation Between Variables	224

CHAPTER I

INTRODUCTION

County Extension workers compose the largest single group of professional educators in the Cooperative Extension Service. Usually in the county to which they are assigned, they are in daily contact with farm men, women, boys, and girls in actual life situations. Thus, they are in a unique position as educators to study the needs of farm and other people in the county, and to help them learn to find solutions to their problems.

Since Extension is a voluntary, out-of-school form of education, its success is determined largely by the degree of confidence local people have in the county level workers. A Federal Extension Service statement regarding agent performance notes that county Extension agents ". . . are the extension personnel who have continuous and direct contact with the people. Depending upon them, Extension succeeds or fails."¹

The following similar idea was expressed by Frutchey: "The effectiveness of the Cooperative Extension Service depends upon its County Extension Agents. A good County Extension Agent means a good program, good methods, and good results."²

¹Federal Extension Service, "Study Plan for the Validation of the Missouri County Agent Inventory" (Washington, D.C.: USDA Federal Extension Service, n.d.), p. 1. (Mimeographed.)

²Fred P. Frutchey, The Development of an Aptitude Test for the Selection of County Agricultural Agents (Washington, D.C.: USDA Federal Extension Service, 1965), p. 3.

Because the success or failure of Extension depends primarily upon the effectiveness of county Extension personnel, one of the primary concerns of Extension supervision and administration needs to be improving the level of effectiveness of county Extension workers. In this regard, Amend says, "The responsibility for proper selection, orientation, and training rests with the supervisor whose ultimate goal is the development of an effective productive work force."³

The desire to improve the level of effectiveness of county Extension workers led early in the development of the Extension Service to studies of personal characteristics of successful agents. Kelsey and Hearne provide the following account of some of the early studies:

In studies of successful agents by Director H. C. Ramsower of Ohio and in personnel record cards kept by the Extension Services of various states, and again in the list of qualifications of extension workers drawn up at the Extension Administration Workshop in Wisconsin, 1946, certain personal characteristics are emphasized again and again. These are vision, ability to plan, initiative, resourcefulness, integrity, faith, courage, judgment, perseverance, tact, and power of expression. These qualities are described as essential to all extension workers in all capacities.⁴

Several studies concerning the factors associated with successful county Extension workers have been conducted in different states since that time. Most studies have approached the problem from the standpoint of the agent's total job.

³Edwin H. Amend, "Supervision: Motivating Not Controlling," Journal of Extension, Vol. VIII, No. 4 (Madison, Wisconsin: Extension Journal, Inc., Winter, 1970), p. 20.

⁴Lincoln David Kelsey and Cannon Chiles Hearne, Cooperative Extension Work (New York: Comstock Publishing Associates, 1949), pp. 65-6.

The present study was primarily concerned with Extension Dairy work--one important phase of the county Extension agent's total job. Further, focusing on this one work area permits a relatively detailed characterization of the technical knowledge level and activity of county Extension workers in a major area of Extension's agricultural program. It was also proposed to study how levels of subject matter competency may relate to agent effectiveness in conducting Extension dairy work in a county. Finally, limiting the study to one work area also provided opportunity to study the relationship between worker motivation (as measured by interest in, self confidence in, job satisfaction from, and attitude toward a given work or audience area) and the level of agent effectiveness.

Dairy is one of the major work areas under the general heading of agricultural production, marketing, management, and conservation. Other work areas under this heading include swine, beef cattle, forage, feed grains, soybeans, cotton, tobacco, horticulture, and forestry. Each work area comprises a complete unit in the county Extension program development cycle. The primary responsibility for the Extension educational program in each work area is usually assigned to a specific county staff member. This makes the dairy work area a very appropriate unit for studying the level of effectiveness of county agents. The statements of the problem, its definition and hypotheses follows.

Statement of the Problem

This study was designed to determine the relationship between county Extension workers' effectiveness with the county dairy program

and their knowledge of dairying and related subjects in certain Tennessee counties. Next, relationships were to be determined between the foregoing and twenty-four selected independent variables within the following four sub-groups: (1) background and training, (2) county situation, (3) interests and attitudes, and (4) work related.

Analysis of Major Factors

The following variables were used in determining relationships:

Effectiveness factors.

1. Planning the county dairy program
2. Carrying out the annual plan of work
3. Evidence of effective educational work in dairying
4. Working relationships
5. Public relations
6. Office management
7. Professional improvement
8. Personality traits of the agent

Knowledge factors. (Utilized as a single dependent and independent variable.)

1. Highest degree earned
2. Undergraduate grade point average
3. Number of hours undergraduate credits in dairying
4. Number of hours of graduate credits in dairying
5. Number of years of experience in Extension
6. Number of years of experience in present position
7. Number of man-days dairy specialists spent in county

County situation factors. (Utilized as separate independent variables.)

1. Percent of farm income received from dairying in county where agent was assigned

2. Number of dairy farms in the county

3. Dollars income from dairying

4. Number of Grade A dairy farms in county

5. Number of men Extension agents assigned to the county

Interest and attitude factors. (Utilized as a single independent variable.)

1. Self-confidence of agent in his dairy subject-matter competency

2. Agent's personal interest in dairying

3. Job satisfaction derived from his feeling of accomplishment in the dairy program

4. Agent perception of the ease of working with dairymen or receptiveness of dairymen to his assistance

5. Agent perception of the relative importance of dairying in the county

Work related factors. (Utilized as separate independent variables.)

1. Total man-days agents devoted to dairy educational work

2. Man-days agents devoted to individual contact methods with dairy clientele

3. Man-days agents devoted to group and mass media methods with dairy clientele

4. Total number of contacts made with dairy clientele
5. Number of individual contacts made by agents with dairy clientele

Basic Assumptions

The value of the findings rests upon certain assumptions which were made for this study. The first assumption was that the overall effectiveness of county Extension workers can be raised by improving their effectiveness as teachers. Extension's primary function is education and, therefore, the Extension worker's principal role is that of a teacher.

A second assumption was that the level of effectiveness of county Extension workers in conducting dairy educational work can be determined. Anastasi says,

If ratings are obtained from trained raters under carefully controlled conditions, they can provide a valuable source of criterion data. It is generally desirable to secure independent ratings from more than one observer, in order to rule out individual bias and idiosyncrasy of the rater.⁵

In reference to teacher ratings, Sandiford states,

Although no one can define exactly what is meant by successful teaching, everyone has a good general idea of what the term means, and it may be assumed that if a sufficient number of informed persons select an individual as a successful teacher, then he is one.⁶

⁵Anne Anastasi, Principles of Psychological Testing (2nd ed., New York: The MacMillan Co., 1968), p. 144.

⁶Peter Sandiford, "Forecasting Teacher Ability," Bulletin No. 8, Department of Educational Research, University of Toronto, p. 39, (1937).

The third assumption was that the relationship of the factors involved in this study to county Extension agent effectiveness in conducting county Extension dairy educational work can be determined and described.

A fourth, and final, assumption was that more knowledge about the factors associated with effectiveness of county Extension workers would be helpful to administrators and supervisors in the Tennessee Agricultural Extension Service as a basis for:

1. Making better decisions about the contents and nature of pre-service, induction, in-service, and graduate training programs
2. Making wiser personnel decisions about placement, motivation, promotions, and transfers of personnel
3. Guiding individual Extension workers in professional improvement.

Scope and Limitations

This study included 42 county Extension workers conducting county Extension dairy educational work in Tennessee. All 42 of the county Extension agents were assigned primary responsibility for the county Extension dairy program in Tennessee counties where dairying was considered important enough to warrant their attendance at a week of intensified dairy in-service training. The criteria used for selecting these counties were \$750,000 or more income from dairying in 1969 and/or 20 percent or more of the county farm income derived from dairying.

All except four of the agents included were county Extension leaders. All agents had the rank of Associate Extension Agent or

Extension Agent. Thus, a total of 42 county Extension agents was included in this study. Forty-one of the 42 agents qualifying for the study completed all of the questionnaires. One agent was unable to complete the necessary questionnaire due to serious illness. The numbers of county Extension workers meeting the necessary requirements for this study were quite small--41 in all.

Therefore, the conclusions drawn shall refer only to the subjects which constitute the population covered by this study. At the same time, the results may have some implication for Extension work in other similar situations, though any real relationship would need to be proven.

As stated earlier, the study was limited primarily to county Extension worker effectiveness in conducting the Extension dairy program. However, an attempt was made to relate certain factors to the level of dairy subject-matter competency of the agents.

The specific factors studied are listed in the section on analysis of major factors.

Definitions of Terms

For the purpose of this study, the following terms are defined in the sense that they were used.

Cooperative Extension Service. That organizational entity of the Department of Agriculture and the land-grant system created under provisions of the Smith-Lever Act and subsequent related legislation which conducts educational programs of an informal, non-resident, problem oriented nature.⁷

⁷U.S. Department of Agriculture, Condensation of Report of the Joint USDE-NASULGC Study Committee on Cooperative Extension, A People and a Spirit (Fort Collins: Colorado State University, November, 1968), p. 17.

County Extension Worker or Agent. A county Extension worker is a professional Extension staff member assigned to work at the county level with the dairy work area assigned as one of his responsibilities.

The County Extension Program Development Cycle. This term includes the successive processes of five-year Extension planning, Extension teaching and Extension evaluation. The cycle is normally completed at the end of a five-year period, whereupon it is ready to be started again.⁸

Five-Year Extension Planning. It is the process of long-range (5-year) county Extension program planning undertaken by county Extension staff members, frequently, but not always, involving representative county lay people (referred to as a program development committee and/or study committees) and appropriate resource people. It and the five-year plan (Plan of Work Projection, or POWP) that results serve as a basis for other parts of the program development cycle. The process includes annual study for the purposes of: (1) updating and making other necessary changes in the five-year plan (POWP); (2) writing of an Annual Revision, and (3) selecting priority five-year objectives and participation goals for use in annual Extension planning.⁹

Five-Year Plan (Plan of Work Projection, Projection or POWP). It is a written, end product of 5-year Extension planning, and serves as a basis for the formulation of the county Extension annual plan of work (POW). Major elements of the Projection for all sections excepting 4-H and other youth include for each work area: (1) the situation, including enough information so that major problems either emerge clearly or are identified; (2) 5-year objectives, and (3) county tasks (teaching objectives). Major elements in the 4-H and other youth section include for each audience: (1) the situation; (2) 5-year participation goals, and county tasks (adjustments needed in organization, leadership, recognition and sponsorship; and project and activity work). Code numbers for related state purposes, primary subjects, primary audiences and county tasks are keyed into the Projection in keeping with the Tennessee Extension Management Information System (TEMIS). Revisions are made annually as needed, and an

⁸Glossary of Tennessee Agricultural Extension Terms (Knoxville: The University of Tennessee Agricultural Extension Service Training and Studies, 1970), p. 1.

⁹Ibid., p. 3.

Annual Revision developed. Priority 5-year objectives, participation goals and county tasks are then selected from the projection to serve as a basis for annual Extension planning.¹⁰

Annual Extension Planning. County Extension annual planning is primarily the responsibility of the county Extension staff. It is a process that includes: (1) stating of priority objectives and goals and related county tasks and allocating man-days; (2) telling why objectives and goals listed are important; (3) selection and identification of appropriate items with TEMIS code numbers; (4) deciding on starting and completion dates; (5) telling who will be responsible, and (6) indicating how progress toward objectives will be measured.¹¹

Annual Plan of Work (POW). The written end product of annual planning is called the Annual Plan of Work (POW) include: (1) priority objectives and participation goals selected for each work area and audience; (2) a brief statement of facts telling why the priority objective or goal is important; (3) county tasks related to each priority objective and goal; (4) code numbers identifying related state purposes, primary subjects, primary audiences and primary teaching methods; (5) starting and completion dates, and total man-days to be allocated; (6) staff responsibility (who will do it), and (7) evaluative methods to be used in checking progress.¹²

TEMIS. Tennessee Extension Management Information System is a modification of SEMIS to serve the specific needs of the Tennessee Extension Service.

Respondent. A respondent is a county Extension agent who completed all of the necessary test and questionnaire.

Population or Group. The 41 county Extension workers included in the study are considered as the population or group.

¹⁰Ibid.

¹¹Ibid.

¹²Ibid.

Sub-group or Category. Any defined portion of the group studied is a sub-group or category.

Effectiveness. Effectiveness is the level of performance of county Extension agents (as judged by district supervisors, associate supervisors and at least three dairy specialists ratings) in developing and conducting an Extension Dairy Educational Program in the county where the agent is assigned the primary responsibility for the county dairy program.

Man-day. Man-day is the equivalent of eight hours worked by one Extension agent.

Importance of the Study

As one looks at the nature of the Cooperative Extension Service, it seems evident that the teaching effectiveness of the county Extension workers determines to a large extent the success or failure of the entire program. Some research has been done in this area, but there is still a very definite need for additional research.

In general, there are two ways of expanding Extension's educational services to its clientele. One method is by adding additional personnel, which is often forbidden due to limited resources available. The second method is by improving the effectiveness of the present personnel, seemingly always a possibility, because few organizations ever reach a point where it is not possible to improve their efficiency. Improving effectiveness can be done through such effort as a better organization of time, better placement, improved training and motivation.

If the basic objective of an organization is continuing growth in either out-put or usefulness, then perhaps there is a continuing

need for study and research on ways of improving the effectiveness of its personnel. The Extension Service has been described by several people as the greatest educational organization of its kind in the world. If Extension is to maintain this image, it must continue to have as one of its guiding principles the objective of continuing growth in educational out-put and usefulness. Which means it must not rest on its laurels and glory in its past achievements if it is to maintain such distinction. An organization like an individual cannot stand still. Extension must continue to move forward or it will have a tendency to slip backward.

The problem of this investigation has two main aspects which may be stated in the following questions: (1) What association, if any exist between the effectiveness of county Extension agents in conducting the dairy educational program in selected Tennessee counties and their background and training, selected county situation factors, indicators of interest and attitude, certain work related factors and their knowledge in dairying and related subjects? (2) What association, if any, exist between the multiple-choice test scores of county Extension agents assigned the primary responsibility of conducting the dairy program in selected Tennessee counties and their background and training, selected county situation factors, indicators of interest and attitude, selected work related factors and their effectiveness rating?

Answers to these questions should have at least three important applications in Extension: (1) Should help those deciding on the

nature and content of training programs; (2) Should help supervisors make wiser decisions about selection placement, and motivation of personnel; and (3) Should give guidance to individual Extension workers as they strive to improve their teaching.

Hypotheses

The null hypothesis used in this study was that: (1) the effectiveness rating of the county Extension workers in conducting an Extension dairy educational program was not significantly related to the test scores made by these agents on a test on dairy and related subjects, and (2) each of the 24 independent variables (listed previously in the analysis of major factors) was not related significantly to the two foregoing dependent variables. The .05 level of significance was established as the required level for rejecting the null hypothesis in this study.

Organization of the Study

This study includes five chapters and the selected bibliography. Chapter I includes an introduction, statement of the problem, analysis of the problem, basic assumptions, scope and limitations, definition of the terms used, importance of the study, hypotheses tested, and organization of the study.

Chapter II contains a review of selected related literature.

Chapter III presents the methods and procedures used in conducting the study.

Chapter IV is an analysis of the data.

Chapter V is a summary of the findings, and conclusions drawn from the study and recommendations for further study and research.

The selected bibliography completes the study.

An appendix is attached including the test instruments, raw data tables, and correspondence.

CHAPTER II

REVIEW OF SELECTED RELATED LITERATURE

This chapter presents a review of related literature pertaining to the criterion of teaching effectiveness, Extension research studies on teaching effectiveness, interest and attitudes, and professional information and subject matter test.

A. CRITERION OF TEACHING EFFECTIVENESS

In order to test the hypotheses of this study, it was necessary to classify the agents on the basis of their teaching effectiveness. Teaching effectiveness being a major criterion variable the value of this study depended on the validity and the reliability of this classification. Therefore, it is very important that the best available method for making the classification be chosen.

In discussing the important attributes of criterion measures, Mitzel says,

. . . Teacher effectiveness as a concept has no meaning apart from the criterion measures or operational definitions of success as a teacher. These measure should possess four basic attributes: (a) relevance, (b) reliability, (c) freedom from bias, and (d) practicality.

Relevance as a criterion attribute is the product of a rational analysis of the job functions and the job objectives. In so far as a criterion measure reflects the behaviors required in the achievement of job objectives, it is relevant. For some types of production work, such as operating a punch press, the job objectives are fairly easy to specify and often self-defining. Indeed, a simple count of the number of units produced by an operator during a specified period will often suffice as the

directly relevant job criterion. On the other hand, analysis of tasks such as teaching does not readily yield criteria which are directly relevant to the job functions. As a consequence we have often had to depend upon indirect and fragmentary definitions of teaching success. The difficulty stems, in part, from lack of agreement among educators on a hierarchy of goals and objectives for teaching.

. . . Perhaps the most significant statement that can be made about any proposed criterion variable is that it is a partial criterion. Relevance for a particular criterion should be defended logically without undue apology for its lack of comprehensiveness, since it seems unlikely that we shall soon find a generally accepted formula for weighing school goals according to their importance for over-all effectiveness. Relevance, whether direct or indirect, is the paramount attribute of any criterion measure.

Reliability as an attribute of a criterion measure--like reliability as a characteristic of a test--is necessary, but not sufficient. An estimate of its reliability is essential, if any use is to be made of a criterion measure. Thorndike points out that it is more important that the reliability of a criterion variable be known than that it be very high.

. . . Freedom from bias in a criterion measure is always a desirable attribute, even though elimination of bias may lower reliability. Bias occurs when some systematic effect lowers or raises the criterion values for some category of subjects.

. . . Practicality is related to convenience and economy, but it is probably the least essential of the four criterion attributes.¹³

More than a half-century of research effort has not yielded meaningful, measurable criteria around which the majority of the nation's educators can rally. No standards exist which are commonly agreed upon as the criteria of teacher effectiveness.¹⁴

Barr, in discussing methods of evaluating teacher effectiveness, said,

There are different approaches to evaluation. Some would evaluate in terms of the basic prerequisites to teacher effectiveness:

¹³Harold E. Mitzel, "Teacher Effectiveness," Encyclopedia of Educational Research, 3rd ed. (New York: The Macmillan Co., 1960), p. 1482.

¹⁴Ibid., p. 1481.

knowledges, skills, and attitudes; some in terms of the teacher performance: behaviors and activities; some, in terms of the personal prerequisites to teacher effectiveness; and some in terms of pupil growth and achievement. Each approach has its advantages and disadvantages.¹⁵

A review of past research and related literature guided the researcher in selecting the rating system used in this study. This survey of past research reveals that four primary methods had been used for determining the success of teachers: (1) achievement of learners; (2) characteristics and traits of the teacher; (3) methods or procedures used by the teacher; (4) judgment of qualified people.

Learner Achievement as a Measure of Successful Teaching

Since the ultimate objective of teaching is to bring about changes in the knowledge, attitudes and skills of the learner, this appears in theory to be the best criterion of teacher effectiveness. However, in practice this method has its problems due to the difficulty in measuring these changes and the difficulty in controlling all of the outside influences.

Schick says that "while much has been achieved in this area it is still quite difficult to control the many factors aside from the teacher which influence the learning processes of pupils. No highly valid and reliable measures are yet available to measure pupil growth."¹⁶

¹⁵ A. S. Barr, Wisconsin Studies of the Measurement and Prediction of Teacher Effectiveness (Madison, Wisconsin: Dembar Publications, Inc., 1961), p. 151.

¹⁶ George Josef Schick, "The Predictive Value of a Teacher Judgment Test," Journal of Experimental Education, Vol. XXII (June, 1959), p. 325.

Because of the informal and complex nature of Extension teaching, controlling the outside influences and measuring results is even more difficult for an Extension worker than it is for the classroom teacher. The County Agent may be working at a dozen different jobs (that is, assisting in the development of farm and home plans, advising farmers on economic outlook, training youth through 4-H meetings, making soil test recommendations, and so forth) at about the same time. The same measure of effectiveness cannot be used on each and all of his different job responsibilities. Nor can an overall measure such as increase in farm income or even increase in milk production per cow be used because additional factors are involved besides the activities of the County Agent. Even though the actual product of the County Agent's effort is the perfect measure of his effectiveness, it is difficult to use directly.¹⁷

Characteristics and Traits as a Measure of Teaching Effectiveness

Characteristics and traits have probably been studied more than any of the others. Most of the identifiable human traits and characteristics have been studied. While a few of these have shown high positive correlation with teaching effectiveness, this technique in general has not been successful.

Hawsam and Fattu both reviewed the research on predictor criteria and teacher success and concluded that such research had

¹⁷ Ivan Nye, The Relationship of Certain Factors to County Agent Success, Research Bulletin 498, Agricultural Experiment Station, University of Missouri, Columbia, 1952, p. 6.

failed to substantiate links for most of the traits and characteristics (such as intelligence, age, experience, cultural background, socio-economic background, sex, marital status, scores on aptitude tests, job interest, voice quality, and special aptitudes) studied. There were slight positive correlations shown between scholarship and teaching effectiveness, although no particular course or group of courses has been shown to be a consistent predictor. Professional knowledge has proven to be a more successful predictor, particularly of teaching performance.¹⁸

Between 1912 and 1950 many tests of intelligence were given to teachers and related to one measure or another of teaching success. Morsh and Wilder reviewed 55 studies appearing between 1927 and 1952 in which intelligence test scores were related to effectiveness measures. In general, the results were disappointing. Relatively high correlations did appear part of the time (in 16 of the 55 studies reviewed by Morsh and Wilder, the correlation coefficient exceeded .30), but these are balanced by instances in which no positive relationship was found in at least 15 investigations.¹⁹

Despite its attractiveness as a hypothesis, the proposition that very high cognitive ability is a sine qua non of the good teacher has relatively little empirical support. The relevance of general intellectual ability to success in teaching (within

¹⁸Robert L. Ebel, "Teacher Effectiveness," Encyclopedia of Educational Research, 4th ed. (Toronto, Ontario: The Macmillan Co., 1969), p. 1424.

¹⁹N. L. Gage, ed. "The Teacher's Personality and Characteristics," Handbook of Research on Teaching (Chicago: Rand McNally and Co., 1963), p. 571.

the range set by those who enter the profession) is small at best and is certainly of little value for predictive purposes. The role played by different types of abilities (e.g., divergent thinking) and by attitudinal correlates of ability has yet to be fully explored. If linked to an adequate conceptualization of teaching, these two types of inquiry may lead us closer to an understanding of how intellectual power contributes to the teacher's behavior and effectiveness in the classroom.²⁰

Sanford and Trump reported that much of the research on teacher effectiveness indicated that the following four factors were of some importance in predicting teaching success: intelligence, scholarship, personality, and scores earned on professional information and subject-matter tests. The correlation between these factors and teaching effectiveness in most cases has been positive but low.²¹

As discussed previously in this report the first studies of successful Extension Agents by Director H. C. Ramsower of Ohio and others were on the personal characteristics of agents.

Characteristics and methods believed to be associated with effective county Extension work appear to be less defensible than the judgment of qualified people, because it requires three judgments. First it is necessary to classify agents on their effectiveness, second to determine what characteristics possessed were responsible for the high level of performance and third, to determine which agents possess such characteristics.²²

²⁰Ibid., p. 574.

²¹Charles W. Sanford and Lloyd J. Trump, "Teacher Education--IV Preservice Selection," Encyclopedia of Educational Research (rev. ed. Toronto, Ontario: The Macmillan Co., 1950), p. 1391.

²²Nye, op. cit., p. 6.

Seemingly, one of the short comings that tends to make this research invalid is that many times the same people are used to estimate both the characteristics and the teaching success.

Methods or Procedures Used by Teachers as a Measure of Teaching Success

According to John Schmid,

Teaching is a complex activity carried on in a complex environment--the school. It is directed by complex organisms--human beings. The recipients of the teaching activity are complex individuals, students, whose characteristics are undergoing continuous and complex change. If we consider teaching as a system of actions of an agent, the teacher, intended to bring about learning in the students, then teaching effectiveness is a generic term relating to the teaching role of the teaching-learning process. That some teachers are better than others is unquestioned; but the identification of those elements in the teacher or the teaching activity which either characterize or are determinants of this 'betterness' is obscured by the realities of the teaching situation and the semantic problems inherent in describing this situation.²³

Teaching method criteria consist of those aspects of teacher and students behavior which are believed to be worthwhile in their own right. They are not necessarily directly related to the primary objectives of education, though their presence or absence in the classroom is looked for because it is assumed that they will have an effect on pupil gains. Method criteria are most often described and measured in the classroom in terms of conditions, climates or typical situations involving social interactions of students and teacher. Method criteria may be obtained by observations of the teacher behavior or the students behavior.

²³ John Schmid, Jr., "Factor Analyses of the Teaching Complex," Wisconsin Studies of the Measurement and Prediction of Teacher Effectiveness (Madison, Wisconsin: Dembar Publications, Inc., 1961), p. 69.

In studying both teacher behavior and student behavior as a process, it has become clear that neither of them should be studied in isolation from the other. The interaction between them appears to be the main aspect of the whole process of learning. However, it is this complexity of the teaching-learning situation which highlights the basic difficulty in employing process criteria for the purpose of evaluating teacher competence. Although, it is also pointed out that if certain defensible and observable educational means are clearly better than others, then their effects should be discoverable in measured educational ends.²⁴

Flanders points out that,

Allen and others (1966) have developed a preservice training procedure called 'microteaching' which involves intensive feedback and have analyzed the effects of such a program on the subsequent teaching behavior of three or four generations of college students who have completed the Stanford Teacher Intern Program. The procedure involves a simulation of teaching in which an intern teaches three to five high school pupils for five minutes while a magnetic audio and video recording is made. This is followed by the analysis of the recording in order to set new goals for the next session; this leads to another five minutes of teaching with different pupils, followed by more analysis, and so on. The pupils in each session as well as the supervisor complete a questionnaire which provides an assessment of the intern's performance. Statistically significant relationships between training assessment measures and subsequent ratings of teaching performance during the first year indicate that the intense behavioral training involving frequent and immediate feedback, in combination with attention to instructional theory, does affect subsequent teaching performance constructively.

In a study in which 20 preservice teachers were taught the Flanders system of interaction analysis and a control group took a traditional student teaching seminar, Hough and Amidon (1964) found that student teachers in the experimental course were given significantly higher ratings by their supervisors, made significantly

²⁴Mitzel, op. cit., p. 483-4.

more positive response on a teaching-attitudes test, and found the course significantly more challenging, interesting, and professionally meaningful than did students in conventional sections.²⁵

Judgment of Qualified People as a Measure of Teaching Success

According to Anastasi, objective performance records alone do not always provide the necessary criterion measures. For many jobs, objective records are inadequate or nonexistent. Even when objective records are readily available, informed judgment is often needed to evaluate the effect of extraneous conditions on performance indices. Therefore, it is generally desirable to include ratings among the criterion measures employed in test validation.

Although personnel ratings are usually obtained from job supervisors, in certain job situations they may also be secured from coworkers, subordinates, instructors, or other personnel. Many companies have merit rating programs as part of their normal administrative procedures. In other companies, ratings may have to be obtained specially for criterion purposes.²⁶

Cronbach indicates that,

One can raise the reliability of ratings by combining impressions of several judges. If the reliability of a rating is about .45, the average of two independent judges is expected to have a reliability of .60 and the average of five judges a reliability of .80. In the average the bias of one judge tends to cancel the bias of another, and each adds information the other had

²⁵ Ned A. Flanders, "Teacher Effectiveness," Encyclopedia of Educational Research, (4th ed.; London: The Macmillan Co., 1969), p. 1430-1.

²⁶ Anne Anastai, Principles of Psychological Testing (3rd ed., New York: The Macmillan Co., 1970), p. 419.

no opportunity to observe. Reliability may be lowered rather than raised, however, when the additional judges are only remotely acquainted with the subject.²⁷

Good points out that the rating is a form of classification based on somewhat subjective values. If an instrument is used which makes the procedure relatively objective, the instrument must have been calibrated in terms of human judgment when it was constructed. He says that although rating is perhaps the least satisfactory of the data-gathering techniques from a scientific point of view, there are many practical problems for which it is the most important of all research techniques. The more nearly we get to the heart of the human problems, the less completely we can meet the demands of those who emphasize the formal characteristics of objective science. Under these circumstances one has to choose between loyalty to formalism and the desire to do something of practical worth, even though it is not entirely above criticism.²⁸

Howsan reviewed studies using various kinds of rating scales and discussed four kinds used most commonly in research: (1) self-ratings, which have proved of little use because there is a consistent bias toward overrating, (2) peer ratings by colleagues, which seem to be based on marginal evidence, (3) student ratings, which seem to be more consistently and favorably treated in the literature than other

²⁷ Lee J. Cronbach, Essentials of Psychological Testing (2nd ed.; New York: Harper and Row, 1960), p. 510-11.

²⁸ Carter V. Good, A. S. Barr and Douglas E. Scates, The Methodology of Educational Research (New York: Appleton-Century-Crofts, Inc., 1941), p. 410.

ratings, and (4) supervisor or administrator ratings. Supervisors' ratings seem to be highly biased and subjective.²⁹

Schick points out that teacher ratings by supervisors have always been under attack as far as their validity and reliability are concerned. It is clearly recognized that different supervisors have different criteria on what constitutes teaching efficiency in different situations. But as long as they are employed by their local board of education or County Agricultural Extension Committee, as long as they represent particular communities, and as long as they judge what is acceptable or not acceptable in teaching, their ratings should be given serious consideration.

If teachers are hired, promoted, evaluated and fired by supervisors who made judgments on their teaching efficiency, it is of little value to the teachers to know that there exists a more valid criterion that would reveal their superior ability in teaching.³⁰

Although ratings may be subject to many judgmental errors, when obtained under carefully controlled conditions they represent a valuable source of criterion data. In a survey of published validation data from industrial and governmental organizations, Lawshe and Blama found ratings to have been used as the criterion in 68 percent of all investigations.³¹

²⁹Ebel, op. cit., p. 1424.

³⁰Schick, op. cit., p. 325.

³¹Anastasi, op. cit., 3rd ed., p. 419.

Methods of Improving Ratings

Barr, in his observations on teacher evaluation programs, said,

Some would like to escape evaluation. This is not, however, very likely. It would seem that teachers have always been evaluated, they are now evaluated, and they will probably continue to be evaluated as long as there are teachers. The problem is how to bring these evaluations in the open and to improve their accuracy.³²

Selection of raters is the first way of improving ratings.

Raters cannot give valid information unless they know the subject being rated well. Other things being equal, those in immediate contact with the one being rated can give better information than those who rely on hearsay.³³

Increasing the number of raters can greatly increase the reliability of the rating. This is particularly true when all raters are well-acquainted with the subject. The reliability coefficients for judgment based on general acquaintance are frequently .40 or .50. Single ratings should never be depended upon. Ratings may be made more reliable by combining the opinions of several judges.³⁴

Rating scales are often used to reduce impressions to manageable form. Rating scale results consist of a list of traits or behaviors to be rated, the judge indicates the extent to which he feels each behavior is characteristic of the subject.³⁵

³²Barr, op. cit., 550-51.

³³Cronbach, op. cit., p. 510-11.

³⁴Lee J. Cronbach, Essentials of Psychological Testing (New York: Harper and Brothers, 1949), p. 402.

³⁵Ibid., p. 397.

The rating process can be improved by training the raters. Research in industrial and military settings have demonstrated the effectiveness of training in increasing the validity of ratings and in reducing such judgment errors as halo effect and leniency error. Even a relatively simple orientation session lasting only an hour or two will produce measurable results. A training program should (1) explain the aims and purposes of the ratings, (2) provide information on common judgment errors such as halo effect, (3) stress the importance of obtaining maximal differentiation by avoiding both leniency and central tendency errors, (4) clarify and illustrate the meaning of the traits to be rated, and (5) give supervised practice in assignment of ratings.³⁶

Cronbach says that the choice among rating schemes depends upon the purpose of the rating, the qualification of the raters, the information they have about the subjects and the likelihood of distortion--deliberate or unconscious. The short, carefully prepared descriptive graphic rating scale is probably best when each subject is rated by different individuals. Ranking is advantageous when a single judge gives ratings on the entire group or a representative sample of the group.³⁷

An analysis of 57 devices for rating teachers published in 1931 showed a total of 199 different items or traits. These traits had a range of frequency of appearance on the 57 scales from 1 to 43.

³⁶Anastasi, op. cit., p. 421.

³⁷Cronbach, op. cit., p. 587.

This is an indication of the disagreement that exists in regard to the traits that should be included on a rating scale for judging teacher effectiveness.³⁸

The above review of literature suggests that the two major difficulties in preparing a score card for judging teacher effectiveness are: (1) determining what traits to include on the scale and (2) deciding what weight to give each trait included on the scale. At the present time, it does not appear that sufficient research information is available to make decisions with complete confidence. An alternative approach would be to list the main tasks or responsibilities of the County Agent as a reminder to the raters, which they might otherwise fail to consider.

B. RESEARCH ON EXTENSION TEACHING EFFECTIVENESS

Most of the classification systems used for Extension research on agent effectiveness have been based on the judgments of others. These ratings have been based on direct observation of agents, past experience with agents, average salary increase or past performance reviews of agents.

These ratings are made by administrators, supervisors, subject matter specialists, co-workers and/or local people associated with the agent. Such judgments of agents' effectiveness have been made

³⁸C. W. Kundsén and Stella Stephens, "An Analysis of Fifty-seven Devices for Rating Teachers," Peabody Journal of Education, 9:15-24, 1931, cited by A. S. Barr, Encyclopedia of Education, 1950, p. 1446.

with and/or without the aid of some type of rating scale.

Nye's study of the relationship of five factors (personality characteristics, vocational interest, attitudes, teaching methods, and background training) to success of county Extension agents, in Missouri, used ten raters--three administrative, two colleagues, and five local persons. Two ratings were used. One using a rating blank composed of 27 detailed questions and the other an overall rating of the agent's effectiveness. In this he was asked to consider factors other than those on the blank.

The ratings resulted in two scores for each agent. One based on the 27 point scale and the other on the overall ratings. In each case the agent was given a score of one for a "poor", two for "fair", and three for "good", four for "superior", and five for "excellent". The scores given by the ten raters were averaged for each agent giving two numerical scores for each agent. One was based on the 27 point rating and the other on the overall rating. The overall rating gave a higher intercorrelation than the 27 point rating and therefore was adopted as the agents' effectiveness score.

Nye found that the factors of highest predictive value were combined in a single device, the Missouri County Agent Inventory. A multiple correlation of 0.80 was found between the inventory score and the ratings of supervisors and farmers.

Using the county agent inventory score alone, it was found that the agent could be correctly placed as most successful, intermediate, or least successful, in approximately three-fourths of the cases. It tells the administrator how much the candidate resembles the characteristics of the most successful one-third of the agents. Of the factors

studied, personality characteristics were found most important followed by background and training, vocational interest, and attitudes.³⁹

Sundaraj, in his study of the relationship between selected background factors and job performance ratings of Tennessee County Agricultural Extension Agent, used for his system of rating agents the total average two-year job performance ratings. Line graphs with scales of from 1 to 7 were used by Tennessee Extension District Supervisors in making these ratings. The line was also labeled beneath--below average, average, and outstanding. In this system the rating was based on 55 line items in seven different areas of responsibility as follows: (1) planning the county program, (2) carrying out the annual plan of work, (3) evidence of effective educational work, (4) working relationship, (5) public relations, (6) office management, and (7) professional improvement.

The five most significant and frequently occurring factors that were positively associated with the total average job performance ratings are listed below in descending order of their importance: (1) average undergraduate grade point earned, (2) credit hours of undergraduate educational course work completed, (3) years of Extension work served, (4) average graduate grade point earned, and (5) average graduate social study grade point earned.

Sundaraj concluded that these five factors out of 16 factors tested could be accepted as predictors of the total two-year average

³⁹Nye, op. cit., pp. 8-9.

performance ratings of county Extension staff members used in the study.⁴⁰

Aiken, study on identification of Procedures Associated with the Teaching Effectiveness of New York County Extension Agents, and Benn, study on Identification of Attitudes and Values Associated with the Teaching Effectiveness of New York County Extension Agents, in their doctoral research at Cornell (in 1952) used the State Supervisory staff and the subject matter specialists to rate the agents' effectiveness. This system placed approximately 25 percent of the agents into four groups. Group "1" was the most effective, group "2" was above average, group "3" was below average, and group "4" was the least effective group. No rating scale was used by the raters. The ratings were made on the overall teaching effectiveness of the agents.

Benn and Aiken found that the more effective agents were more likely to use recommended educational practices, believed in greater participation by farm families in planning and executing the county Extension program, favored more cooperation among Extension workers in a county and with other agencies, were more interested in knowing more about principles of program building, enjoyed better vocational adjustment, and had more advanced college training since graduation.⁴¹

⁴⁰Srinivasulu Madras Sundaraj, "A Study of Relationships Between Selected Factors and Job Performance Ratings of Tennessee County Agricultural Extension Agents" (unpublished Master's thesis, University of Tennessee, 1962).

⁴¹Aiken, op. cit.; Benn, op. cit.

Curry, in his study, compared five more effective agents with five less effective agents, using subject matter specialist ratings of agents for his research on the ways county Extension agents perform their role, at Michigan State in 1951. The Agents were placed in four groups as follows: "A" (Superior) unusual accomplishment, "B" (Good) satisfactory or somewhat better than average, "C" (Fair) program could definitely be improved, "D" (Poor) progress not at all satisfactory.

Among the characteristics found to differentiate the five more effective and the five less effective agents were, the former received more requests for information, made more attempts to reach rural families personally, paid much attention to developing participation in program planning, in local leadership and organization, had closer working relationship with their own staff members and with other agency representatives, had more confidence in their abilities, were better salesmen of information and ideas and followed up on their recommendations to rural families and thereby developed the families' confidence in the agent.⁴²

Mustafa, in his study of factors associated with effectiveness of county Extension agents at Kansas State, used a panel of Extension administrators and supervisors to group the agents into three more-or-less equal groups--top third, med-third, and bottom third. The criteria for rating job performance included: (1) understanding of

⁴²Donald Glenn Curry, "A Comparative Study of the Way in Which Selected County Agricultural Agents Perform Their Role" (unpublished Master's thesis, Michigan State College, 1951), pp. 24-9.

job-self-improvement; (2) developing, carrying out, and reporting county programs; (3) office management; (4) leadership development; (5) personal appearance; (6) professional competence; and (7) communications ability.

The coefficients of associations between the various background characteristics and effectiveness of agents in this study were:

1. There was a perfect positive association between the effectiveness of agents and:
 - (a) M.S. degree or agents desire toward an advanced degree.
 - (b) Thirteen hours or more Education courses.
2. There was a high positive association between the effectiveness of agents and:
 - (a) Previous job experience in teaching Vocational Agriculture, Extension Service and sales work.
 - (b) Agricultural Education, Vocational Education, and Extension Education majors.
 - (c) Previous job experience in the U.S. Army and National Guard.
 - (d) 4.1 hours or more (more than one) Sociology courses.
 - (e) Education courses (one and more).
 - (f) More than two (3-4) Speech and Journalism courses.
3. There was a very low negative association between the effectiveness of agents and tenure on the job.⁴³

Matthews in Texas compared the ratings of county extension agents which are regularly made in Texas by three or more persons, with information on file in the college office.

⁴³ Nejdet Mustafa, "An Analysis of Factors Associated With the Effectiveness of County Extension Agents in the State of Kansas" (unpublished Master's thesis, Kansas State University, 1965), pp. 7-8.

A low relationship was found between ratings and quality of college record, classroom teaching experiences, graduate courses completed, the method of induction into the Extension Service, and other agricultural experience.

A fairly high positive relationship was found between the ratings and tenure in Extension and general psychology courses taken.⁴⁴

In a study by Stone and others at Michigan State College,

. . . the county agricultural agents of Michigan were classified into two groups, by a panel of experienced extension administrators familiar with the work of all the agents. The panel was asked to select for Group 1 only those agents throughout the state who, in their opinion, were the most outstanding. Approximately one-quarter of the county agents were classified as 'Group 1 agents' as a result. For the purposes of this study, all others were then considered as 'Group 2 agents'.

. . . In comparing the work of Group 1 and Group 2 agents, the detailed statistical reports submitted monthly to the state extension office at Michigan State College were used as a primary source of data. Information for the years of 1950 and 1951 was compiled from that source.

. . . The following seem to be the most important facts brought out by the study: It is evident from the results that Group 1 agents contacted more people in an average month's time than Group 2 agents did.

Group 1 agents managed both their office time and time spent in the field in such a way that they could contact, individually, roughly two times as many people.

They wrote many more news stories and circular letters, and more radio broadcasts--thus contacting more people through these standard methods of communication than those in Group 2.

Group 1 agents held more method demonstrations, and contacted more people in that way. (But while they attended a few more meetings of other kinds, public attendance at meetings participated in by Group 2 agents was slightly greater.)

⁴⁴Lucinda Crile, "Findings From Studies Completed--Administrative Organization and Management," Review of Extension Research (January to December 1953), p. 4.

The most striking difference between the groups was the greater number of people who sought advice from the agents recognized as being outstandingly successful extension teachers. By their work, that group had created in people's minds a desire to seek the counsel and help of their county agricultural agent.⁴⁵

C. RESEARCH INVOLVING SUBJECT-MATTER TESTS

Anastasi states that,

Some occupational achievement tests are concerned, not with job skills, but with technical information. Written tests suitable for either group or individual administration have been developed for this purpose. The extensive testing program conducted by both federal and state civil service agencies rely heavily on this type of test. Examples of commercially available written trade tests are provided by the series of Purdue Personnel Tests. These tests include, among others, trade information tests for such occupations as carpentry, welding, sheet metal work, and engine lathe operation.

. . . The Purdue Trade Information Test in Engine Lathe Operation was administered to 60 men, including 30 journeymen machinists and 30 vocational high school graduates with at least one year of machine shop instruction. It is apparent that the test differentiated sharply between the two groups. All examinees scoring above 68 were journeymen, as were 93 percent of those scoring between 63 and 68. In contrast, only 50 percent of the scores between 53 and 62 and only 18 percent of the scores below 52 were obtained by journeymen.⁴⁶

In a study of the relationships of certain competencies to success in teaching vocational agriculture, teacher success was determined from ratings given to the vocational agriculture teachers by the state supervisors of vocational agriculture, principals, five pupils, and five farmers.

⁴⁵ J. T. Stone and others. Progress Report. Summary of the research study "The Differential Characteristics of More Successful Versus Less Successful Informal Extension Teachers" (East Lansing: Michigan State College, 1952), pp. 3, 4, 12, 13.

⁴⁶ Anastasi, op. cit., 3rd ed., 1970, pp. 426-7.

Torrence found no statistically significant correlation between teacher effectiveness as he measured it and the vocational agriculture teacher's knowledge of technical agriculture, agricultural manipulative skills, knowledge of professional education or a combination of these.⁴⁷

Anastasi suggests that,

Considerable research has been done on the use of tests in the selection of prospective teachers at the elementary and high school levels for the prediction of performance in teacher training courses, the most valuable indicators have proved to be previous academic grades, general intelligence tests, and academic achievement tests. . . . Examinations are available in many fields, including elementary school education, early childhood education, English language and literature, social education, industrial arts, physical education, business education, home economics and music education. All items in both common and optional examinations emphasize understanding of and application of knowledge rather than memory for factual details. . . .

When first introduced, the national teacher examinations aroused considerable controversy. With continued use, they have gained wide acceptance. It is recognized, of course, that the tests were designed to assess only knowledge. Teacher effectiveness depends also upon attitudes, motivation, emotional adjustment, specific experience in teaching, and other factors that the test does not attempt to measure.⁴⁸

Hampton found that teachers were generally rated highest in cooperation and loyalty, courtesy and friendliness, and lowest in knowledge of subject matter, general culture, resourcefulness, and speech. Resourcefulness and knowledge of subject matter seem to be the qualities most frequently sought by lower superintendents.⁴⁹

⁴⁷A. P. Torrence, "A Study of the Relationships of Certain Competencies to Success in Teaching Vocational Agriculture," Journal of Experimental Education, XXV, September, 1956, p. 31.

⁴⁸Anastasi, op. cit., 2nd ed., pp. 480-2.

⁴⁹Nellie D. Hampton, "An Analysis of Supervisory Ratings of

Peronto in discussing his finding from the Wisconsin studies concerning the abilities and patterns of behavior of good and poor teachers says:

The good teacher is defined here as the teacher who is rated as good by supervisors, administrators, or teacher educators, or whose students appear to show substantial gains in the measured products of education as measured by the paper and pencil tests employed. The poor teacher is one who on the basis of either of these criteria is ranked in some bottom fraction of the group studied.

. . . Of the characteristics believed to differentiate good and poor teachers, only knowledge of subject matter and pupils and professional knowledge appear to be definitely established as discriminating between good and poor teachers. Interest and proficiency in teacher-pupil relationships appears to be related to the personal growth of pupils but unrelated to academic achievement. Good teachers seem to possess some minimal degree of physical and emotional energy, emotional stability, dominance, and flexibility. . . . The evidence in these studies of good and poor teachers on professional motivation is too limited to warrant drawing conclusions.⁵⁰

D. STUDIES ON INTERESTS AND ATTITUDES

Cronbach suggests that,

Only a few studies have examined whether the usual interest scores predict job performance. The most adequate studies are Strong's investigation of insurance agents. The Strong scores predict either ratings or records of business produced, with correlations of about .40. Men with A scores in sales interest wrote, on the average, \$169,000 per year of new policies, whereas C men averaged only \$62,000. A few C men, however, were unmistakably successful.

Elementary Teachers Graduate From Iowa State Teachers College," Journal of Experimental Education, XX, December, 1951, pp. 179-216.

⁵⁰ Archie L. Peronto, "The Abilities and Patterns of Behaviors of Good and Poor Teachers," Wisconsin Studies of the Measurement and Prediction of Teacher Effectiveness (Madison, Wisconsin: Demar Publications, Inc., 1961), pp. 97-8.

. . . A high interest score should be interpreted as indicating that if a person survives training and enters the occupation, he is likely to enjoy his work. Though interests imply motivation, their influence on success is rather small. The Frederiksen-Melville study explains this in part. They found that grades of 'compulsive' students depend only on abilities, such students make an effort whether interested or not, and their interests have no predictive value. Among noncompulsive students, however interests predict achievement with validity .36-.55. While it is dangerous to generalize from this one study, it seems reasonable to conclude that a person with interest and abilities suitable for an occupation can and will do well in it, a person with suitable abilities but unsuitable interest can do well but may not, and a person with suitable interest and low aptitude will do badly.⁵¹

Attitudes as major personality factors guide and channel perception and learning.

Experimental results demonstrate the principle clearly. In an interesting experiment, Levine and Murphy found that of two groups equal in learning ability as tested on neutral material, the group with strongly anti-Soviet attitudes learned more rapidly and remembered better a passage 'excitedly anti-Communist' than one more 'moderately pro-Communist.' The other, pro-Communist, group learned more rapidly and remembered better the pro-Communist selection. Not a few experiments are reported in the psychological journals showing similar selective perception and learning related to attitudes, needs, and frames of reference.⁵²

Cronbach states that,

Much attention has been given to determining how attitudes can be changed. One series of studies investigated the influence of motion pictures upon attitudes of youth. A typical finding was that after seeing a motion picture 'Street of Chance' students ranked gambling a more serious crime. The effect of seeing 'Birth of a Nation' on attitudes toward the negro was also marked. Other studies of attitudes have proved definitely that appropriate educational procedures produce marked shifts.⁵³

⁵¹Cronbach, op. cit., 2nd ed., pp. 425, 427.

⁵²H. H. Remmers and N. L. Gage, Educational Measurement and Evaluation (Rev. ed.; New York: Harper and Brothers, 1955), p. 377.

Clegg suggested that there is a definite relationship between opportunity for well planned subject matter training and changes in behavior and attitudes.

An Extension worker has to know something. Knowledge does not relate just to techniques and methods, suggests that agents, specialist, supervisors, and administrators need to provide opportunities for the intellectual growth of the people for whom they are responsible. Findings from the study of county Extension administrators suggest that learning opportunities need to be long range and well planned. Apparently, 'fire call' problem solving and 'shot gun' training do not provide the best bases for stimulating changes in behavior and attitudes.⁵⁴

Determining Attitudes and Interests

Remmers and Gage suggest that,

Attitudes can be evaluated as educational outcomes or, when considered as interests, as related to vocational and educational choices. For the former purpose, the two main approaches are (1) single questions and (2) scales and questionnaires. Single questions need to be carefully worded; their validity can take a variety of forms. Scales can be made by Thurstone's equal-appearing intervals method or in the form of straightforward summated questionnaires. Guttman's scale analysis provides a way of estimating the degree to which adding weighted responses to a series of questions is justified by the uni-dimensionality, or homogeneity, of the attitudes measured. Although much disputed, the results of attitude measurement techniques can have significant meaning when properly interpreted. Disguised techniques furnish data that are free of some of the limitations of the older approaches. Published attitude scales have been less used than those designed for special situations and purposes.

As educational-vocational interests, attitudes are most often appraised by means of interest inventories, although observational procedures and information tests have also been used. The Study of Values, the Kuder Preference Record, and Strong's Vocational Interest Blanks have used different approaches and formats. These devices, and many not so well understood, have in one

⁵⁴Denzil O. Clegg, "Work as a Motivator," Journal of Cooperative Extension, Vol. I, No. 3 (Madison, Wisconsin: Extension Journal, Inc., Fall 1963), p. 146.

sense the same meaning: the systematic, quantitative recording of one's values, or likes and dislikes, for various goals and activities. Like most such inventories, these can be 'faked'; accordingly, scores on them have straightforward significance only when individuals respond frankly.⁵⁵

Rank Order and Paired Comparison Methods

Benn says that,

The rank order and paired comparison methods are similar in that statements, persons, or objects are compared on the basis of relative favor or approval. In the first case the items are ranked from the most approved to the least approved; in the second a series of judgments is made as to the relative approval on the basis of a comparison of items two at a time. Either results in a measure of the relative importance of the items being considered.⁵⁶

⁵⁵H. H. Remmers and N. L. Gage, op. cit., p. 381.

⁵⁶Harold William Benn, "Identification of Attitudes and Values Associated with the Teaching Effectiveness of New York County Extension Agents" (unpublished Doctoral dissertation, Cornell University, Ithaca, New York, 1952), p. 62.

CHAPTER III

METHODS AND PROCEDURES

The purpose of this chapter is to set forth the design of the study and methods used in conducting the study. A description is given of the kinds of data, methods of collecting data, effectiveness rating system used, construction of subject-matter test, measuring of interest and attitudes and treatment of the data.

Kinds and Sources of Data

The data needed for this study included those related to the dependent variable (teaching effectiveness and dairy subject matter knowledge of agents) and the independent variables (undergraduate grade point average, hours of undergraduate credits in dairying, number of hours of graduate credit in dairying, man-days dairy specialist spent in the county, number of men Extension agents assigned to the county, number of years of experience in Extension, number of years of experience in present position, percent of farm income received from dairying in county where assigned, number of dairy farmers in the county, number of Grade A dairies in county, total dollar income from dairying in county, number of man-days devoted by the agent to the dairy educational program, number of contacts made by the agent with dairy clientele, number of contacts per man-day expended in the dairy program, amount of time agent spent in office and out-of-office, and interests and attitudes of agents toward dairying).

Data were obtained from (1) Tennessee Extension Management Information System (TEMIS), (2) Extension education files, (3) Extension personnel files, (4) Dairy Extension records, (5) supervisors, administrators, and dairy subject matter specialists, (6) college transcripts, and (7) county Extension workers. Most of the data used in this study were in numerical form.

Collection of Data

The time (man-days) expended on the dairy educational program by the county agent, the number of contacts made by the county agent with dairy clientele and the number of man-days dairy specialists spent in the county were taken from the Tennessee Extension Management Information System (TEMIS) by selection of the appropriate county task, state subjects, and state purpose codes.

Data on the percent of farm income in the county received from dairying and the number of dairy farmers were taken from the Tennessee Extension dairy specialist records. The number of years of experience was obtained from the personnel file. The number of hours of undergraduate and graduate credit completed in dairying and undergraduate grade point average were taken from college transcripts.

Choosing a Classification System

In theory, learner achievement seems to be the perfect measure of teaching effectiveness. This appears to be true because one of the primary objectives of teaching is to effect a change in the attitudes, knowledge, and skills of the learner. This criterion is criticized because it is difficult to measure change in the various

aspects of the learner's achievement. Measurement is frequently confined to gains in knowledge. Another criticism of learner achievement is that it is extremely hard to control all other influences and measure only those influenced by the teacher.

The informal, complex, and voluntary nature of Extension teaching makes the use of learner achievement as a criterion measure even less practical than for a classroom situation. Therefore, this method of measuring teacher success was rejected for this study.

Next, consideration was given to methods and procedures used by the teacher. This method has gained some support in recent years for classroom teachers. The development of micro-teaching, interaction analysis and other techniques has made this a distinct possibility for the classroom teaching situation. Again the nature of Extension teaching (that is, wide variations in age, different frequencies of attending group meetings, different teaching methods, variations in the interest of pupils, and so forth) make this method invalid as a criterion measure. However, the newer techniques (that is, micro-teaching, interaction analysis, and so forth) may have definite utility for future in-service training of Extension personnel.

A third possibility considered was characteristics and/or traits of the teacher. In this study, the section or review of selected related literature has shown that much research has been done in an attempt to apply these criteria to teaching effectiveness. In general, this technique has not been successful, even though, some high correlations with certain characteristics have been reported.

The characteristics and/or traits technique requires three judgments as follows: (1) classification of agents based on their relative effectiveness, (2) determination of agent characteristics deemed responsible for high performance, and (3) identification of agents possessing the desirable characteristics.

Finally, another technique, judgment of qualified people, was considered and selected as the best method to use for classifying Extension agents on their teaching effectiveness in the present study. This technique had a number of weaknesses as pointed out in the literature review. However, it appears, based on the review of literature, to be the most defensible of the methods presently available for measuring Extension agent teaching effectiveness.

As pointed out in the literature review, the more nearly we get to the heart of the human problems, the less completely we can meet the demands of those who emphasize the formal characteristics of objective science. Under these circumstances one has to choose between loyalty to formalism and the desire to do something of practical worth even though it is not entirely above criticism.

After selecting the basic technique to use in measuring the teaching success of agents, the next consideration was how to make it as valid and reliable as possible. As stated in the review of literature, there are some very definite steps that can be taken which will greatly improve ratings of teaching effectiveness.

The first decision was the selection of qualified judges to rate the agents on the effectiveness of their teaching. The district and associate supervisors and the dairy subject matter specialists

were selected, because it was felt that they most nearly met the necessary requirements. The requirements were: (1) to be qualified to judge an effective dairy program, (2) to have had an opportunity to observe the agents judged in a variety of teaching situations, and (3) to be familiar with as large a number as possible of the agents to be judged.

The district and associate supervisors visit the counties often and evaluate the agents' programs at regular intervals. The dairy specialists assist agents with the planning and implementation of their dairy program, often appearing on programs with the agents.

Research has shown that several independent ratings by people who are familiar with the agent program makes a more valid and reliable rating. Each agent in this study was rated by at least five different raters.

The second decision was to determine what procedure the raters should follow in making the ratings. The important question in this was whether to use a score card (composed of specific items to be rated) which many researchers prefer or to use an over-all rating (with only a list of the main responsibilities of agents in conducting an effective dairy program and personality traits thought to be important to be used as a general reminder or guide). The over-all method was considered appropriate for the following reasons: (1) the score card is no guarantee of an objective rating because the judgment on the individual items may still be relatively subjective, (2) the over-all rating of effectiveness is usually used as a basis for promotion, transfers, and salary adjustments, even though an annual

performance review is usually conducted with each agent, (3) sufficient research information is not available at the present time to select and assign weights to each of the important factors in Extension teaching effectiveness, and (4) the score card might have taken more time, for the raters who had to judge a fairly large number of agents, than was available for this purpose.

The writer felt that a list of major responsibilities would give some guidance to the raters, yet give the necessary flexibility the qualified judges needed to make a valid and reliable rating of agent effectiveness in their conduct of county Extension dairy programs.

The score card method was considered appropriate because it seems to be favored by most writers on this subject. Especially, where more than one rater was used and where not all subjects were rated by each rater as was the case in this study. It was felt that it would probably give a higher correlation between raters, because it would require the raters to consider the same responsibilities and personality traits in judging the effectiveness of each agent.

Because a valid and reliable rating of agent effectiveness was so important to this study, it was decided to have the judges rate each agent's effectiveness by two methods. Agents were rated on their effectiveness in conducting the county Extension dairy program by the score card rating method and the overall rating method.

Rating Procedures

All raters were brought together for instructions on rating

procedures. This was done to insure an adequate understanding of the rating procedure and more uniformity of procedure. An explanation was given of the nature and purpose of the study. Assurance was given the raters that their ratings would be kept confidential and would in no way help or hinder the individual agent. The raters were asked not to rate an agent unless they had sufficient contact with him to make a comparison with other agents. Brief instructions were given on rating procedures, pitfalls to watch for in making ratings, and explanation of the rating scale.

Score card rating method. In an attempt to secure the maximum uniformity in rating, all raters used the same rating scale. The score card was composed of 40 detailed questions under eight broad areas of agent responsibilities and personality traits--seven areas (composed of 31 questions) dealing with agents' responsibilities as follows: (1) planning the county dairy program, (2) carrying out the annual plan of work, (3) evidence of effective educational work in dairying, (4) working relationships, (5) public relations, (6) office management, and (7) professional improvement. And one area (composed of nine questions) dealing with the personal characteristics of the agent. A four point scale was used to score each of the fairly detailed questions. A copy of the rating scale is included in Appendix B.

Over-all rating method. The over-all rating procedures used in this study were similar to the one used by Benn⁵⁷ and Aiken.⁵⁸

⁵⁷Benn, op. cit., p. 99-101.

⁵⁸Charles Roy Aiken, "Identification of Procedures Associated

The first step in the rating procedure was the preparation of a list of the agents to be rated. The names were listed in alphabetical order by districts. Included on the list was a rater's identification number at the top center of the page. Following this was the list of agents including an agent identification number (at the left of the page), the agent's name (last name first), and the name of the county or counties to which he was assigned.

Five sheets of paper with blanks for inserting the agents' names were prepared and numbered 1, 2, 3, 4, and 5 (for the names of agents not rated) at the top left hand corner. These were placed in large envelopes with a copy of the above list of agents. Enough kits of these were prepared to provide one for each rater.

The raters were then instructed to write the names of approximately 25 percent of the names of agents rated on each of the sheets numbered 1, 2, 3, and 4.

Sheet "1" was for the most effective agents, sheet "2" for those above average, sheet "3" for those somewhat below average, and sheet "4" for the least effective agents. The names of agents they did not feel confident in rating were placed on the fifth sheet. It was explained that the agents rated at the top or bottom did not mean good or poor agents, but that those were only relative measures of agent effectiveness in the dairy area. The raters were then asked to rank the agents within each of the four groups.

with the Teaching Effectiveness of N.Y." (unpublished Doctoral dissertation, Cornell University, Ithaca, New York, 1952), pp. 84-5.

The final effectiveness score for each Extension agent was an average of all the ratings he received from all judges on the score card rating method. Using the composite rating (an average of all judges effectiveness rating for each agent) the 42 agents participating in this study were ranked in order of effectiveness from 1 to 42 on each of the two rating methods. The correlation coefficient between the ranking of agents on the two rating methods was then computed using the Kendall Rank Order Correlating Coefficient technique.⁵⁹ The following formula was used in computing the correlation coefficient.

$$r = \frac{S}{1/2 N (N-1)} = \frac{711}{1/2 \times 42 \times 41} = \frac{711}{861}$$

$$r = .83$$

S = The value of S is determined by starting with the first number on the left and counting the number of ranks to its right which are larger. Then subtract from this the number of ranks to its right which are larger.

N = The number of respondents or subjects.

The relatively high correlation ($r = .83$) between the two rating methods indicates that there was a high degree of agreement between the judges on the two effectiveness rating methods. Which means that one method of rating agents' effectiveness in this particular case was probably about as good as the other method.

⁵⁹Sidney Siegel, Non Parametric Statistics for the Behavioral Sciences (New York: McGraw-Hill Book Co., Inc., 1956), pp. 213-17.

The score card method of rating agent's effectiveness in conducting a county Extension dairy program was chosen as the official performance rating for this study for the following reasons: (1) This method was favored by most writers surveyed on this subject. Especially, where more than one rater was used and where not all subjects were rated by each rater as was the case in this study. The score card is probably a more objective rating method than the over-all rating method because it required each rater to consider the same responsibilities and personality traits in judging the effectiveness of each agent, (3) the nature of scores obtained from the score card rating method may provide more flexibility in their use than the rankings obtained from the over-all rating method, and (4) more nearly quantitative.

The correlation of each judge's score with the average of all other judges' scores was computed as a further check on the validity of the effectiveness rating method used in this study. But before the comparisons were made among judges, standard scores were computed from the raw scores assigned each respondent by the supervisors, associate supervisors and each dairy specialist involved in the ratings. This was done to make the comparisons among judges' scores more meaningful.⁶⁰

$$\text{Standard Score} = \frac{(X - \bar{X})}{s} \quad (10) + 50$$

⁶⁰N. W. Downie and R. W. Heath, Basic Statistical Methods (2nd ed.; New York: Harper and Row, 1965), p. 64.

Using the standard scores, a correlation was computed between each judge's scores and the average scores for all other judges using the Pearson Product - Moment Correlation.⁶¹

$$r = \frac{N\sum XY - (\sum X)(\sum Y)}{7[N\sum X^2 - (\sum X)^2][N\sum Y^2 - (\sum Y)^2]}$$

Following are the correlations of each judge's scores with an average of all other judges' scores.

Judge Number 1 (Supervisors) (N = 42)	r = .77
Judge Number 2 (Associate Supervisors) (N = 42)	r = .74
Judge Number 3 (Dairy Specialist) (N = 42)	r = .80
Judge Number 4 (Dairy Specialist) (N = 36)	r = .66
Judge Number 5 (Dairy Specialist) (N = 42)	r = .71
Judge Number 6 (Dairy Specialist) (N = 22)	r = .71
Judge Number 7 (Dairy Specialist) (N = 19)	r = .61

The scores of each of the seven judges had a positive correlation (ranging from .61 to .80) with the average of the scores of all other raters. This is an indication that there was a high degree of agreement among the different judges. It provides further evidence of the validity of the rating procedure used in this study.

Construction of Dairy Subject Matter Test

A multiple-choice test containing 145 questions covering what the committee (a reading committee was formed to assist in making decisions on test items. In addition to this researcher, the committee

⁶¹Ibid., p. 85.

was composed of: Dr. Tom Miles, Professor and Head of Dairying, College of Agriculture; Dr. William M. Miller, Associate Professor of Dairying, Agricultural Extension Service; Dr. Cecil E. Carter, Jr., Associate Professor of Extension Education; Mr. John B. Brower Associate District Supervisor and former Dairy Specialist, Agricultural Extension Service; Dr. Dave Craig, Assistant Professor of Agriculture Education, College of Agriculture; and Dr. Ralph Hamilton, Professor and Head of Agricultural Communications) felt to be an adequate sample of the important phases of dairying and related subjects necessary to cover the content and assess the objectives of the test was constructed. A copy of the test instrument is included in Appendix B. This test was constructed in close cooperation with Extension Dairy Subject Matter Specialists, other subject matter specialists closely associated with dairying, and the dairy teaching staff in the College of Agriculture. Approximately 20 percent more questions than planned for the final instrument were constructed.

One basis upon which the adequacy of the test (from the standpoint of subject matter coverage) was judged was the subject matter presented at one week of intensified (included night sessions and assignments) dairy in-service training in the spring of 1970. This in-service training was planned and the content covered was selected by a committee including members of the Extension dairy department, Extension education department, Extension communications department, and members of agricultural economics, and agricultural engineering departments. Also, it was based partly on the results of a practice check-list survey completed by the county Extension workers with ten

dairy farmers in each of the 42 counties (see Griffin study). It was the feeling of this group at the time that they were providing an adequate coverage of the agents' dairy subject matter needs for conducting an effective county dairy program. Each agent completed a plan of work for a dairy program in his county as a part of the training.

Each specialist involved in the intensified dairy in-service training program with the agents was asked to prepare sufficient multiple-choice test questions to adequately assess the agents' competency in the area they presented at the dairy in-service training in the spring of 1970. A copy of the letters of request and instructions to the specialists are in Appendix A. Other questions were prepared by the overall reading committee and others.

The primary objective of the test was to measure the subject matter competency (factual knowledge, understanding of dairy information, application of principles, and interpretation of data) of county Extension agents needed to collect, analyze, and interpret the dairy situation in the county and based on this, to develop and implement an effective Extension dairy educational program with the dairy clientele in the county.

The test developing committee, test reading committee, and others were asked to evaluate the following:

1. Quality of individual test items (determine if items were well constructed).
2. Complete coverage and balance coverage of subject matter areas.

3. Determine if test items were necessary and sufficient to assess the objective.

After the initial test items were completed, they were reviewed by the test developing committee, test reading committee, and other competent critics such as teaching staff of The University of Tennessee College of Agriculture. These reviews led to elimination, revision, and additions to the questions.

This test was then reprinted and given to 26 Tennessee County Agricultural Extension Agents (representing all five Extension districts), not included in the study. Each was asked, after he completed the test, for suggestions which might aid in improving the test items. A record was kept on the time taken by agents to complete the test. This information provided a guide to setting time limits on the official test group.

The basic item analysis was made by tabulation of the responses that were made to each item on the test. Tabulation was made as follows:

1. Number getting each item right
2. Number choosing each of the wrong options
3. Number omitting the item.

This tabulation provided information on the difficulty of each item, the discrimination of each item and on the usefulness of each option (the extent to which the wrong answers were fairly equally distributed among the wrong options). The information gained from the tryout led to further improvement in the test.

After a final review of the test by the reading committee, and members of the development committee, it was reprinted in mimeograph form in sufficient numbers to use with each respondent in this study. Also an appropriate answer sheet was prepared. A copy of the answer sheet is included in Appendix B. A correction was made for guessing. The common correction formula ($\text{score} = \text{right} - \text{wrong}/N-1$) was used.

Validity

The validity of a test depends upon the efficiency with which it measures what it attempts to measure. In order to be valid a test must, therefore, accomplish the purpose the user had in mind for it. The three basic types of validity are: curricular validity (content and construct), statistical validity (substitutive and predictive), and logical or face validity (by assumption or by definition).

As pointed out in the review of literature, curricular validity is recognized as being the most important of the three since, in the final analysis, any method of test validation must be based on relatively subjective judgment concerning the degree to which the test accomplishes the objectives.

As stated in the previous section of this report on construction of the test, the materials presented to the agents served as a basis for this test. An analysis of the materials covered in this session provided evidence of the thinking of qualified Extension educators on questions dealing with content, emphasis, and methods, and they provide an objective basis for building the test.

Another method frequently used in validating tests involves a statistical technique to determine the correlation between test scores and some other criteria such as ranking by expert judges, scores on other type tests designed for the same use and measures of success on certain types of future outcomes. Since no outside criterion was available, it was necessary to rely on the other two methods of validating the test.

Face validity is based on an introspective analysis of the content by experts in the field. This was done by the committee in selecting content for the dairy in-service training session, and also by the test reading committee in judging each item as well as the adequacy of the total test.

Reliability

A test is said to be reliable when it consistently measures what it does measure. Reliability is usually expressed by the use of the coefficient of correlation. Of the four methods of estimating the reliability coefficient, presented in the literature review, the "split-half" or "chance-half" procedure was chosen as the method used in this study. The test was given to a group of agents and their scores were then obtained for two arbitrarily determined halves of the test. The method used for dividing the test into "chance-halves" was by obtaining separate scores on the odd-numbered and even-numbered items. The correlation coefficient ($r = .722$) obtained between the two sets of scores indicates the degree of conformance between the chance-halves of the test. The reliability coefficient which would be

expected for a test as long as the two halves combined was then found by "stepping up" the correlation by means of the Spearman-Brown Prophecy Formula, an arbitrary formula devised for that purpose.

The following Formula⁶² was used in computing the reliability of the whole test:

$$\text{Reliability of lengthened test} = \frac{nr}{1 + (n-1) r}$$

where n = number of times test is lengthened

r = original reliability coefficient

Where the r is between scores on two half tests, this formula becomes:

$$\text{Reliability of whole test} = \frac{2 (\text{reliability of half test})}{1 + (\text{reliability of half test})}$$

$$\text{Reliability of whole test} = \frac{2 \times 72.2}{1 + 72.2} = \frac{144.4}{172.2} = .84$$

Administering of the Questionnaires

Respondents were brought together in two separate groups on consecutive days in Knoxville and Nashville for orientation regarding the nature and purpose of the study and to administer the questionnaires (the multiple-choice test and interest and attitude scale). A copy of the letter from the Associate Dean of Extension and an example of the follow-up letter to the agent from an associate supervisor announcing these meetings are in Appendix B. The agents were brought together in groups to add as much uniformity as possible to the procedure. Emphasis was placed on the anonymous nature of the individual test score and the individual agent's rating.

⁶²Remmers and Gage, op. cit., p. 134.

All agents except four were available on the days selected. The Associate District Supervisors collected the data from the four absentees. They followed a similar procedure with the individuals as that used with the two groups.

A scoring key was used to score the multiple-choice test. One point was given for each correct answer. The score was then corrected for guessing as discussed earlier in this report.

Measuring the Interest and Attitudinal Factors

Selected interest and attitudinal factors (personal interest, self-confidence, perception of ease of working with clientele groups or desire of clientele group for agents' assistance, personal satisfaction from job accomplishments, and agent perception of the importance of work areas in county) were measured using the rank order comparison technique. This gave a measure of the relative importance of dairying compared with the other work areas on each factor. A copy of the interest and attitude scale is included in Appendix B.

In scoring the interest and attitudinal factors, numbers were assigned by the reverse of the ranking. For example, a rank of 1 would be given a score of 8 (there were 8 work areas to be ranked), a rank of 2 a score of 7, and so forth, until 8 is reached which would have a score of 1.

Treatment of the Data

This study was concerned with determining the association between 24 independent variables (composed of factors relating to background and training, interest and attitudes, expenditure of

agents' time and knowledge of dairy and related subject matter) and two dependent variables (teaching effectiveness and subject matter competency), using county workers' Extension dairy program in certain Tennessee counties. Therefore, it was necessary to determine the correlations and multiple correlations between variables. The stepwise regression analysis program called STRAP developed by A. R. Colville and L. S. Holmes at the University of California at Los Angeles was used.⁶³

In the STRAP program, each independent variable is entered in order of its effect on the variability of the dependent variable. A sequence of multiple linear regression equations is computed in a stepwise manner. One variable is added at each step to the regression equation. The variable added is the one that accounts for the greatest amount of variation in the independent variable.⁶⁴

All data was punched on IBM cards. Computations were made in The University of Tennessee Computing Center using the 7040 digital computer.

⁶³Stepwise Regression Analysis, BMD02R (Los Angeles: The University of California, November, 1964), p. 206-13.

⁶⁴W. J. Dixon (ed.), BMD Biomedical Computer Programs (2nd edition; Berkeley and Los Angeles: The University of California Press, 1970), p. 233.

CHAPTER IV

ANALYSIS AND DISCUSSION OF DATA

A. INTRODUCTION

The purpose of this chapter is to present, analyze, and discuss the data of the study. The results are discussed under two main headings which correspond to the two dependent variables of the study. The first section will consider the relationship of selected factors with the effectiveness of county Extension workers in conducting an Extension dairy program in selected Tennessee counties and the second section will consider the relationship of selected factors of knowledge in dairy and related subjects of the 41 county Extension workers involved in the study.

This study was primarily concerned with Extension dairy work. All 41 of the county Extension workers studied were assigned primary responsibility for the county Extension dairy program in selected Tennessee counties where dairying was considered to be of major importance. The criteria used for selecting these counties were \$750,000 or more income from dairying in 1969 and/or dairying accounting for 20 percent or more of the county farm income. It should be pointed out that dairying was still only one of the important phases of these county Extension workers total job. The reasons for selecting this specific population for study was discussed in Chapter I.

Data in this study was summarized and analyzed with the use

of observations, coefficient of correlation,⁶⁵ multiple correlation,⁶⁶ and crosstabulation⁶⁷ techniques. Relationships must have achieved at least at the .05 level in order to be considered statistically significant in this study.

Stepwise Regression Program

The Stepwise Multiple Regression Analysis used in this study is a variation of multiple regression which provides a means of choosing independent variables which will provide the best prediction of the dependent variable possible with the fewest independent variables. The Stepwise Regression Method constructs a prediction equation adding one independent variable at each step. The first step is to choose a single independent variable which is the best predictor of the dependent variable. The second independent variable to be added to the regression equation is the one which provides the best prediction in conjunction with the first variable. The same process is followed step-by-step until all variables are added or until no other variable makes a significant contribution to the equation.⁶⁸ In addition to the multiple regression the Stepwise Regression Program also provides a coefficient of correlation for each variable with every other variable.

⁶⁵Downie and Heath, op. cit., pp. 78-91.

⁶⁶J. P. Guilford, Fundamental Statistics in Psychology and Education (4th ed.; New York: McGraw-Hill Co., 1965), pp. 392-416.

⁶⁷Norman Nie, Dale H. Bent, and C. Hadlai Hull, Statistical Package for the Social Sciences (St. Louis: McGraw-Hill Book Co., 1970), pp. 116-18.

⁶⁸Ibid., pp. 180-81.

Testing the null hypothesis. The hypothesis used in this study was that each independent variable was not significantly related to the effectiveness rating of Extension agents in conducting the Extension Dairy educational program in selected Tennessee counties and to the multiple-choice test scores made by county Extension agents on dairy and related subjects. The zero order coefficient of correlation was used to test each null hypotheses. The .05 level of significance was established as the required level for rejecting a null hypothesis.

Null hypotheses were not tested concerning the multiple relations between the two dependent variables and specific independent variables in this study.

Coefficient of Correlation. The Coefficient of Correlation (r) is a summarizing statistic, which tells a story though it is only a single number. Correlation is basically a measure of relationship between two variables. It can vary from a value of +1.00, which means perfect positive correlation, through 0.00, which means complete independence or no correlation, through -1.00, which means perfect negative correlation. Coefficient of Correlation then gives an indication of two things: (1) the size of the relationship and (2) the direction of the relationship. The direction of the relationship is either positive or negative. When two variables are positively correlated, as one increases the other also increases. When variables are inversely related, one increases as the other decreases. This type of relationship is indicated by a negative correlation coefficient.

A Matrix of correlation showing the Coefficient of Correlation (r) for each of the selected variables with every other variable was

included in Appendix C, Table XXVII. The test of significance for the Coefficient of Correlation ($N = 41$, $df\ 39$) was ascertained from a correlation table.⁶⁹ Similar tables are available in most elementary statistics text books.

Multiple correlation of coefficient. An important part of this study was to determine the combined importance of several independent variables to the effectiveness rating of Extension agents and to their knowledge about dairy and related subjects. It was believed that effective performance of agents and their knowledge about dairying were associated with or depended upon more than one variable at a time. Just as the coefficient of correlation allows the researcher to measure the linear relationship between one independent variable and a dependent variable, multiple regression allows one to study the linear relationship between a set of independent variables and a number of dependent variables while taking into account the interrelations among the independent variables.

Multiple correlation was used in this study because the researcher was interested in the strength of correlation between a dependent variable and two or more independent variables simultaneously. The Coefficient of multiple correlation indicates the strength of relationship between one variable and two or more other variables taken together. The multiple correlation is not merely the sum of the correlations of the dependent variable and the different independent

⁶⁹Downie and Heath, op. cit., p. 306.

variables taken separately. One reason this is important is that independent variables themselves are overlapping (intercorrelated) to some extent. The multiple R is related to the intercorrelation of independent variables as well as to their correlation with the dependent variable.

The multiple R is subject to interpretation as to the size and importance of the relationship between a dependent variable and two or more independent variables. One interpretation of the multiple R is in terms of R^2 , which is called the coefficient of multiple determination. The proportion of variance (which can be expressed in percent) in the dependent variable that is dependent upon, associated with, or predicted by independent variables is indicated by R^2 .

Tables were developed to show the correlation and multiple correlation between dependent and independent variables. R's and R^2 's were shown for most independent variables correlated with each dependent variable. Separate multiple R's and R^2 's were also shown for the independent variables correlated with each dependent variable within each sub-group (background and training, selected aspects of the dairy situation in the county, interest and attitude of agents, teaching efforts and knowledge of dairy and related subjects) studied.

The test of significance for each coefficient or multiple correlation R was taken from a correlation table.⁷⁰ As was indicated in the discussion on the analysis of the coefficient of correlation

⁷⁰J. P. Guilford, op. cit., p. 539 (Table D).

(r), the relation shown in the multiple correlation (R) analysis cannot always be interpreted as being one of cause and effect.

Crosstabulation analysis. Crosstabulation analysis was used in this study to aid the researcher in understanding and showing more clearly the relationship between single variables and to provide a measure of association describing the relationship between two variables while controlling for the effects of an additional variable. In crosstabulation the control is accomplished by examining the joint frequency distribution of two variables among two or more categories of one or more control variables. With crosstabulation the control is literal, for example, one simultaneously locates each observation according to the values it takes on three or more variables. For this reason, it takes very large numbers of cases to execute even relatively simple controls. This was one of the major problems in using crosstabulation analysis in this study.

Limited use was made of crosstabulation in this study to aid the researcher in understanding and clarifying relationship between variables.

B. DETERMINING THE RELATIONSHIP BETWEEN SELECTED FACTORS AND
THE EFFECTIVENESS RATING OF EXTENSION WORKERS IN
CONDUCTING THE EXTENSION DAIRY EDUCATIONAL
PROGRAM IN SELECTED TENNESSEE COUNTIES

Rating the Effectiveness of County Extension Agents Working with the
Extension Dairy Program in Certain Tennessee Counties

Information on the development, administration, and testing for validity

of the agent effectiveness ratings was discussed in detail in Chapter III. Because a valid and reliable rating of agents' effectiveness was so important to this study, judges rated each agent's effectiveness by two methods. Agents were rated on their effectiveness in conducting the county Extension dairy program by the score card rating method and the over-all rating method.

A Correlation Coefficient ($r = .83$) was obtained between the two rating methods using the Kendall Rank Order Correlation Coefficient technique. This indicated a high degree of agreement between the two rating methods.

The Score Card Method of rating agent's effectiveness was chosen (reasons presented in Chapter III) as the official performance rating for this study. The scores of each of the seven sets of judges had a positive correlation (ranging from .61 to .80) with the average of the scores of all other raters. This is an indication that there was a high degree of agreement among the different judges. It provides further evidence of the validity of the rating procedure used in this study.

All of the independent variables tested for association with agents' effectiveness by the correlation and multiple regression analysis in this study were first divided into five sub-groups. These sub-groups were; background and training factors, county situation factors, interest and attitude factors, work related factors and knowledge factors. The selected factors in each of these sub-groups were entered separately into the multiple regression analysis with agents' effectiveness in conducting the Extension dairy educational program in certain Tennessee counties.

Relationship of Selected Background and Training Factors with Effectiveness Rating of Agents in Conducting the Extension Dairy Educational Program in Certain Tennessee Counties

Findings regarding null hypothesis tested with the Coefficient of Correlation. Table I shows the Coefficient of Correlation (r) between each of the seven background and training factors and the effectiveness rating of Extension agents in conducting the county dairy program. The three background and training factors that were found to equal or exceed the .05 level of significance required were: (1) number of years in the present position with the Extension Service, significant at the .001 level; (2) total number of years in Extension, significant at the .01 level; and (3) number of man-days dairy specialist spent in the county in FY 1971 was also found to be significant at the .01 level.

Therefore, the null hypothesis stating that the number of years in present position, total number of years in Extension and number of man-days dairy specialists spent in the county were not significantly related to effectiveness rating of agents were rejected.

The factors concerning number of years in present position and total number of years in Extension were inversely related to effectiveness rating of Extension agents. On the basis of this analysis, it would appear that as the length of time in present position and total number of years in Extension increases the effectiveness rating score of agents in conducting the county Extension dairy educational program in the selected Tennessee counties tended to decrease.

TABLE I
 INFLUENCE OF SELECTED BACKGROUND AND TRAINING FACTORS ON THE
 EFFECTIVENESS RATING OF AGENTS WORKING WITH THE EXTENSION
 DAIRY EDUCATIONAL PROGRAM IN SELECTED
 TENNESSEE COUNTIES
 N=41

Selected Background and Training Factors	Effectiveness Rating			
	r	R	R ²	% Change in R ²
No. yrs. present position	-.49 ^a	.49 ^b	.24	23.9
Undergraduate grade point average	.20	.62 ^a	.38	14.3
No. Man-days dairy specialists in Co.	.40 ^b	.68 ^b	.47	8.6
No. yrs. in Extension	-.46 ^b	.70 ^b	.49	2.2
No. hrs. grad. credits dairy	.01	.71 ^b	.51	1.8
Highest degree earned	.18	.72 ^b	.51	0.5
No. hrs. ungrad. credit dairy	.06	.72 ^b	.52	0.4

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

The number of man-days Extension dairy specialist spent in the county was found to be positively associated with the effectiveness rating of agents. This means that as the number of man-days spent by dairy specialist increases the effectiveness rating score of agents also increases (that is, Extension specialists worked a larger number of days in counties where the agents were rated higher on effectiveness of their dairy program).

The four background and training factors that were found not to reach the .05 level of significance were: (1) undergraduate grade point average of agents, (2) number of hours of graduate credits in dairying, (3) highest degree earned by agents, and (4) number of hours of undergraduate credits in dairying.

Therefore, the null hypothesis stating that undergraduate grade point average, number of hours of graduate credits in dairying, highest degree earned and number of hours of undergraduate credit in dairying were not significantly related to agent effectiveness rating could not be rejected at the .05 level.

In the multiple correlation analysis. All seven of the selected background and training variables were shown to be associated significantly at the .01 level with the effectiveness rating of Extension workers in conducting the Extension dairy education program in certain Tennessee Counties (Table I). These seven factors accounted for 52 percent of the variation in the effectiveness rating of agents. Three of the background and training factors (number of years in position, undergraduate grade point average and number of man-days dairy specialists

spent in the county) accounted for 47 percent of the variation in teaching effectiveness rating of agents. The remaining four variables collectively accounted for only 5 percent of the variations.

The number of years in present position and years in Extension were the only two of the seven factors found to be inversely related to effectiveness. These two variables account for approximately 50 percent of the total variation in effectiveness of Extension agents. As would be expected, these two variables were highly intercorrelated with a coefficient of correlation of .84. This helps explain why in the multiple correlation analysis after the number of years in present position come in first accounting for 23.9 percent of the variation, that years in Extension then accounted for only 2.2 percent even though both had about equally as high a correlation with effectiveness (-.49 and -.46, respectively).

Relationship of Selected County Situation Factors with Effectiveness Rating of Agents in Conducting the Extension Dairy Education Program in Certain Tennessee Counties

Findings regarding null hypothesis tested with the Coefficient of Correlation. The Coefficients of Correlation (r) between each of the county situation factors and the effectiveness rating of Extension agents in conducting the county dairy program are shown in Table II. The only county situation factor found to be significantly related at the .05 level to agent effectiveness was dollars income from dairying in the county.

Therefore, the null hypothesis stating that dollars of income from dairying in the county was not significantly related to the

TABLE II
 INFLUENCE OF SELECTED COUNTY SITUATION FACTORS RELATED TO DAIRYING
 ON THE EFFECTIVENESS RATING OF AGENTS WORKING WITH
 THE EXTENSION DAIRY EDUCATIONAL PROGRAM
 IN CERTAIN TENNESSEE COUNTIES
 N=41

Selected Co. Situation Factors	Effectiveness Rating			
	r	R	R ²	% Change in R ²
Income from Dairying	.35 ^c	.35 ^c	.12	12.3
No. men Ext. agents in County	.22	.38 ^c	.14	2.0
No. Grade A dairy farms in Co.	.23	.39	.15	0.8
No. total dairy farms in Co.	.25	.39	.16	0.3
Percent of Co. farm income from Dairy	.13	.00	.16	0.0

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

effectiveness rating of agents was rejected. The factor was found to be positively associated with the teaching effectiveness of agents.

The other four county situation factors found not to reach the .05 level of significance were: (1) number of men Extension agents assigned to the county, (2) number of Grade A dairy farms in the county, (3) total number of dairy farms in the county, and (4) percent of county farm income from dairying.

Therefore, the null hypotheses stating that the number of men agents assigned to the county, the number of Grade A dairy farms in the county, the total dairy farms in the county and percent of county farm income from dairying was not significantly related to effectiveness rating of agents could not be rejected by this analysis.

In the multiple correlation analysis. Also shown in Table II, over three-fourths of the total variation accounted for by the selected county situation factors was accounted for by the dollars of dairy income in the county. However, two factors reached the .05 level of significance for Multiple Correlation with the effectiveness rating of Extension agents. Dollars of dairy income in the county accounted for 12.3 percent of the variation, and the remaining two factors accounted for 1.7 percent of the variation in agent effectiveness. One variable, percent of county farm income from dairying, failed to enter into the computations because of insufficient F level. All of the selected county situational factors accounted for 16 percent of the variation in agent effectiveness in conducting the Extension dairy program in selected counties in Tennessee.

Relationship of Selected Indicators of the Relative Interest and Attitude of Agents in Dairying with Effectiveness Rating of Agents in Conducting the Extension Dairy Program in Certain Tennessee Counties

Findings regarding null hypothesis tested with the Coefficient of Correlation. Data in Table III reveal that none of the selected interest and attitude factors were significantly related at the .05 level to agents teaching effectiveness rating. Also an examination of the Correlation Matrix in Appendix C, Table XXVII, shows that the Coefficient of Correlation between the total score on the interest and attitude scale and the effectiveness rating scores of agents was not related at the .05 level of significance.

Therefore, the null hypothesis stating that the interest and attitude scale was not significantly related to effectiveness of agents could not be rejected.

Failure to show a significant association between agents' effectiveness rating and their interest and attitudes toward dairying could have been due to the small variation found among agents in regard to their interest and attitudes toward dairying.

In the multiple correlation analysis. The agent's feeling concerning the receptiveness of dairy clientele to Extension teaching efforts and the agents' estimate of the relative importance of dairying in the county were the interest and attitude factors accounting for the largest percent of variation in the effective performance of Extension agents (Table III). However, these interests and attitude

TABLE III
INFLUENCE OF SELECTED INTEREST AND ATTITUDE FACTORS ON AGENT'S
EFFECTIVENESS IN WORKING WITH THE EXTENSION DAIRY
EDUCATIONAL PROGRAM IN SELECTED
TENNESSEE COUNTIES
N=41

Selected Interest and Attitude Factors	Effectiveness Rating			
	r	R	R ²	% Change in R ²
Receptiveness of dairy clientele	.24	.24	.06	5.9
Importance of dairying in county	.01	.31	.10	3.9
Self-confidence in dairy subject matter	.19	.32	.10	0.6
Interest in dairying	.12	.35	.12	1.8
Job satisfaction	.19	.35	.12	0.0

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

factors did not reach the .05 level of significance for multiple correlation with effectiveness rating of agents. Of the 12 percent of variation in effectiveness rating, which was accounted for by the receptiveness of dairy clientele variable, 3.9 percent was accounted for by the importance of dairying variable, and 2.2 percent of the variation being accounted for by the remaining three factors making up the interest and attitude scale used in the study.

Relationship of Selected Work Related Variables with Effectiveness
Rating of Agents in Conducting the Extension Dairy Educational Program
in Certain Tennessee Counties

Findings regarding null hypothesis tested with the Coefficient of Correlation. Data in Table IV show that four of the twelve work related variables equalled or exceeded the .05 level of significance. The four factors in the sub-group which met the required significance were: (1) number of man-days dairy specialists spent in the county, significant at the .01 level; (2) number of man-days agent devoted to group and mass media methods in dairying, significant at the .01 level; (3) number of group contacts made with dairy clientele, significant at the .05 level; and (4) number of man-days agents spent in the office was also significant at the .05 level.

Therefore, the null hypotheses stating that the number of man-days dairy specialist spent in the county, number of man-days agent devoted to group and mass media methods with dairy clientele, number of group contacts made with dairy clientele and number of

TABLE IV

INFLUENCE OF SELECTED WORK RELATED FACTORS ON THE EFFECTIVENESS RATING
OF AGENTS WORKING WITH THE EXTENSION DAIRY EDUCATIONAL
PROGRAM IN SELECTED TENNESSEE COUNTIES
N=41

Selected Work Related Factors	Effectiveness Rating			
	r	R	R ²	% Change in R ²
No. man-days Spec. in Co.	.40 ^b	.40 ^b	.16	15.6
No. man-days agent in office	.30 ^c	.46 ^b	.22	5.8
No. group contacts-dairy	.34 ^c	.51 ^b	.26	4.3
Total No. contacts-dairy	.23	.52 ^c	.28	1.7
Percent in-office time is of total	.21	.55 ^b	.30	2.9
Man-days dairy individual contacts	.16	.56 ^c	.31	0.9
No. man-days agent out-of-office	.04	.57 ^c	.33	1.3
Man-days devoted to dairy-other	.40 ^b	.58 ^c	.34	0.3
Man-days devoted to dairy	.24	.00	.00	0.0
Number of individual contacts with dairy	.16	.00	.00	0.0
Total man-days worked	.19	.00	.00	0.0
No. contacts per man-day	.15	.58 ^c	.33	0.6

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

man-days agent spent in the office were not significantly related to the effectiveness rating scores of agents were rejected.

Each of the above factors was positively associated with effectiveness of agents. This means that as each of these independent variables increase the effectiveness score of agents also increases. Stated more specifically, agents judged to have more effective dairy programs in their counties tended to devote more time to group work and mass media, spent more time in the office, made more group contacts with dairymen and made more use of Extension specialists.

The other eight work related factors not reaching the required .05 level of significance were: (1) total number of dairy contacts made with dairy clientele in the county, (2) percent in-office time is of total time worked by the agent, (3) man-days spent in dairy education with the individual contact method, (4) man-days agent spent out-of-office, (5) number of contacts agent made per man-day devoted to dairy, (6) total man-days devoted to dairy work, (7) number of individual contacts made with dairy clientele, and (8) total man-days worked by agent.

Therefore, the null hypothesis stating that the total number of contacts made with dairy clientele, percent in-office time is of the total time worked, man-days spent with dairy clientele on individual contact methods, man-days agent spent out-of-office, number of contacts agent made per man-day worked with dairy clientele, total man-days worked by agent, number of individual contacts made with dairy clientele, and total man-days worked by agent were not significantly related to agents effectiveness rating score at the .05 level could not be rejected.

In the multiple correlation analysis. Data in Table IV, page 75, also revealed that the twelve work related factors accounted for 34 percent of the variation in agent effectiveness. Approximately 90 percent of the variation in agent effectiveness accounted for by this group of variables was due to only five of the work related variables. The number of man-days specialists spent in the county accounting for 15.6 percent, number of man-days agent spent in the office accounted for 5.8 percent, number of group contacts with dairy clientele accounted for 4.3 percent, total number of contacts with dairy clientele accounted for 1.7 percent, percent in-office time is of total accounted for 2.9 percent of the variation in agent effectiveness. The remaining four factors which entered into the computation accounted for 4 percent of the variation in effectiveness of agents in conducting the Extension dairy educational program in selected Tennessee counties. The three variables which failed to enter into computation due to insufficient F level were: total man-days devoted to dairy work, number of individual contacts with dairy clientele and total man-days worked by agents. Nine of the twelve work related variables reached the .05 level of significance.

Relationship of Multiple-Choice Test with Effectiveness Rating of Agents in Conducting the Extension Dairy Educational Program in Selected Tennessee Counties

Findings regarding null hypothesis tested with the Coefficient Correlation. The Coefficient of Correlation between the scores on

the multiple-choice test and the effectiveness rating scores of agents was associated at the .05 level of significance (Appendix C, Table XXVII).

Therefore, the null hypothesis stating that the knowledge of dairy and related subjects was not significantly related to the effectiveness rating of agents in conducting the dairy education program was rejected.

This factor was positively associated with effectiveness of Extension agents at the .01 level of significance which indicated that knowledge about dairy and related subjects was related to teaching effectiveness of agents in the county Extension dairy program in selected Tennessee counties.

Data in Table V show that the Coefficient of Correlation between the scores on three sections of the multiple-choice test (records and record keeping, abnormal milk, and building and farmstead planning) were significantly related to effectiveness rating scores at the .05 level or below. Three other sections of the test were related to effectiveness at the .10 level of significance.

In the multiple correlation analysis. Data in Table V show that all twelve sections of the multiple-choice test had a significant (.01 level) multiple correlation with effectiveness of agents. Of the 45 percent variation in effectiveness rating scores accounted for by the multiple-choice test, 21.7 percent was accounted for by the record and record keeping section of the test, 10.7 percent was accounted for by the abnormal milk section of the test, 3.8 percent

TABLE V

INFLUENCE OF SELECTED TEST FACTORS ON EFFECTIVENESS RATING OF AGENTS
WORKING WITH THE EXTENSION DAIRY EDUCATIONAL PROGRAM
IN SELECTED TENNESSEE COUNTIES
N=41

	Effectiveness Rating			
	r	R	R ²	% Change in R ²
Record keeping	.46 ^b	.46 ^b	.22	21.7
Abnormal milk	.46 ^b	.57 ^b	.32	10.7
Building Planning	.33 ^c	.60 ^b	.36	3.8
Artificial Breeding and Genetics	.26 ^d	.61 ^b	.38	1.6
Waste Disposal	.05	.62 ^b	.39	0.9
Extension Communications	.12	.63 ^b	.40	1.3
General Dairying	.06	.64 ^b	.41	0.4
Quality Feed Production	.26 ^d	.64 ^b	.41	0.3
Nutrition and Feeding	.28 ^d	.64 ^b	.41	0.4
Farm Planning	.11	.64 ^b	.42	0.4
Extension Program Development	.16	.65 ^b	.42	0.3
Milking Management	.01	.65 ^b	.42	0.0

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

was accounted for by the building and farmstead planning section of the test, 1.6 percent was accounted for by the artificial breeding, sire selection, and genetic section of the test, 1.3 percent was accounted for by the Extension communication section of the test, and 3 percent of the variation being accounted for by the remaining seven sections of the subject matter test. All twelve sections of the test were positively correlated with effectiveness ratings, therefore, each section added to the validity of the test.

Fourteen of the independent variables accounting for the largest percent of variation in agent effectiveness were selected from the multiple correlation analysis (Tables I, II, III, IV, and V, pages 68, 71, 74, 76, and 80, respectively) on the five sub-groups of independent variables. The 14 selected factors were then entered as a total group into a multiple correlation analysis with agent effectiveness.

Relationship of 14 selected factors with the effectiveness rating of Extension agents in conducting an Extension dairy educational program in certain Tennessee counties. Each of the 14 variables entered in the multiple regression analysis had a significant multiple correlation (.01 level) with the effectiveness rating of county Extension agents (Table VI). Number of years in present position was the only variable which was inversely related to the effectiveness rating of agents. Five of the 14 selected factors accounted for 65 percent of the variation in effectiveness of the county Extension workers. The percent of variance in agent effectiveness accounted for by each of the five factors were: number of years in the present position, 23.9

TABLE VI
INFLUENCE OF SELECTED FACTORS ON THE EFFECTIVENESS RATING OF
EXTENSION AGENTS WORKING WITH THE DAIRY EXTENSION
PROGRAM IN SELECTED TENNESSEE COUNTIES
N=41

Selected Variables	Effectiveness Rating			
	r	R	R ²	% Change in R ²
No. yrs. present position	-.49 ^a	.49 ^b	.24	23.9
Undergrad. grade point average	.20	.62 ^b	.38	14.3
Man-days devoted to dairy work-group and mass media methods	.38 ^c	.70 ^b	.50	11.5
Total score on multiple-choice test	.48 ^b	.74 ^b	.55	5.6
No. of men Ext. agents in the county	.22	.80 ^b	.65	9.5
No. man-days agent in office	.30 ^c	.82 ^b	.68	2.9
No. of contacts per man-day	.15	.83 ^b	.70	1.9
No. hrs. grad. credits in dairying	.02	.84 ^b	.71	1.6
Interest and attitude scale	.17	.85 ^b	.73	0.6
No. of man-days dairy spec. in co.	.40 ^b	.86 ^b	.74	0.9
No. individual contacts dairy	.09	.86 ^b	.74	0.8
No. hrs. ungrad. credits in dairying	.06	.86 ^b	.74	0.5
Highest degree earned	.18	.86 ^b	.75	0.4
No. of dairy farms in the county	.25	.86 ^b	.75	0.3

^aSignificant at .001 level

^bSignificant at .01 level

^cSignificant at .05 level

^dSignificant at .10 level

percent; undergraduate grade point average, 14.3 percent; man-days devoted to dairy work with group and mass media methods, 11.5 percent; score on multiple-choice test, 5.6 percent; and number of men Extension agents assigned to the county, 9.5 percent. The other nine factors entered into the multiple correlation accounted for only 10 percent of the variation in effectiveness. The 14 factors entered into the correlation analysis accounted for 75 percent of the variation in agents' effectiveness.

These data indicate that the five best predictors of agents' effectiveness in conducting the Extension dairy program were:

(1) numbers of years in present position, (2) undergraduate grade point average, (3) man-days devoted to dairy work with group and mass media method, (4) score on multiple-choice test on dairying and related subjects, and (5) number of men Extension agents assigned to the county.

Crosstabulation analysis was made with selected variables to aid the researcher in further clarifying the relationship between these variables.

Comparing the relationship of effectiveness with years in Extension. The crosstabulation analysis shows some additional details of the relationship between years in Extension and teaching effectiveness of agents not revealed by the correlation or multiple correlation analysis presented earlier in the report.

Data in Table VII reveal three distinct categories of years in Extension with effectiveness rating of agents. In the first category

TABLE VII
RELATIONSHIP OF EFFECTIVENESS RATING OF AGENTS
WITH YEARS IN EXTENSION
N=41

Effectiveness Rating Scores	Years in Extension			Row Total
	5-12	13-31	32-43	
	Number of Agents			
Below the Mean	0	12	8	20
Above the Mean	6	15	0	21
Column Total	6	27	8	41

(5 to 12 years in Extension) all six agents were rated above average in their effectiveness rating. Contrast this with the category (32 to 43 years in Extension) of agents at the other end of the scale where all eight agents were rated below average in effectiveness. In the middle category (13 to 31 years in Extension) slightly over half of the agents, 15 out of 27 were rated above average in effectiveness.

These data clearly show that the greatest difference in effectiveness rating of agents in conducting the county Extension dairy educational program in selected Tennessee counties was among the youngest category (5 to 12 years in Extension) and the oldest category (32 to 43 years in Extension).

Scattergram Showing Agents' Effectiveness Rating Scores in Relation to Number of Years in Extension

The scattergram (Figure 1, Appendix C) shows some additional information regarding the association of agents' effectiveness rating with years in Extension. The three primary observations from the scattergram providing additional information were:

(1) Only one agent in the 5 to 12 years in Extension category had an effectiveness rating score exceeding 130, even though all six of these agents rated above average for the group. The agent in this category with an effectiveness rating score over 130 had served 12 years in Extension.

(2) Eight of the agents in the 13 to 31 years in Extension category rated above 130 in effectiveness. These eight agents had served from 17 to 31 years with the Extension Service.

(3) Five of the eight agents with an effectiveness rating score below 90 were in the 32 to 43 years in Extension category.

Comparing the relationship of effectiveness with years in Extension while controlling for highest degree earned. The cross-tabulation data in Table VIII show that all six agents in the 5 to 12 years in Extension category have obtained Master's Degrees and were rated above average in effectiveness. While in the 32 to 43 years in Extension category only 2 out of eight agents had obtained a Master's Degree and all eight were rated below average in effectiveness. The 27 agents in the middle category (13 to 31 years in Extension) were about equally distributed between those with B.S. Degrees (13 agents) and those with M.S. Degrees (14 agents). Also the breakdown of agents rated above average was approximately equal (7 of 13 agents with a B.S. Degree and 8 of 14 with a M.S. Degree).

This would indicate that years in Extension was highly related to effectiveness rating of agents; while highest degree earned was only slightly related to effectiveness. Also that controlling for highest degree earned had little effect on the relationship of effectiveness and years in Extension.

Comparing the relationship of effectiveness with years in Extension while controlling for undergraduate grade point average. Four of the six agents in the first category (5 to 12 years in Extension) were below average on undergraduate grade point average (Table IX). However all six of these agents were rated above average in effectiveness. This shows that the majority of the agents in this

TABLE VIII
 RELATIONSHIP OF EFFECTIVENESS RATING OF AGENTS BY YEARS
 IN EXTENSION CONTROLLING FOR HIGHEST
 DEGREE EARNED
 N=41

Effectiveness Rating Scores	Years in Extension			Row Total
	5-12	13-31	32-43	
Number of agents (19) with B.S. Degree				
Below the Mean	0	6	6	12
Above the Mean	0	7	0	7
Number of agents (22) with M.S. Degree				
Below the Mean	0	6	2	8
Above the Mean	6	8	0	14
Column Total	6	27	8	41

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12

category were below average in undergraduate grade point average, but were rated above average in performance.

In the second category (13 to 31 years in Extension) a few more of the agents (8 of 15) in the below the mean grade point average were also rated below average in effectiveness; while considerably fewer of the agents (4 of 12) who had above the mean grade point averages were rated below average in effectiveness. This shows the positive relationship between undergraduate grade point average and effectiveness.

Five of the eight agents in the third category (32 to 43 years in Extension) were above the mean in undergraduate grade point average. However, all eight were rated below average in effectiveness.

These data show that all more recently employed agents (5 to 12 years) were rated above average in effectiveness, even though a majority of them were below the mean in undergraduate grade point average. Contrast this with agents who had worked 32 years and over where all eight agents rated below average in effectiveness, while the majority of this category were above the mean in undergraduate grade point average.

Comparing the relationship of effectiveness with years in Extension while controlling for knowledge in dairy and related subjects.

The data in Table X show that three of the six agents in the 12 to 15 years in Extension category scored above average on the multiple-choice test in dairying and related subjects. It also shows that all six of these agents rated above average in effectiveness.

TABLE X
 RELATIONSHIP OF EFFECTIVENESS RATING OF AGENTS BY YEARS IN
 EXTENSION CONTROLLING FOR SCORES ON THE
 MULTIPLE-CHOICE TEST
 N=41

Effectiveness Rating Score	Years in Extension			Row Total
	5-12	13-31	32-43	
Number of agents below average on test scores				
Below the Mean	0	4	8	12
Above the Mean	3	5	0	8
Number agents above average on test scores				
Below the Mean	0	8	0	8
Above the Mean	3	10	0	13
Column Total	6	27	8	41

Eighteen of the 24 agents in the middle category (13 to 31 years in Extension) scored above average on the multiple-choice test. Fifty-six percent of the agents in both categories (scoring below and above average on the test) rated above average in effectiveness. In the third category (32 to 43 years in Extension), all eight agents scored below average on the multiple-choice test and also rated below average on effectiveness.

These findings show that a majority of the agents (8 of 12) in the first two categories (5 to 12 and 13 to 31 years in Extension) who scored below average on the test rated above average on effectiveness. In contrast to this, none of the 8 agents in the 32 to 43 years in Extension category scoring below average on the test was rated above average on effectiveness.

Comparing the relationship of effectiveness with years in Extension while controlling for time spent in the county by dairy specialist. Three out of the six agents in the 5 to 12 years in Extension category were located in counties with below average time spent by dairy specialist (Table XI). Yet, all six of these agents rated above average in effectiveness. Contrast this with the third category (32 to 43 years in Extension) where six out of the eight agents were located in counties with below average time spent by dairy specialist and all eight of these agents rated below average in effectiveness. In the middle category (13 to 31 years in Extension) eight out of the nine agents located in the counties with more than average time spent by dairy specialist were rated above average in

TABLE XI
RELATIONSHIP OF EFFECTIVENESS RATING OF AGENTS BY YEARS
IN EXTENSION CONTROLLING FOR TIME SPENT BY
DAIRY SPECIALIST IN THE COUNTY
N=41

Effectiveness Rating Score	Years in Extension			Row Total
	5-12	13-31	32-43	
No. Co. with Below Ave. Time Spent by Spec.				
Below the Mean	0	11	6	17
Above the Mean	3	7	0	10
No. Co. with Above Ave. Time Spent by Spec.				
Below the Mean	0	1	2	3
Above the Mean	3	8	0	11
Column Total	6	27	8	41

effectiveness; compared to only seven out of 18 agents in this category located in counties with less than average time spent by dairy specialists who were above average in effectiveness.

Comparing the relationship of effectiveness with years in Extension while controlling for dollars income from dairying in the county. The data in Table XII show that four of the six agents in the first category (5 to 12 years in Extension) were located in counties where income from dairying was below average. Even so, all six of these rated above average in effectiveness.

The third category (32 to 43 years in Extension) had five of the eight agents located in counties where the income from dairying was below average. All of these agents were rated below average in effectiveness.

Some Other Observations Regarding the Relationship of Significantly Related Independent Variables

The correlation matrix in Table XXVII, Appendix C shows the inter-correlation of each variable with every other variable. An examination of these coefficient of correlation shows that the two independent variables significantly associated with years in present position and years in Extension were: (1) highest degree earned (significant at the .01 level) and (2) undergraduate grade point average (significant at the .01 level).

Highest degree earned was inversely related to number of years in present position and to number of years in Extension. This indicates

TABLE XII
RELATIONSHIP OF EFFECTIVENESS RATING OF AGENTS BY YEARS
IN EXTENSION CONTROLLING FOR DOLLARS INCOME
N=41

Effectiveness Rating Score	Years in Extension			Row Total
	5-12	13-31	32-43	
No. Co. Below Ave. in Income from Dairy				
Below the Mean	0	8	5	13
Above the Mean	4	8	0	12
No. Co. Above Ave. in Income from Dairy				
Below the Mean	0	4	3	7
Above the Mean	2	7	0	9
Column Total	6	27	8	41

that agents who had worked fewer years tended to have M.S. degrees; and, conversely agents who had worked a greater number of years tended to have only a B.S. degree.

Undergraduate grade point average was positively associated (significant at .01 level) with number of years in present position. This would indicate that "younger" agents had lower grade point averages and conversely that "older" agents tended to have higher undergraduate grade point averages.

The number of undergraduate credits in dairy was found to be related, at the .05 level of significance, to number of Grade A dairy farms in the county. Surprisingly perhaps, this would indicate that agents who had completed fewer undergraduate credits in dairy were located in counties with a larger number of Grade A dairymen. However, the total number of dairy farms in counties was positively associated, at the .05 level of significance, with number of hours of graduate credits in dairying. Agents located in counties with larger number of dairymen tended to take courses in dairying during their graduate training.

Factors that were found to be associated at the .05 level of significance or below with number of man-days dairy specialists spent in the county were: (1) number of man-days devoted to dairy work-group and mass media methods (significant at the .001 level), (2) total man-days devoted to dairy work in the county (significant at the .001 level), (3) number of Grade A farms in the county associated (significant at the .01 level), (4) dollars income from dairying in the county (significant at the .01 level), (5) total contacts with dairy clientele

(significant at the .01 level), and (6) score on the interest and attitude scale (significant to the .05 level). All of these factors were positively associated with number of man-days dairy specialist spent in the county.

This indicated that dairy specialists tended to spend more time in counties where: (1) the Extension agent tended also to work more with groups of dairymen, (2) there were larger numbers of Grade A dairymen, and (3) agents had relatively higher interest and attitude toward dairying.

Summary of Findings Related to Effectiveness Rating

Summary of correlation analysis on the 25 selected variables with effectiveness. As shown in Tables I, II, III, IV, and V, pages 68, 71, 74, 76, and 80, respectively, and Appendix C, Table XXVII, 8 of the 25 independent variables were found to be related to effectiveness at or below the .05 level of significance. The 8 factors found to equal or exceed the .05 level required to reject the null hypotheses were:

1. Number of years in the present position (significant at the .001 level);
2. Number of years in Extension (significant at the .01 level);
3. Number of man-days dairy specialist spent in the county (significant at the .01 level);
4. Dollars income from dairying in the county (significant at the .01 level);

5. Number of days agent spent in the office (significant at the .05 level);

6. Number of group contacts with dairy clientele (significant at the .05 level);

7. Number of man-days devoted to dairy through group and mass media methods (significant at the .01 level);

8. Knowledge of dairying and related subjects (significant at the .01 level).

Of the eight factors reaching the .05 level of significance, years in present position and total years in Extension, were the only factors that were inversely related to the effectiveness rating of agents. The other six factors were positively associated with agent effectiveness.

Factors not reaching the required level of significance for rejecting the null hypotheses were:

1. Extension agents undergraduate grade point average
2. Number of hours of graduate credits in dairying completed by agents
3. Highest degree earned by agents
4. Number of hours of undergraduate credits in dairying completed by agents
5. Number of men Extension agents assigned to the county
6. Number of Grade A dairy farms in the county
7. Total number of dairy farms in the county
8. Percent of county farm income from dairying
9. Interest and attitude score of agents

10. Total number of contacts agents had with dairy clientele
11. Percent in-office time was of total time spent by agents in dairying
12. Man-days agents devoted to dairy through individual contact methods
13. Number of man-days agents spent out-of-office
14. Number of contacts per man-day spent by agents in dairying
15. Total man-days agents devoted to dairying
16. Number of individual contacts by agents with dairy clientele
17. Total man-days worked by agent

The interest and attitude sub-group was the only sub-group not having at least one factor to reach or exceed the .05 level of association required to reject the null hypotheses.

Summary of multiple correlation on the sub-groups of variables with effectiveness. Multiple correlation between agent's effectiveness score and selected groups of variables of the background and training, (in the agent's background and training, county situation, agent's interest and attitude, and agent's knowledge of dairy and related subjects) were shown in Tables I, II, III, IV, and V, pages 68, 71, 74, 76, and 80, respectively. All sub-groups except interest and attitude had at least one variable which was significantly related (at the .05 level) to agent effectiveness. Number of years in Extension, number of years in present position and man-days agents worked out-of-the-office were the only variables which were inversely related to effectiveness ratings of agents.

The variation in agent effectiveness accounted for by all independent variables, for each sub-group was as follows: (1) background and training factors, 52 percent; (2) county situation factors, 16 percent; (3) interest and attitude factors, 12 percent; (4) work related factors, 34 percent; and (5) multiple-choice test sections, 42 percent. Independent variables accounting for the largest percent of variation in effective performance of agents for each sub-group of factors were as follows:

Background and training of agents. Number of years in the present position, undergraduate grade point average, number of man-days dairy specialist spent in county, and number of years in Extension accounted for the largest percent of variation in agent effectiveness. Two of these variables, years in present position and years in Extension, accounting for over half of this variation were inversely related to effectiveness.

County situation related to dairying. Number of dollars income from dairying in the county and number of men Extension agents assigned to the county were the factors in this sub-group accounting for the largest percent of variation in agent's effectiveness rating.

Relative interest and attitude of agents concerning dairying and dairy clientele. Receptiveness of dairy clientele to Extension teaching efforts and agents estimate of the relative importance of dairying in the county accounted for most of the variation in agent effectiveness which was accounted for by this sub-group of factors. However, neither of these factors was significant at the .05 level.

Work related factors. Number of man-days dairy specialists were in each county, number of man-days agents spent in the office, and number of group contacts with dairy clientele accounted for most of the variation in agent effectiveness which was accounted for by the variables in this sub-group.

Knowledge of dairy and related subjects. The section on dairy records and record keeping, the section on abnormal milk, and the section on dairy building and farmstead planning accounted for most of the variation in agent effectiveness which was accounted for by all 12 sections of the multiple-choice test.

Summary of crosstabulation analysis of selected variables. Analysis of data using the crosstabulations, showed that the greatest contrast in agent effectiveness and years in Extension was between the groups of agents at the two extreme ends of the scale of years in Extension. As shown in Table VII, page 84, all six agents in the youngest category (5 to 12 years in Extension) were rated above average in effectiveness. Whereas, all eight agents in the oldest category (32 to 43 years in Extension) rated below average in effectiveness.

Data in Tables VIII, IX, X, XI, and XII, pages 87, 88, 90, 92, and 94, respectively, help describe more clearly the relationship between agent effectiveness and years in Extension while controlling for selected background and training, knowledge in dairy and related subjects, county situation, and work related factors.

The characteristics of the agents in the youngest group (5 to 12 years in Extension) were as follows:

1. Highest degree earned (Table VIII, page 87)--all six agents had obtained a Master's Degree.

2. Undergraduate grade point average (Table IX, page 88)--four agents were below the mean and two agents were above the mean.

3. Scores on the multiple-choice test in dairy and related subjects (Table X, page 90)--three agents scored below the mean and three agents scored above the mean.

4. Number of man-days dairy specialist spent in the county (Table XI, page 92)--three agents were located in counties below the mean and three agents were located in counties above the mean.

5. Dollars income from dairying in the county where agent was assigned (Table XII, page 94)--four agents located in counties below the mean and two agents located in counties above the mean.

As revealed above, all agents in this group had a Master's Degree, however, only one-third of these agents were above the mean in undergraduate grade point average and one-third were located in counties where dairying was above average in importance.

Three out of six agents in the category scored above average on the knowledge test and one-half were located in counties with above average time spent by dairy specialist.

The characteristics of the eight agents in the oldest category (32 to 43 years in Extension) were as follows:

1. Highest degree earned (Table VIII, page 87)--two agents had a Master's Degree and six agents had a B.S. Degree.

2. Undergraduate grade point average (Table IX, page 88)--three agents were below the mean and five agents were above the mean.

3. Scores on multiple-choice test on dairy and related subjects (Table X, page 90)--all eight agents were below the mean.

4. Number of man-days dairy specialists spent in the county where agent was assigned (Table XI, page 92)--six agents were located in counties below the mean and two agents were located in counties above the mean.

5. Dollars income from dairying in the county where agent was assigned (Table XII, page 94)--five agents were located in counties below the mean and three agents were located in counties above the mean.

As shown above, all eight of the agents in this category scored below average on knowledge of dairying as measured by the multiple-choice test, even though five out of eight were above the mean in undergraduate grade point average. Twenty-five percent of these agents had a Master's Degree and were located in counties where time spent by dairy specialist was above average. Three of the eight agents scoring below the mean on the knowledge test were located in counties where dairying was above average in importance.

C. DETERMINING THE RELATIONSHIP BETWEEN SELECTED FACTORS AND THE
SCORE MADE ON A MULTIPLE-CHOICE TEST IN DAIRYING AND
RELATED SUBJECTS BY EXTENSION WORKERS FROM
SELECTED TENNESSEE COUNTIES

The effectiveness ratings of county Extension agents in conducting the dairy educational program in selected Tennessee counties in relation

to selected factors were discussed in the previous section. This section will present findings from analyses of data concerning the relation between selected independent variables and the scores made by these agents on a multiple-choice test concerning dairying and related subjects (dependent variable).

Testing the Competency, in Dairying and Related Subjects, of Extension Agents Working with the Extension Dairy Program in Selected Tennessee Counties

Detailed information on the development, administration and testing for reliability and validity of the multiple-choice test, on dairying and related subjects, was discussed in Chapter III. A great deal of effort was exerted by a large number of individuals in the development of this instrument. An attempt was made to make it a valid and reliable test of the Extension agent's competency in developing and conducting an effective dairy educational program in the county.

The validity of a test depends upon the degree to which it measures what it attempts to measure.

The validity of this comprehensive multiple-choice test, in measuring the competency of Extension agents in dairying and related subjects, was determined in part by specialists (college teaching staff and agricultural Extension staff) in the areas being tested.

The highly significant correlation ($r = .48$) found between the scores of agents on this test and the effectiveness rating of these agents in conducting the Extension dairy educational program

in selected Tennessee counties, provides further evidence of the validity of this test in measuring agent's competency in developing and conducting an effective dairy program.

A test is said to be reliable when it consistently measures what it does measure. Using the split-half procedure, explained earlier in this report, the reliability of the whole test was .84. This is considered to be adequate by most writers on this subject. Guilford said, "in practice we except reliability coefficients to be in the upper bracketts of r values, usually .80 to .98."⁷¹

In order to minimize the effects of guessing on the final test scores, a common correction factor was used. The correction formula used was as follows: final score equals right answers minus wrong answers divided by the number of options minus one.

Since the individual sections of the test were developed separately by specialists in the different areas, an over-all reading committee (representing the different subject matter areas) was selected to help improve the continuity and consistency of the whole test. As a result of the common instructions given to specialists on developing the test, the week of intensified in-service training covering much of the subject matter used in the test, and the over-all reading committee's review and input into the test, the various sections of the test were assumed to have approximately equal difficulty and equal basic understanding requirements.

⁷¹Guilford, op. cit., p. 146.

However, the data in Table XIII showing the low individual percentage score, mean percentage score, and high individual percentage scores (percentage derived by dividing the number of questions in each section by the score made after correction factor applied) made by agents on the 12 sections of the multiple-choice test indicates that there were considerable differences among agents' scores between the different sections of the test.

The highest individual percentage score made on a section of the multiple-choice test was 100, made on the following four areas: production of quality feed, dairy building and farmstead planning, Extension communication, and principles of farm planning. These four areas also had the highest mean percentage scores for all agents. The mean percentage scores in these four areas were: dairy building and farmstead planning 76, Extension communication 75, production of quality feed 70, and principles of farm planning 57.

The lowest individual percentage score on a section of the test was 0, made on four sections of the test. These four areas were: milking management, abnormal milk, general dairying, and artificial breeding and genetics. These four sections of the test also had the lowest mean percentage scores. The mean percentage scores on these areas were: milking management 25, abnormal milk 29, general dairying 33, and artificial breeding and genetics 40.

Other mean percentage scores on sections of the test from highest to lowest were: Extension program development 55, waste disposal 51, feeding and nutrition 48, and records and record keeping 45.

TABLE XIII

LOW INDIVIDUAL PERCENTAGE SCORE, MEAN PERCENTAGE SCORE AND HIGH
INDIVIDUAL PERCENTAGE SCORE MADE ON THE TWELVE SECTIONS
OF THE MULTIPLE-CHOICE TEST AND ON THE TOTAL TEST
BY EXTENSION AGENTS WORKING WITH THE DAIRY
PROGRAM IN SELECTED TENNESSEE COUNTIES

Sections of the test	Low	Mean	High
	Percentage scores after correcting for guessing		
Dairy Building and Farmstead Planning	27	76	100
Extension Communications	38	75	100
Production of Quality Feed	44	70	100
Farm Planning	12	57	100
Extension Program Development	20	55	90
Waste Disposal	27	51	80
Feeding and Nutrition	6	48	81
Records and Record Keeping	8	45	69
Artificial Breeding and Genetics	0	40	85
General Dairying	0	33	62
Abnormal Milk	0	29	75
Milking Management	0	25	70
Total Test	30	50	68

The lowest individual percentage score on the total multiple-choice test was 30. The mean percentage score of all agents on the test was 50, and the highest individual percentage score on the total test was 68.

Relationship of Selected Background and Training Factors with the Multiple-Choice Test Scores of Agents Working with the Extension Dairy Program in Selected Tennessee Counties

Findings regarding null hypotheses tested. The coefficient of correlation between the multiple-choice test scores of agents working with the dairy program in selected Tennessee counties and each of the seven background and training factors selected for study were shown in Table XIV. The two background and training factors found to be significantly associated (.05 level) with agents' test scores were: (1) total number of years in Extension, and (2) number of years in the present Extension position.

Therefore, the null hypothesis stating that the number of years in Extension and the number of years in present position were not significantly related to scores of Extension agents on the multiple-choice test were rejected.

Both of these factors (years in Extension and years in present position) were inversely related to the multiple-choice test scores of Extension agents. This means that as the length of time in Extension and/or years in present position increased their scores on the test tended to decrease.

TABLE XIV
 INFLUENCE OF SELECTED BACKGROUND AND TRAINING FACTORS ON THE MULTIPLE-
 CHOICE TEST SCORES OF AGENTS WORKING WITH THE EXTENSION
 DAIRY PROGRAM IN SELECTED TENNESSEE COUNTIES
 N=41

Selected Background and Training Factors	Multiple-Choice Test Scores			
	r	R	R ²	Increase in R ²
No. of years in Extension	-.37 ^c	.37 ^c	.13	13.4
Undergrad. grade point average	.11	.43 ^c	.18	5.1
Hrs. undergrad. credits in dairying	-.11	.45 ^c	.21	2.0
Man-days dairy specialist in the county	.13	.47 ^c	.22	1.7
Years in present position	-.33 ^c	.48 ^c	.23	0.8
Highest degree earned	.24	.48	.23	0.0
Hrs. graduate credits in dairying	.13	.48	.23	0.0

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

Of the background and training variables, highest degree earned had the highest positive correlation with agents' knowledge test scores, however, it was not significantly associated at the .05 level.

The five background and training factors that were found not to reach the .05 level of significance were: (1) undergraduate grade point average, (2) hours of undergraduate credits in dairying, (3) man-days dairy specialist spent in the county, (4) highest degree earned by agents, and (5) hours of graduate credits in dairying.

Therefore, the null hypothesis stating that undergraduate grade point average, hours of undergraduate credits in dairying, man-days dairy specialist spent in the county, highest degree earned and hours of graduate credits in dairying were not significantly related at the .05 level would not be rejected.

In the multiple correlation analysis. Five of the seven selected background and training factors were shown to be associated significantly at the .05 level with scores made by agents on the multiple-choice test (Table XIV). These five factors accounted for 23 percent of the variation in test scores of agents. The five factors and the amount of variance accounted for by each were: years in Extension, 13.4 percent; undergraduate grade point average, 5.1 percent; hours of undergraduate credits in dairying, 2.0 percent; man-days dairy specialist spent in the county, 1.7 percent; and, years in present position, 0.8 percent.

The two remaining factors failing to account for any additional variation in agents' test scores were: highest degree earned by

agents, and hours of graduate credits in dairying. These two factors failed to reach the .05 level of association with the agents' test scores in the multiple correlation analysis.

Three of the seven background and training factors (years in Extension, years in present position, and hours of undergraduate credits in dairying) were inversely related to agents' scores on the multiple-choice test in dairying and related subjects.

Relationship of Selected County Situation Factors with the Multiple-Choice Test Scores of Agents Working with the Extension Dairy Program in Selected Tennessee Counties

Findings regarding the null hypothesis tested by the coefficient of correlation. The data in Table XV show that all five of the county situation factors failed to reach the .05 level of association with agents' test scores in the correlation analysis. However, number of men agents assigned to the county and dollars income from dairying in the county were found to be significantly associated with test scores at the .10 level.

Therefore, the null hypothesis stating that the number of men agents assigned to the county, dollars of income from dairying in the county, number of Grade A dairy farms in the county, and percent dairy income is of the total farm income in the county were not significantly related at the .05 level would not be rejected.

The number of men agents assigned to the county was inversely related to test scores. All other county situation factors were positively associated with agents' scores.

TABLE XV

INFLUENCE OF SELECTED COUNTY SITUATION FACTORS ON THE MULTIPLE-CHOICE
TEST SCORE OF AGENTS WORKING WITH THE EXTENSION DAIRY PROGRAM
IN SELECTED TENNESSEE COUNTIES
N=41

Selected County Situation Factors	Multiple-Choice Test Scores			
	r	R	R ²	Increase in R ²
Number of men agents assigned to county	-.27 ^d	.27	.07	7.3
Income from dairying	.27 ^d	.44 ^c	.19	11.6
No. of Grade A dairy farms in county	.25	.44 ^c	.19	0.4
Total no. of dairy farms in county	.20	.44	.20	0.2
% dairy income is of total income	.17	.44	.20	0.0

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

In the multiple correlation analysis. Table XV shows that 20 percent of the variation in agents' test scores were accounted for by the five county situation factors. Number of men agents assigned to the county and dollars income from dairying in the county accounted for 19 percent of the variation in test scores on the multiple-choice test (that is, knowledge of dairying and related subjects).

The remaining three variables (number of Grade A dairy farms, total number of dairy farms, and percent dairy income is of total farm income in the county) accounted for only 1 percent of the variation in the test scores.

Only two of the county situation factors, dollars income from dairying and number of Grade A dairy farms, showed a significant multiple correlation with test scores. One of these factors, number of Grade A dairy farms appeared to be relatively "unimportant" in accounting for the variation in test scores. Most of its significance may be attributed to the carryover effect of the preceding variable, dollars of income from dairying, which entered the multiple correlation analysis.

Based on the data in Table XV, dollars income from dairying was the most accurate of the county situation factors in predicting agents' test scores on the multiple-choice test. This variable accounted for approximately 60 percent of the variation in test scores which was accounted for by all county situation factors.

Relationship of Selected Indicators of Agent's Interest and Attitude
Concerning Dairying with the Multiple-Choice Test Scores of Agent
Working with the Extension Dairy Program in Selected Tennessee Counties

Findings regarding the null hypotheses tested with the coefficient of correlation. The rank order comparison technique was used to measure agent interest in dairying and attitude towards working with the dairy clientele in the county. This interest and attitude scale gave a measure of the relative feeling of agents about their Extension dairy work when compared with other Extension work areas on each of the five factors selected as indicators of agents interest and attitude.

Data in Table XVI shows the inter-correlation of each of these factors with agents' scores on the multiple-choice test. All five of these factors were positively associated with agents' scores on the multiple-choice test, however, none of the five were significantly correlated at the .05 level. The combined score from all five factors, also, failed to reach the .05 level of significance (Appendix C, Table XXVII).

Therefore, the null hypothesis stating that the score on the interest and attitude scale was not significantly associated with the score on the multiple-choice test could not be rejected.

This means that interest and attitude of these agents, as measured by this scale, was not significantly related to knowledge (as measured by the multiple-choice test) of agents in dairying and related subjects.

This, however, was not the case with the interest and attitude scores and test scores of the 26 agents pre-testing the questionnaires.

TABLE XVI

INFLUENCE OF SELECTED INTEREST AND ATTITUDE FACTORS ON THE MULTIPLE-
CHOICE TEST SCORES OF AGENTS WORKING WITH THE EXTENSION DAIRY
PROGRAM IN SELECTED TENNESSEE COUNTIES
N=41

Selected Interest and Attitude Factors	Multiple-Choice Test Scores			
	r	R	R ²	Increase in R ²
Job satisfaction in dairy work	.21	.21	.04	4.4
Personal interest in dairy work	.19	.23	.05	0.7
Self-confident in dairy work	.05	.31	.09	4.2
Relative importance of dairying in county	.08	.32	.11	1.2
Receptiveness of dairy clientele to Extension assistance	.13	.34	.11	0.7

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

The correlation of scores on the interest and attitude scale with scores on the multiple-choice test of the pre-test group of agents was significant at the .001 level. This can perhaps be explained by the greater range in score on the interest and attitude scale of these agents. From the standpoint of scores on the interest and attitude scale, the agents involved in the study were much more homogeneous than those of the agents in the pre-test group.

Perhaps the interest and attitude scale used in this study was not adequate to measure the real differences in the interest and attitude of this homogenous group of agents.

In the multiple correlation analysis. All five of the selected interest and attitude factors accounted for only 11 percent of the variation in agents' scores on the multiple-choice test (Table XVI). Job satisfaction and self-confidence accounted for 78 percent of this variation. However, none of the factors was found to be significantly associated in the multiple correlation analysis with test scores of agents. The three remaining factors: interest, importance, and receptiveness accounted for only about 22 percent of the variation in test scores accounted for by all of the selected interest and attitude factors.

According to these data, the agents' feeling of job satisfaction and his feeling of self-confidence in the dairy work area was the most accurate of the interest and attitude factors in predicting agents' scores on the multiple-choice test. These two factors accounted for about an equal amount of the variance in agents' knowledge of dairying.

Relationship of Selected Work Related Factors with the Multiple-Choice Test Scores of Agents Working with the Extension Dairy Program in Selected Tennessee Counties

Findings regarding null hypotheses test with the coefficient of correlation. The coefficient of correlation for each of the 12 work related factors with multiple-choice test scores of agents are shown in Table XVII. All 12 of these factors failed to reach the .05 level of significance required in this study to reject the null hypotheses.

Therefore, the null hypotheses stating that the man-days devoted to individual contact methods, number of individual contacts with dairy clientele, number of contacts per man-day worked, total man-days agents worked, man-days devoted to group and mass media contact methods with dairy clientele, man-days dairy specialist spent in county, percent office time is of total time worked, man-days agent worked out-of-office, man-days agent worked in-office, total contacts made with dairy clientele, total man-days devoted to dairy work, and number of group contacts made with dairy clientele by the agent were not significantly associated could not be rejected.

Ten of the 12 work related variables were positively associated with agents' test scores, although not reaching the .05 level required for significance.

In the multiple correlation analysis. Data in Table XVII also show that the 12 selected work related factors accounted for 21 percent of the variation in test scores of agents. However, none of these

TABLE XVII

INFLUENCE OF SELECTED WORK RELATED FACTORS ON THE MULTIPLE-CHOICE
TEST SCORES OF AGENTS WORKING WITH THE EXTENSION DAIRY
PROGRAM IN SELECTED TENNESSEE COUNTIES
N=41

Selected Work Related Factors	Multiple-Choice Test Scores			
	r	R	R ²	% Increase in R ²
Man-days devoted to individual contact methods with dairy clientele	.17	.17	.03	2.9
No. of contacts with dairy clientele	.06	.25	.06	3.5
No. of dairy contacts per man-day worked	.12	.34	.11	5.0
Total man-days agent worked	.09	.35	.12	1.0
Man-days devoted to group and mass media contacts	.06	.37	.14	1.2
Man-days dairy specialist in county	.13	.40	.16	2.2
% in-office time is of total time worked	-.07	.40	.16	0.3
Man-days agent out-of-office	.09	.45	.20	3.8
Man-days agent in-office	-.02	.46	.21	1.0
Total contacts with dairy clientele	.11	.46	.21	0.0
Man-days devoted to dairy	.16	.46	.21	0.0
Group contacts with dairy clientele	.15	.46	.21	0.0

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

factors was found to be significantly associated in the multiple correlation analysis with agents' scores on the multiple-choice test in dairy and related subjects.

Five of these factors accounted for 17.4 percent of the 21 percent variation in test scores accounted for by all of the work related factors. The five factors and percent of variation accounted for were: (1) number of contacts with dairy clientele per man-day devoted to dairy work, 5 percent; (2) man-days agent spent out-of-office, 3.8 percent; (3) number of individual contacts with dairy clientele, 3.5 percent; (4) man-days agent devoted to individual contact methods with dairy clientele, 2.9 percent; and (5) man-days dairy specialist spent in county, 2.2 percent.

The seven remaining variables accounted for only 3.6 percent of the variance in test scores of agents.

Relationship of the 12 Sections of the Multiple-Choice Test with the Total Multiple-Choice Test Scores of Agents Working with the Extension Dairy Program in Selected Tennessee Counties

Scores on each of the 12 sections of the multiple-choice test were found to be associated (.05 level) with the scores on the total multiple-choice test (Table XVIII).

In the multiple correlation analysis--all 12 sections of the multiple-choice test were found to equal or exceed the .05 level of significance in association with the total multiple-choice test. Each section of the test accounted for some increase in the variation accounted for in the total test. However, the Extension program

TABLE XVIII

INFLUENCE OF SELECTED SECTIONS OF THE TEST ON THE TOTAL MULTIPLE-
CHOICE TEST SCORES OF AGENTS WORKING WITH THE EXTENSION
DAIRY PROGRAM IN SELECTED TENNESSEE COUNTIES
N=41

Sections of the Multiple- Choice Test	Multiple-Choice Test Scores			
	r	R	R ²	% Increase in R ²
Aritificial Breeding and Genetics	.67 ^a	.67 ^b	.45	44.7
Waste Disposal	.58 ^a	.80 ^b	.64	19.3
Records and Record Keeping	.57 ^a	.88 ^b	.78	14.2
Nutrition and Feeding	.52 ^a	.91 ^b	.84	5.3
Building and Farmstead Planning	.48 ^b	.93 ^b	.87	3.5
General Dairying	.46 ^b	.95 ^b	.90	3.5
Abnormal Milk	.36 ^b	.97 ^b	.94	3.6
Extension Communication	.46 ^b	.98 ^b	.96	2.0
Production of Quality Feed	.41 ^b	.99 ^b	.97	1.2
Extension Program Development	.30 ^c	.99 ^b	.98	0.4
Milking Management	.33 ^c	.99 ^b	.98	0.6
Principles of Farm Planning	.37 ^c	1.00 ^b	.99	0.9

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

development, milking management, and farm planning sections accounted for less than 2 percent of the variation in the total test. This means that these three sections could have been eliminated without much effect on the validity of the test, because the other nine sections of the test accounted for 98 percent of the variation in the total test.

Certain factors were selected from each of the sub-groups studied and combined in a multiple correlation analysis with agents' test scores.

Relationship of Selected Factors from Each of the Sub-groups Studied with the Scores on the Multiple-Choice Test by Extension Agents from Selected Tennessee Counties

Thirteen independent variables were selected from the four sub-groups (background and training, county situation, interest and attitude, and work related factors) for a multiple correlation analysis with agents' test scores. These 13 factors account for 35 percent of the variation in the multiple-choice test scores of Extension agents (Table XIX). Three of these factors accounted for 62 percent of this variance. The three factors and percent variation in test scores accounted for by each were: years in present position in Extension, 11.1 percent; dollars income from dairying in the county, 7 percent; and undergraduate grade point average, 3.5 percent. The other 10 factors accounted for about 13 percent of the variance. Each factor accounted for about equal amounts of the variance.

In a multiple correlation analysis with test scores as the dependent variable, 15 other independent variables were added to

TABLE XIX

INFLUENCE OF SELECTED FACTORS ON THE MULTIPLE-CHOICE TEST SCORES OF
EXTENSION AGENTS WORKING WITH THE EXTENSION DAIRY PROGRAM IN
SELECTED TENNESSEE COUNTIES

N=41

Selected Variables	Scores on Multiple-Choice Test			
	r	R	R ²	Increase in R ²
Years in present position	-.33 ^c	.33 ^c	.11	11.1
Dollars from dairying in county	.27 ^d	.42 ^c	.18	7.0
Undergrad. grade point average	.11	.46 ^c	.22	3.5
Hrs. of undergrad. credits in dairy	-.11	.48 ^c	.23	1.7
Interest and attitude scale	.14	.50 ^c	.25	1.6
No. individual contacts with dairy clientele	.06	.52 ^c	.27	2.1
Total man-days agent worked per year	.09	.53 ^c	.29	1.5
Highest degree earned	.24	.55 ^c	.30	1.5
Man-days devoted to dairy work with ind. methods	.17	.56	.31	1.2
Man-days devoted to dairy work with group and mass media methods	.06	.57	.33	1.4
Hrs. of grad. credits in dairy	.13	.58	.34	1.5
Man-days specialist spent in county	.13	.59	.35	0.5
No. of contacts per man-days worked	.12	.59	.35	0.2

^aSignificant at the .001 level

^bSignificant at the .01 level

^cSignificant at the .05 level

^dSignificant at the .10 level

the 13 above. The most notable of these variables, from the standpoint of variation accounted for in test score, was agents' effectiveness rating scores. In the multiple correlation analysis agents' effectiveness rating accounted for 23 percent of the 71 percent variation in test scores accounted for by the 28 variables.

These data indicate that the most accurate predictors of agents' test scores on the multiple-choice test were: (1) effectiveness rating score of agents, (2) years in present position, (3) dollars income from dairying in the county, and (4) undergraduate grade point average.

Years in present position was inversely associated with agents' test scores. This means, the longer the agent had been in his present position the lower score he tended to make on the multiple-choice test.

Effectiveness rating, dollars income from dairying, and undergraduate grade point average were positively associated with scores on the multiple-choice test. This means, as one increases the other tended also to increase.

Summary of Findings Related to Multiple-Choice Test Scores of Agents

Summary of the correlation analysis on the 24 selected variables with agents' scores on the multiple-choice test. Data in Tables XIV, XV, XVI, XVII, and XVIII, pages 108, 111, 114, 117, and 119, respectively, and Appendix C, Table XXVII reveal the coefficient of correlation for each of the 24 independent variables with the multiple-choice test scores of agents working with the Extension dairy program in selected Tennessee counties.

Only two of the 24 independent variables were found to equal or exceed the .05 level of association with the agents' scores on the multiple-choice test in dairy and related subjects. The two factors found to be related at required significance level (.05) in order to reject the null hypotheses were: (1) number of years in Extension, and (2) number of years in present position in Extension.

Each of these independent variables was inversely associated with scores on the multiple-choice test. This means as the years in Extension and/or years in the present position increase the agents' score on the multiple-choice test tended to decrease (that is, agents with long tenure tended to score lower on knowledge test scores than did agents who had fewer years tenure).

Factors not reaching the required .05 level of significance for rejecting the null hypotheses were: (1) highest degree earned, (2) undergraduate grade point average, (3) number of hours undergraduate credits in dairying, (4) number of hours of graduate credits in dairying, (5) number of man-days dairy specialists spent in county, (6) percent of farm income in county where assigned received from dairying, (7) number of dairy farms in the county, (8) income from dairying, (9) number of Grade A dairy farms in county, (10) number of men Extension agents assigned to the county, (11) total score on interest and attitude scale, (12) total man-days agents devoted to dairy educational work, (13) man-days agents devoted to individual contact methods with dairy clientele, (14) man-days agents devoted to group and mass media methods with dairy clientele, (15) total number of contacts made with dairy clientele, (16) number of individual

contacts made by agents with dairy clientele, (17) number of group contacts made by agents with dairy clientele, (18) number of contacts per man-days devoted to dairy work, (19) total man-days worked by agent, (20) total man-days worked by agent out-of-office, (21) total man-days worked by agent in-office, and (22) percent in-office time was of the total time worked by each agent.

The background and training sub-group was the only sub-group having an independent variable to reach or exceed the .05 level of significance required to reject the null hypothesis.

Summary of findings from the multiple correlation analysis on the sub-groups of independent variables with the multiple-choice test scores of agents. The results of multiple correlation analysis of factors in the five sub-groups were shown in Tables XIV, XV, XVI, XVII, and XVIII, pages 108, 111, 114, 117, and 119, respectively. The five sub-groups and percent variation in the multiple-choice test scores accounted for by each sub-group of factors were: (1) sections of the multiple-choice test, 99 percent; (2) background and training factors, 23 percent; (3) work related factors, 21 percent; (4) county situation factors, 20 percent; and (5) interest and attitude factors, 11 percent. All except two of the sub-groups (interest and attitude, and work related) had at least one factor significantly associated with test scores in the multiple correlation analysis.

Independent variables accounting for the largest percent of the variation in agents' test scores within each sub-group of factors were as follows:

1. Background and training of agents--two factors (years in Extension and undergraduate grade point average) accounted for 18 percent of the 23 percent variation in the multiple-choice test scores which was accounted for by all seven background and training factors. Years in Extension, which accounted for 64 percent of the variation accounted for by all factors in this sub-group, was inversely associated with scores made by agents on the multiple-choice test. This means, as the years in Extension increased the scores agents made on the test tended to decrease.

2. County situation factors--the county situation factors accounted for 20 percent of the variation in test scores. Dollars income from dairying in the county and number of men agents assigned to the county accounted for 19 percent of this variance. The other three variables accounted for only 1 percent of the variation in test scores.

3. Interest and attitude factors--the greatest part of the variation in test scores accounted for by interest and attitude factors was accounted for by two factors (job satisfaction and self confidence). However, each of the five interest and attitude factors failed to reach the .05 level of significance. Only 11 percent of variation in test score was accounted for by the five interests and attitude variables.

4. Work related factors--the 12 work related factors accounted for 21 percent of the variation in test scores. However, none of the factors were found to be significant at the .05 level in the multiple correlation analysis. Number of man-days worked accounted for more of the variation (5 percent) in test scores than any other work related factor.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. INTRODUCTION

County Extension workers compose the largest single group of educators in the Cooperative Extension Service. Therefore, the success or failure of Extension depends primarily upon the effectiveness of county Extension personnel. The desire of the investigator to help improve the effectiveness of county Extension workers led to this research. It has been said that the responsibility for proper selection, orientation, training, and continued motivation of employees rests with the supervisor whose ultimate goal is the development of an effective productive work force.⁷² The importance of this study rests with the implications it provides for better understanding of and improvements in the foregoing areas.

To determine why some individual staff members function effectively and others remain only marginally productive has challenged the skills and efforts of researchers and practitioners in the field of administration and supervision since the beginning of organizations. This study is a continuation of those endeavors, concentrating its inquiries on determining agents' effectiveness in planning and conducting the county Extension dairy program and their knowledge in dairying

⁷²Amend, op. cit., p. 20.

and related subjects and the relationship of these variables to each other and to selected independent variables. The independent variables were classified into the following four sub-groups:

- (1) background and training factors, (2) county situation factors, (3) interest and attitude factors, and (4) work related factors.

B. SUMMARY OF METHODS AND PROCEDURES USED

Limitations of the Study

This study was composed of 41 county Extension workers assigned the primary responsibility for the Extension dairy educational program in selected Tennessee counties. To be included in the study, the agent must have attended a week of intensive in-service training in dairying and related subjects in the 1970 calendar year. In order to be eligible to attend this in-service training, the agent must have been assigned to a county with at least \$750,000 from dairying and/or at least 20 percent of the county farm income derived from dairying.

Effectiveness Rating Used

The effectiveness ratings of agents in this study were based on the judgment of qualified people. Each agent's effectiveness was rated by a District Supervisor, an Associate District Supervisor, and from three to five Extension Dairy Specialists who had had the opportunity to observe the agent in a variety of teaching situations with the dairy educational program in the county during the past year.

In an attempt to maximize the accuracy and uniformity of the ratings, all raters used the same rating scale or score card. The

score card was composed of eight broad areas of agents' responsibilities and personality traits. Seven areas on the score card (including a total of 31 questions) dealt with agents' responsibilities in planning and conducting an Extension dairy program in the county and one area on the score card (composed of nine questions) dealt with agents' personality traits, felt by the researcher after reviewing the literature to be related to effectiveness.

Raters were brought together in groups for instruction on rating procedures. Pitfalls to watch for in making ratings and explanation of the rating scale were discussed. Assurance was given the raters that their ratings would be kept confidential and would in no way help or hinder the individual agent.

Development and Use of the Multiple-Choice Test

A comprehensive multiple-choice test (145 questions) was used to determine agents' knowledge in dairying and related subjects. This test was developed by Extension personnel and members of the teaching staff in the College of Agriculture, University of Tennessee, under the direction and guidance of the researcher. The objectives of the test and procedures for developing the multiple-choice test were provided in writing and discussed verbally with all those involved in developing and critiquing the test.

In addition to the critique of the test by the developing and reading committee, a basic item analysis was made by tabulation of the responses that were made to each item on the preliminary test taken by the 26 county Extension agents used to pre-test the instrument.

These 26 agents represented the five Extension districts in the state. The information gained from the pre-test and the item analysis helped the researcher and the developing committee make further improvements in the test.

The use of an answer sheet and a scoring key aided the researcher greatly in improving the speed and accuracy of the scoring procedure. A common correction formula was used for correcting for guessing on the test.

Interest and Attitude Scale Used

The rank order comparison technique was used to measure agents' interest in dairying and attitude toward working with the dairy clientele in the county. This interest and attitude scale gave a measure of the relative feeling of agents about the Extension dairy work in the county when compared with other Extension work areas on five factors (agents' job satisfaction, agents' self-confidence, agents' perception of clientele receptiveness to Extension's assistance, personal interest, and importance in the county) selected as indicators of agents' interest and attitude.

Data Collection

Information regarding knowledge in dairying and related subjects, and data concerning interest and attitudes of agents toward dairying were collected from the 41 agents enrolled in the study. Agents were brought together in two groups to complete the multiple-choice test and the interest and attitude scale.

Data on the background and training of agents were taken from the file and college transcripts. Data on the county situation were taken from materials prepared by the Extension Agricultural Economic Department and the Extension Dairy Department. Work related data were taken from TEMIS.

Analysis of Data Used

The statistical problem in this investigation was to determine the association of agents' effectiveness with the county Extension dairy program and agents' knowledge in dairying and related subjects with each other and with the independent variables. The 24 independent variables classified into four sub-groups were as follows:

Background and training factors.

1. Highest degree earned
2. Undergraduate grade point average
3. Number of hours undergraduate credit in dairying
4. Number of hours of graduate credits in dairying
5. Number of years of experience in Extension
6. Number of years of experience in present position
7. Number of man-days dairy specialists spent in county

County situation factors.

8. Percent of farm income in county where assigned received from dairying
9. Number of dairy farms in the county
10. Income from dairying

11. Number of Grade A dairy farms in county
12. Number of men Extension agents assigned to the county

Interest and attitude factors.

13. Total score on interest and attitude scale

Work related factors.

14. Total man-days agents devoted to dairy educational work
15. Man-days agents devoted to individual contact methods
with dairy clientele
16. Man-days devoted to group and mass media methods with
dairy clientele
17. Total number of contacts made with dairy clientele
18. Number of individual contacts made by agents with dairy
clientele
19. Number of group contacts made by agents with dairy clientele
20. Number of contacts per man-days devoted to dairy work
21. Total man-days worked by agent
22. Total man-days worked by agent out-of-office
23. Total man-days worked by agent in-office
24. Percent in-office time was of total time worked by the
agent

The null hypotheses used in this study were that the relationships stated above were not significant at the .05 level. The coefficient of correlation (r) was used to test the association of each of the independent variables with each of the dependent variables listed above and also to test the relationship between effectiveness ratings and test scores.

Stepwise regression was used to further analyze the data. The statistics involved were: (1) the coefficient of correlation, r (used to test the null hypotheses), (2) the coefficient of multiple correlation, R , and (3) the coefficient of multiple determination, R^2 (the last two were used to determine the correlation between the dependent variable and two or more independent variables simultaneously). Also, limited use was made of crosstabulation analysis to help show more clearly the exact nature of some of the above relationships.

C. SUMMARY OF FINDINGS

Findings were summarized under two main headings corresponding with the dependent variables of the study. The first section summarizes the findings regarding the association of agents' effectiveness with selected background and training, county situation, interest and attitude, work related and knowledge factors. The second section summarizes the findings regarding the association of agents' knowledge with the above mentioned groups of independent variables.

Association between agents' effectiveness and selected independent variables were determined by use of coefficients of correlation and multiple correlation and through crosstabulation analysis. Therefore, this section of the summary was divided into three sub-sections corresponding to the methods used to analyze the data.

Results Regarding Agents' Effectiveness

Null hypotheses testing regarding the association between agents' effectiveness and selected independent variables. The null

hypotheses stated that there was no significant association between agents' effectiveness rating scores and each independent variable studied. Eight out of the 25 factors analyzed for association with agents' effectiveness were found to equal or exceed the .05 level of significance required to reject the null hypotheses. These factors were:

(1) Number of years in present position--effectiveness ratings of agents tended to decrease as years in Extension increased. Agents judged to be more effective in terms of their dairy program had fewer years of service in their present position.

(2) Number of years in Extension--the statistical analysis revealed that agents with fewer years in Extension had significantly higher effectiveness rating scores than agents with a greater number of years in Extension. Tenure of agents (both years in position and years in Extension) was inversely related to agents' effectiveness rating in this study.

(3) Number of man-days dairy specialist spent in the county--agents' effectiveness rating was positively associated with the amount of time specialist spent in their counties. The most effective agents tended to involve dairy specialists more in conducting their county dairy program.

(4) Number of man-days devoted to dairy work with group and mass media methods--agents' effectiveness tended to increase as the amount of time agents spent on group and mass media teaching methods increased.

(5) Knowledge about dairying and related subjects--the more effective agents scored higher on the multiple-choice test on dairying and related subjects than the less effective agents.

(6) Income from dairying in the county where agent was assigned--agents' effectiveness increased as the income from dairying in the county increased. Agents judged to be more effective were located in counties where income from dairying was also high.

(7) Number of man-days agent spent in the office--effectiveness rating of agents increased as time spent in the office increased. Agents judged to be more effective spent more time in their office than did the less effective agents.

(8) Number of contacts with dairy clientele--the more effective agents made more contacts with dairy clientele than less effective agents.

Therefore, the null hypotheses stating that there were no significant association between agents' effectiveness and years in present position, years in Extension, time spent by dairy specialists in their county, time spent in the office, time devoted to dairy work with group and mass media, scores on dairy test, income from dairying in the county, and number of contacts with dairy clientele were rejected.

All of the other independent variables studied except one (man-days agents were out-of-office) showed a positive correlation coefficient with agents' effectiveness ratings, however, all failed to reach the .05 level of significance required to reject the null hypotheses. The 17 independent variables which did not achieve the

.05 level of significance were: (1) highest degree earned, (2) undergraduate grade point average, (3) hours undergraduate credits in dairying, (4) hours of graduate credits in dairying, (5) percent of county farm income received from dairying, (6) number of dairy farms in the county, (7) number of Grade A dairy farms in county, (8) number of men Extension agents assigned to the county, (9) total score on interest and attitude scales, (10) total man-days agents devoted to dairy educational work, (11) man-days agents devoted to individual contact methods with dairy clientele, (12) number of individual contacts agents made with dairy clientele, (13) number of group contacts agents made with dairy clientele, (14) number of contacts per man-days agents devoted to dairy work, (15) total man-days worked by agent, (16) total man-days agents worked out-of-office, and (17) percent agents' in-office time was of total time worked.

Therefore, the null hypotheses stating that there was no significant association between agents' effectiveness and each of the above 17 independent variables was not rejected.

Findings from the multiple correlation analysis between agents' effectiveness ratings and two or more of the selected independent variables simultaneously. The percent of variation in agents' effectiveness accounted for by all independent variables in each sub-group and the independent variables accounting for the largest percent of the variation in agents' effectiveness within each sub-group of independent variables are given below:

(1) Background and training factors accounted for 52 percent of the variation in agents' effectiveness ratings. Years in present

position, undergraduate grade point average and man-days dairy specialists spent in the county accounted for 90 percent of the variation in agents' effectiveness accounted for by all seven factors in this sub-group. Years in present position accounting for almost one-half of this variation in agents' effectiveness and it was inversely related to effectiveness.

(2) Scores on the 12 sections of the multiple-choice test in dairying and related subjects accounted for 42 percent of the variation in agents' effectiveness ratings. Scores on the sections on dairy records, abnormal milk and building and farmstead planning accounted for approximately 86 percent of the variation in agents' effectiveness accounted for by all 12 sections of the test.

(3) Work related factors accounted for the third largest percent (34) of variation in agents' effectiveness ratings. Man-days dairy specialists spent in the county, man-days agent spent in-office and number of contacts with dairy clientele accounted for approximately 80 percent of the variation in agents' effectiveness accounted for by all 11 of the work related variables.

(4) County situation factors accounted for 16 percent of the variation in agents' effectiveness ratings. Income from dairying accounted for approximately 80 percent of the variation in agents' effectiveness accounted for by all five county situation factors.

(5) Scores on the five sections of the interest and attitude scale accounted for 12 percent of the variation in agents' effectiveness ratings. Agents feelings concerning the receptiveness of dairy clientele to Extension's assistance and relative importance of dairying

in the county accounted for the largest percent of the variation in agents' effectiveness accounted for by all five factors in this sub-group.

The independent variables listed above by sub-groups accounted for the largest percent of the variation in agents' effectiveness. Therefore, within each sub-group the above mentioned variables were the best predictors of the agents' effectiveness rating.

Fourteen of the above mentioned independent variables were selected for further multiple regression analysis. The 14 variables were analyzed to determine which were the best predictors of agents' effectiveness. The 14 variables accounted for 75 percent of the variation in agents' effectiveness. Five of these variables accounted for 65 percent of the variation in effectiveness of the county Extension workers studied. The five factors and the percent of variation accounted for by each were: number of years in the present position, 23.9 percent; undergraduate grade point average, 14.3 percent; man-days devoted to dairy work with group and mass media methods, 11.5 percent; score on multiple-choice test, 5.6 percent; and number of men Extension agents assigned to the county, 9.5 percent.

The remaining nine variables accounted for only 10 percent of the variance in agents' effectiveness.

Findings from the crosstabulation analysis with agents' effectiveness ratings, years in Extension and other selected variables. The crosstabulation analysis provided a breakdown of the agents (below and above average for the group) on each of the selected factors.

Findings from the breakdown of agents into three sub-groups based on years in Extension compared with other selected factors are presented below.

As was shown previously in the section of the report on null hypotheses testing, there was the relatively high negative correlation between agents' effectiveness rating scores and tenure (both number of years in Extension and also number of years in present position). The crosstabulation analysis further showed that there were three distinct categories of years in Extension with agents' effectiveness rating scores. These categories, some observations and implications for each were as follows:

(1) The youngest category, from the standpoint of tenure, were those agents with from 5 to 12 years in Extension. All six of the agents in this category rated above average in effectiveness. This indicates that perhaps some common factor or factors such as proximity to college training, desire to prove self and/or other motivational factors were probably operating to influence agents' job performance during this stage of their career.

All six of the agents in this category had completed their Master's degree. However, only one-half of these agents scored above average for the group on the multiple-choice test. Also they were average for the group on undergraduate grade point average.

(2) Fifteen of the 27 agents in the 13 to 31 years in Extension category had an effectiveness rating above the mean for the total group. Eight of these agents exceeded an effectiveness rating of 130 as compared to only one in the previous category. The agents with an

effectiveness rating score over 130 had a range in tenure from 17 to 31 years, which indicates that agents who remain properly motivated may continue to improve in effectiveness for many years. Also, complacency and/or other factors probably begin to exert an important influence on many agents' effectiveness during this stage in their career. Fifty-five percent of the agents in this category had received a Master's degree. Likewise, about 55 percent scored above the group average on the test. Only 44 percent of these agents had above the group mean undergraduate grade point average.

(3) All eight agents in this category (32 to 43 years in Extension) were rated below average in effectiveness. Five of the eight agents with effectiveness ratings below 90 were in the 32 to 43 years in Extension category, which indicates that failure to maintain the necessary competencies, complacency, and/or other factors probably had a strong influence on agents' effectiveness during this stage of their career. All of the agents in this category made below the group average on the multiple-choice test in dairying and related subjects. Yet, over 62 percent of these agents had above the group mean undergraduates grade point average. Only 25 percent had earned a Master's degree.

Results Regarding Agents' Knowledge

Hypotheses testing regarding the association between agents' knowledge in dairying and related subjects and the selected independent variables. The null hypotheses stated that there was no significant association between agents' knowledge in dairying and related subjects

and each independent variable studied. Only three out of the 25 factors analyzed for association with agents' test scores were found to equal or exceed the .05 level of significance required to reject the null hypotheses. The findings concerning these factors were:

(1) Number of years in Extension--test scores of agents decreased as years in Extension increased.

(2) Number of years in present position--agents' test scores were inversely related to years in present position in Extension. Agents' test scores tended to decrease as tenure (both years in Extension and years in position) increased.

(3) Effectiveness ratings of agents--agents' test scores tended to increase as effectiveness rating increased. Stated another way, the most effective agents made higher scores on the the multiple-choice test in dairying and related subjects.

Therefore, the null hypotheses stating that there were no significant association between agents' knowledge in dairying and related subjects and years in Extension, years in present position and effectiveness ratings of agents were rejected.

All other independent variables studied except one (hours of undergraduate credits in dairying) were related positively to agents' test scores. However, all failed to reach the .05 level of significance required to reject the null hypotheses. Therefore, all other null hypotheses tested for association with agents' test scores were not rejected.

The 22 factors found not reaching the .05 level of significance were: (1) highest degree earned, (2) undergraduate grade point average,

(3) hours of undergraduate credits in dairying, (4) hours of graduate credits in dairying, (5) man-days dairy specialists spent in county, (6) percent of farm income in county where assigned received from dairying, (7) number of dairy farms in the county, (8) number of Grade A dairy farms in county, (9) income from dairying, (10) number of men Extension agents assigned to the county, (11) total score on interest and attitude scale, (12) total man-days agents devoted to dairy educational work, (13) man-days agents devoted to individual contact methods with dairy clientele, (14) man-days agents devoted to group and mass media methods with dairy clientele, (15) total number of contacts made with dairy clientele, (16) number of individual contacts made by agents with dairy clientele, (17) number of group contacts made by agents with dairy clientele, (18) total man-days worked by agent, (19) total man-days worked by agent out-of-office, (20) number of contacts per man-days devoted to dairy work, (21) total man-days worked by agent in-office, and (22) percent in-office time was of total time worked by the agent.

Therefore, the null hypotheses stating that there was no significant association between agents' knowledge in dairying and related subjects and each of the above 22 factors were not rejected.

Findings from the multiple correlation analysis on the correlation between agents' knowledge and two or more of the selected independent variables simultaneously. The percent of variation in agents' knowledge accounted for by all variables in each sub-group and the independent variables accounting for the largest percent of

the variation in agents' knowledge within each sub-group of factors were:

(1) Background and training factors accounted for 23 percent of the variation in agents' test scores. Two factors, years in Extension and undergraduate grade point average, accounted for 18 percent of this variation. Years in Extension, accounted for almost 60 percent of the variation accounted for by all seven factors in this sub-group, was inversely related to agents' scores on the multiple-choice test.

(2) Work related factors accounted for the second largest percent (21) of variation in agents' test scores. Number of contacts with dairymen per man-day worked, man-days agents out-of-office, total number of contacts with dairy clientele, man-days devoted to individual contact methods with dairymen and man-days dairy specialists spent in the county accounted for 17.4 percent of the variation accounted for by all 12 work related factors.

(3) County situation factors accounted for 20 percent of the variation in agents' test scores. Income from dairying in the county and number of men Extension agents assigned to the county accounted for 19 percent of this variation. The other three factors accounted for only 1 percent of the variation in agents' test scores.

(4) Scores on the five sections of the interest and attitude scale accounted for 11 percent of the variation in agents' scores on multiple-choice test, job satisfaction and self-confidence accounted for 9 percent of this variation. However, each of these factors failed to reach the .05 level in the multiple correlation analysis.

The factors listed above accounted for the largest percent of the variation in agents' test scores accounted for by all factors in each sub-group. Therefore, within each sub-group these factors were the best predictors of the agents' knowledge in dairying and related subjects.

Thirteen factors were selected on the basis of the multiple regression and analysis from the four sub-groups. These factors were analyzed with the multiple regression analysis to determine their association with agents' test scores. All 14 factors accounted for 35 percent of the variation in agents' test scores. The most accurate predictors of agents' scores on the multiple-choice test were:

(1) agents' effectiveness rating scores, (2) years in present position, (3) income from dairying in the county, and (4) undergraduate grade point average.

D. CONCLUSIONS

Based on the findings of this study the following conclusions have been drawn:

1. There is a positive relationship between agents' effectiveness in conducting the county Extension dairy program and these agents' knowledge in dairying and related subjects.

2. There is a negative relationship between agents' effectiveness ratings and also agents' scores on the dairy subject-matter test and to these agents' tenure (both years in present position and years in Extension).

3. There is a positive relationship between agents' effectiveness and the amount of time these agents spent on group and mass media teaching methods.

4. There is a positive relationship between agents' effectiveness and the amount of time dairy specialist spent in the county where agent was assigned.

5. There is a positive relationship between agents' effectiveness and the amount of time these agents spent in their offices.

6. The most accurate predictors of agents' effectiveness ratings are number of years in present position (negative association), undergraduate grade point average, man-days devoted to dairy work with group and mass media methods, scores on multiple-choice test and number of men Extension agents assigned to the county.

7. The most accurate predictors of agents' test scores are agents' effectiveness ratings, years in present position (negative association), income from dairying in the county and undergraduate grade point average.

E. RECOMMENDATIONS

These recommendations were derived from the findings of the study, the review of related literature, and the judgment and experience of the researcher.

1. The Tennessee Agricultural Extension Service should consider establishing and maintaining an up-to-date testing program in connection with the dairy and similar in-service training programs. This should help improve the quality of training as well as help evaluate

competency levels of agents. Further this should help those responsible for training make wiser decisions concerning training needs. It also should help them evaluate progress made toward training objectives.

2. District supervisors should stay informed (through observation and routine study of TEMIS print-outs) about the uses being made of subject matter specialists in each county, and also about allocations of county staff time through different teaching methods in the various work areas. This situational information should be reviewed regularly with county personnel in an attempt to insure the most effective possible allocations of county staff and specialist time in the counties.

3. Since this study shows that the effectiveness of agents tended to decrease with tenure, every consideration should be given by Extension administrators and supervisors to find methods of preventing this from happening in the future and to reversing this trend.

The recently established procedure for allowing county Extension workers to move through progressive steps (Assistant Extension worker, Associate Extension worker, and Extension worker) in rank and title may provide a motivational tool to help prevent this leveling off in performance. In order that title changes may function as a motivator of high performance, careful consideration should be given to not making agents' title or rank changes automatic with tenure, but relating them, as stated in present policy, to the performance of the

individual and also accompanied with appropriate financial rewards. Proper use of the merit reward system should help keep agents motivated and performing at a more effective level.

4. District supervisors should study the local situation carefully with county Extension staffs and with groups of county staff members with common problems and interest in search of appropriate and timely areas for program emphasis. Assistance in making and encouragement in carrying out appropriate and timely changes in program emphasis can help provide the needed challenge to motivate an agent to maintain or improve his effectiveness.

5. The University of Tennessee and Agricultural Extension Service Administration should continue to review and change their retirement policies when warranted based on available information.

6. Further research should be encouraged to further clarify the following conditions which were indicated in this study:

a. The negative association between tenure and agents' effectiveness and agents' test scores.

b. The relation of the leveling off or drop in agents' dairy knowledge and effectiveness to motivation.

c. The use of testing as a tool for improving in-service training programs (testing before training starts and at different time periods after training).

d. Testing as a tool in motivating agents to remain alert during in-service training.

e. The relationship of time expenditure, via different teaching methods, and agent effectiveness.

- f. The different methods of evaluating agents' performance.
- g. The use of different interest and attitude scales in determining the degree of agents' motivation.

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APPENDICES

APPENDIX A

To: All persons participating in the instruction phase of the one week of dairy in-service training presented to agents in certain Tennessee counties in 1970

Subject: Request for assistance in preparing multiple-choice questions designed to assess the Dairy Subject Matter Competency of the Tennessee County Extension Agents participating in the week of In-service Training in 1970.

Dear Co-workers:

As many of you know, I am doing a study of certain factors (dairy subject matter competency, background and training, attitudes and interests, and teaching efforts) associated with county Extension workers effectiveness in the conduct of Extension dairy educational work in certain Tennessee counties. I need your help in preparing a multiple-choice test that will assess the dairy subject matter competency of county Extension agents involved in the study. Enclosed is a section from the methods and procedures and from the literature review that will help you better understand what I am attempting to do and also give you some guidance in preparing the test items for the part of the training you presented at the in-service training.

It would be greatly appreciated if you would prepare sufficient multiple-choice items to adequately assess the agent's competency in the area you presented at the Dairy In-service Training in 1970. I

would very much like to have these items by July 26, 1971. Let me thank you in advance for your cooperation in this endeavor.

Sincerely,

Rural A. Peace

Construction of the Dairy Subject Matter Test

A multiple-choice test containing _____ questions covering what was felt to be an adequate sample of the important phases of dairy subject matter necessary to cover the content and assess the objectives of the test was constructed. This test was constructed in close cooperation with Extension Dairy Subject Matter Specialists, other subject matter specialist closely associated with dairying, and the dairy teaching staff in the College of Agriculture. Approximately 20 percent more questions than planned for the final instrument were constructed.

One basis upon which the adequacy of the test (from the standpoint of subject matter coverage) was judged was the subject matter presented at one week of intensified (included night sessions and assignments) dairy in-service training in 1970. This in-service training was planned and the content covered was selected by a committee including members of the Extension dairy department, Extension education department, Extension communications department, and members of the Extension agronomy, agricultural economic, and agricultural engineering departments. Also, it was based partly on the results of a practice check list survey completed by the county Extension worker with 30 dairy farmers in each of the 42 counties. It was the feeling of this group at the time that they were providing an adequate coverage of the agents' dairy subject matter needs for conducting an effective county dairy program. Each agent completed a plan of work for a dairy program in his county as a part of the training.

The primary objective of the test was to measure the subject matter competency (factual knowledge, understanding of dairy information, application of principles, and interpretation of data) of county Extension agents needed to collect, analyze, and interpret the dairy situation in the county and based on this, to develop and implement an effective Extension dairy educational program with the dairy clientele in the county.

The committee assisting with the test will be asked to judge the following:

1. Quality of individual test items (determine if items are well constructed)
2. Complete coverage and balance coverage of subject matter areas
3. Determine if test items are necessary and sufficient to assess the objective.

After the initial test items were completed, they were reviewed by the test reading committee and other competent critics such as Extension administrators, supervisors, specialists, and members of the teaching staff of The University of Tennessee College of Agriculture. These reviews led to elimination, revision, and additions to the questions.

This test was then reprinted and given to ____ Tennessee County Agricultural Extension Agents not included in the study. Each of these agents were asked, after he completed the test for suggestions which might aid in improving the test items. A record was kept on time taken by different portions of the agents to complete the test. This information provided a guide to setting time limits on the official test group.

The basic item analysis was made by tabulation of the responses that were made to each item on the test. Tabulation was made as follows:

1. Number getting each item right
2. Number choosing each of the wrong options
3. Number omitting the item
4. The distribution of the above in the upper and lower fractions of the group

This tabulation provided information on the difficulty of each item, the discrimination of each item and on the usefulness of each option (are the wrong answers fairly equally distributed among the wrong options).

The information gain from the tryout led to further improvement of the test.

After a final review of the test by the reading committee, it was reprinted in mimeograph form in sufficient copies to use with each respondent in this study.

Preparing Multiple-Choice Tests

Ross and Stanley recommend the following rules and suggestions for constructing a multiple-choice tests:

1. Make all optional responses grammatically consistent.
2. As a rule, use direct questions rather than incomplete statements.
3. Avoid making the correct response consistently longer or shorter than the others.

4. Avoid using in the correct response the same words or phrases that occur in the question or incomplete statement.
5. Make all responses plausible.
6. At least four choices should be presented whenever possible.
7. In testing for the understanding of a term or concept, the term should usually be presented first, followed by a series of definitions or descriptions from which the choice is to be made.
8. To measure the higher levels of understanding, increase the homogeneity of the options provided.

Stanley lists 14 question-types which may serve as a guide in formulating multiple-choice test questions.

1. Definition

- a. What means the same as ...?
- b. What conclusion can be drawn from ...?
- c. Which of the following statements expresses this concept in different form?

2. Purpose

- a. What purpose is served by ...?
- b. What principle is exemplified by ...?
- c. Why is this done?
- d. What is the most important reason for ...?

3. Cause

- a. What is the cause of ...?
- b. Under which of the following conditions is this true?

4. Effect

- a. What is the effect of ...?
- b. If this is done, what will happen?
- c. Which of the following should be done (to achieve a given purpose)?

5. Association

What tends to occur in connection (temporal (same time), casual (one causes the other), or concomitant (varying together)) with ...?

6. Recognition of Error

Which of the following constitutes an error (with respect to a given situation)?

7. Identification of Error

- a. What kind of error is this?
- b. What is the name of this error?
- c. What recognized principle is violated?

8. Evaluation

What is the best evaluation of ... (for a given purpose) and for what reason?

9. Difference

What is the important difference between ...?

10. Similarity

What is the important similarity between ...?

11. Arrangement

In the proper order (to achieve a given purpose or to follow a given rule), which of the following comes first (or last, or follows a given item)?

12. Incomplete Arrangement

In the proper order, which of the following should be inserted here to complete the series?

13. Common Principle

All of the following items except one are related by a common principle:

- a. What is the principle?
- b. Which item does not belong?
- c. Which of the following items should be substituted?

14. Controversial Subjects

Although not everyone agrees on the desirability of _____, those who support its desirability do so primarily for the reason that _____.

Many objective type tests tend to emphasize facts, because it is easier to construct questions testing factual knowledge than those that measure understanding, application of principles or interpretation of data. Although there is a positive relationship between factual knowledge and understanding, the relationship is not perfect. In order for a person to understand a principle, he must have the relevant facts and basic skills. But the mere possession of facts does not assure that the one being tested really understands the material.

Objective test questions do not divide into distinct groups, those that measure factual knowledge, understanding, application or interpretation. Many items may involve two or more of these at various levels. Multiple-choice items in particular lend themselves to testing the understanding and application of principle with certain material. The multiple-choice question also works well with the interpretive type item. This type of item consists of an introductory section of material, giving the necessary background and setting the problem, followed by a series of questions checking for interpretation of the materials. The introductory materials may be text, graphs, tables, maps, charts or any similar materials. The introductory material can be complete in itself, providing all of the information needed for understanding, or it can be incomplete so that the person being tested must know certain things in addition to those given.

To the following:

Clyde K. Chappell
William M. Miller
V. D. Parsons
T. Ray Spann
Herbert C. Holt
Joe D. Burns

Kenneth E. DeBusk
Hugh O. Vaigneur
Ralph L. Hamilton
Frank M. DeFriesse
Robert S. Dotson
Cecil E. Carter, Jr.

Dear Co-workers:

I would like to take this opportunity to express my sincere appreciation to you for your excellent response to my recent request for help in designing a dairy test. I received approximately 160 questions in response to this request.

These questions were mimeographed and given to a reading committee composed of persons representing--Extension supervision and administration, Extension Agriculture economics, Extension education, Extension communication, Extension dairying, dairy teaching and research, and education. In addition to the editing of individual items which helped to clarify many questions, the major criticism of the test was concerning the fact that most questions presented were factual and highly technical. Most members of the reading committee indicated that it was a thorough test of the factual knowledge needed in conducting a dairy program.

Many members of the reading committee recommended that some problem solving questions that would test the understanding and/or reasoning ability of agents were badly needed to improve the test.

It would be greatly appreciated if you would write me at least one problem solving type question that would test the understanding and/or reasoning ability of agents in planning and conducting an Extension dairy program in the county. Hopefully the test can be completed within the next ten days to two weeks. Thanks again for your most valuable assistance on this project.

Sincerely,

Rural A. Peace
Associate District Supervisor

To: Associate District Supervisors (Agriculture)

Gentlemen:

The dairy meetings of agents have been scheduled as follows:

Wednesday, November 10, in Knoxville--128 Plant Sciences
Building

Thursday, November 11, in Nashville--Ellington Agricultural
Center Auditorium

You, of course, realize that Mr. Rural Peace will be in attendance and will conduct a dairy survey questionnaire during the morning and possibly part of the afternoon.

After that, Mr. Clyde Chappell or another member of the Dairy Department will discuss with the agents answers to questions contained in the questionnaire and, in general, discuss the dairy educational program for the state. The meeting will begin at 9:30 a.m. and will end at 3:30 p.m.

We are most interested in the outcome of this study as it may provide some information on which future decisions might be made relative to inservice training programs.

Yours very truly,

William D. Bishop
Associate Dean

cc Clyde Chappell
V. W. Darter
District Supervisors

TO: FOLLOWING EXTENSION AGENTS IN DISTRICT FIVE

Charles Edwards
Raymond Sutton
Arnold Hunter
James W. Bond
Thomas B. Carney

Bob L. Gilley
Charles McCall
J. W. McClain
J. C. Amos
James L. Pipkin

Dear Agents:

We would like to ask that you reserve Wednesday, November 10, 1971 to participate in the completion of a questionnaire related to the Dairy Extension program. We would like to ask that you meet with us at 9:30 A.M. to 3:30 P.M. in Room 128, Plant Sciences Building, Institute of Agriculture Campus.

For your information, Mr. Rural Peace, Associate District Supervisor, District IV, will be conducting a study on evaluation of the Dairy Extension program in the counties that participated in the Dairy Inservice Training in 1970. Part of this study will involve your completing the questionnaire on November 10. Mr. Clyde Chappell will be available after you have completed the questionnaire and he and Mr. Peace will discuss these questions with you.

It is essential that each of you reserve this date and participate in the completion of this questionnaire since all of these need to be completed under the same conditions. Mr. Peace will be meeting with other agents on Thursday, November 11, for the same purpose.

I am enclosing a parking sticker for your use on this day.

Very truly yours,

John B. Brower, Jr.
Associate District Supervisor

JBBJr/mk
Enclosure

cc: Mr. Rural Peace

TO: ALL AGENTS ASSISTING WITH THE PRE-TESTING OF THE DAIRY
QUESTIONNAIRE AND PARTICIPATING AS RESPONDENTS IN THE DAIRY
EXTENSION EDUCATION STUDY

Dear Agents:

I would like to take this opportunity to express my appreciation to you for your assistance with the Dairy Study. I was very favorably impressed by the excellent positive attitude exhibited by every single one of you towards participating in this project. Your help on this study is greatly appreciated.

Enclosed is your copy of the 145 question multiple-choice test with the correct answers marked for your use. Most of you checked the way you answered each question on your copy as you completed the questionnaire. It is hoped that this will serve as a good review for you of the Dairy Inservice Training attended earlier. You may want to discuss certain ones of these questions with the appropriate specialist as they visit your county.

Again let me say Thank You for not only the help on this study, but for the excellent attitude you express while providing the help.

Yours truly,

Rural A. Peace
Associate Supervisor

RAP/lh

Encl.

cc: Dr. Bishop
H. T. Short
Owen Hodges
Ray Stamey
John Brower
Clyde Chappell

APPENDIX B

Agent's Name _____

(For rating County Extension Agent Dairy Educational Program Effectiveness)

Deals with areas of agents responsibilities:

	Poor	Fair	Good	Excellent
A. Planning the County Dairy Program (12 pts.)				
1. Effectively involves appropriate people				
2. Develops an adequate long-range and annual plan in dairying				
3. Evaluates the planning process and resulting written documents				
B. Carrying out the annual plan of work (40 pts.)				
1. Makes a continuous effort to effectively carry out the dairy plan of work				
2. Effectively uses a variety of appropriately selected teaching methods				
3. Uses mass media effectively				
4. Uses group methods effectively				
5. Uses personal contacts effectively				
6. Delegates and shares responsibilities with staff, committees, and leaders				
7. Involves public agencies and other organizations in implementing the dairy program				
8. Provides opportunity for leadership development				

	Poor	Fair	Good	Excellent
9. Uses sound, up-to-date dairy subject matter information				
10. Evaluates and adjusts aspects of the dairy plan of work as needed				
C. Evidence of effective educational work in dairying (24 pts.)				
1. Increases participation in the dairy work				
2. Has active leadership in the dairy program				
3. Has county or area wide activities underway in dairying				
4. Helps increase the net income from dairying				
5. Gives priority to educational work in areas of dairying where major improvement is needed				
6. Is recognized as an educational leader in dairying in the county or area				
D. Working relationships (12 pts.)				
1. Cooperates and promotes teamwork among county staffs and promotes teamwork				
2. Cooperates with farm and community organizations and groups in promoting dairying in the county				
3. Enlists the aid of the dairy specialist staff when needed in planning and carrying out the dairy work in county or area				

	Poor	Fair	Good	Excellent
E. Public relations (20 pts.)				
1. Maintains effective public relations				
2. Maintains a pleasant, friendly, and business-like office				
3. Keeps appropriate people well-informed				
4. Builds and maintains close working relationships with communication media personnel				
5. Cooperates with other federal and state agencies where possible in promoting dairying				
F. Office management (8 pts.)				
1. Handles contacts promptly and courteously				
2. Maintains adequate, up-to-date filing system for dairying				
G. Professional improvement (8 pts.)				
1. Keeps self up-to-date in dairying by personal inquiry				
2. Attends and actively participates in inservice training				

Deals with agents personal characteristics

	Little	Some	Much	Very Much
H. Personality traits of the agent (36 pts.)				
1. How much self-reliance and confidence in dealing with dairy clientele				
2. How much initiative has he demonstrated in the dairy educational program				
3. How much enthusiasm has he shown in working with dairy clientele				

	Poor	Fair	Good	Excellent
4. Has he shown good decision making ability with regard to dairy educational program				
5. Does he have a positive attitude				
6. Does he exhibit helpful attitude toward dairy clientele				
7. How friendly is he with dairy clientele				
8. Does he show interest in dairy farmers' problems				
9. Is his personal appearance appropriate for the job				

Name _____ County _____

A SCALE FOR MEASURING INTEREST IN AND ATTITUDE (relative-rank order comparison) TOWARD
THE FOLLOWING WORK OR AUDIENCE AREAS

Work or Audience Areas	Personal Interest	Feeling of Self-Confidence	Receptiveness of Clientele to Extension's Assistance	Personal Satisfaction from Job Accomplishment	Importance in County
BEEF					
SWINE					
DAIRY					
CROPS					
HORTICULTURE					
FORESTRY					
COMMUNITY & RESOURCE DEV.					
POULTRY					

Directions: Above is a list of statements about work or audience areas. Please rank each statement on each of the work or audience areas. Ranking of work or audience areas should be made in degree of from most to least (1 through 8).

DAIRY QUESTIONNAIRE

Directions:

Read each of the following items and decide which choice best completes the statement or answers the question. Mark your answers on the separate answer sheet. Do not mark them on the test booklet. Indicate your answer by circling, on the answer sheet, the letter corresponding to your choice. That is, if you think that choice B is the best answer to item 1, circle the B in the row after number 1 on your answer sheet.

When the test is scored, a percentage of the wrong answers is subtracted from the number of right answers as a correction for haphazard guessing. It is improbable, therefore, that mere guessing will improve your score significantly; it may even lower your score. If however, you are not sure of the correct answer but have some knowledge of the question and are able to eliminate one or more of the answer choices as wrong, your chance of getting the right answer is improved, and it will be to your advantage to answer such a question. Circle the correct answers for each of the following questions on the answer sheet provided.

I. NUTRITION AND FEEDING

1. The greatest single factor affecting the nutrient content of forages fed to dairy cattle is:
 - a. whether it is cut for hay or silage
 - b. type of forage crop fed
 - c. reduction in digestibility with advancing maturity of forage
 - d. increase in protein content with advancing maturity of forage

2. Surveys among farmers, in a state wide survey, having their forage analyzed have shown:
 - a. forage testing was profitable to the dairyman
 - b. they would not recommend it to their neighbor
 - c. they will continue to test only if service is free
 - d. forage testing was done to please their County Agent
3. On the average, feed costs represents about what part of the total cost of producing milk
 - a. 1/4
 - b. 1/3
 - c. 1/2
 - d. 3/4
4. It is estimated that ____ percent of the difference between herd averages are environmental in origin.
 - a. 80%
 - b. 60%
 - c. 40%
 - d. 20%
5. The maximum amount of urea that a cow should consume daily is
 - a. 0.1 lb. per 1000 lbs. body weight
 - b. 0.5 " " " " " "
 - c. 2.5 " " " " " "
 - d. 5.0 " " " " " "
6. A dairyman reports blindness among his young calves. In response to his request for assistance you should look at which of the following for a possible cause:

- a. whether the concentrate is all grain or not
 - b. whether the forage being fed is weathered or over mature
 - c. whether the cows are confined or are allowed to get off the concrete each day
 - d. whether the calves are weaned earlier than six weeks of age
7. If well-fed growing calves do not get enough vitamin A they may
- a. develop white scours
 - b. lose patches of hair
 - c. go blind because of pressure on the optic nerve
 - d. die from pneumonia
8. The total water requirements of cows are determined mostly by
- a. the amount of milk produced
 - b. the amount of salt consumed
 - c. how much sweating caused by high temperature
 - d. how much dry matter is consumed
9. Concentrate feeds for milk cows need supplementation with calcium
- a. when the forage is solely corn silage or grass or cereal hay and/or silage
 - b. where heavy phosphate fertilization is practiced
 - c. when the feed contains urea or other NPN concentrates
 - d. during the winter when vitamin D is limited
10. New born calves should receive only colostrum for feed early because
- a. they cannot digest any other feeds
 - b. they need the colostrum for a purgative
 - c. colostrum furnishes them immunity factors against diseases
 - d. they need the vitamins and minerals found only in colostrum

11. Feeding iodized salt instead of common salt to a dairy herd is recommended
 - a. to prevent diseases such as foot rot, ringworm and dermatitis
 - b. to increase milk production through its effect on thyroxine production
 - c. to prevent goiter in new born calves
 - d. to improve the digestibility and utilization of feed nutrients
12. If two cows are equal in lactation ability but differ in size, the smaller cow will be the more profitable because
 - a. she requires less space and lower overhead costs
 - b. her feed costs for maintenance are lower
 - c. her TDN requirement for milk yield (above maintenance) is lower
 - d. she requires less protein in her ration
13. Except for possible effects on palatability, the source of protein in cattle rations is of minor importance because
 - a. rumen microorganisms change most nitrogenous compounds into their own characteristic proteins
 - b. the cow does not require so-called essential amino acids
 - c. all proteins can be digested to a common set of amino acids
 - d. cows can make the proteins they need out of starch and cellulose
14. A farmer tells you he has an adequate supply of good corn silage and medium quality grass hay and asks your advice on the percent protein grain ration he should feed. What percent would you recommend?

- a. 14%
 - b. 16%
 - c. 18%
 - d. 20%
15. The net energy evaluation of feeds gives a better measure than TDN of their use for milk production because
- a. some of the digestible nutrients cannot be converted to energy
 - b. digestible nutrients from different sources differ in the amount of loss due to heat
 - c. the cow has to convert TDN to energy before it can make milk
 - d. net energy evaluations are more accurately determined than TDN
16. DHIA records (annual summary) show that as feed cost goes up, income over feed cost
- a. goes down
 - b. stays relatively unchanged
 - c. goes up

II. DAIRY RECORDS AND RECORD KEEPING

17. On the DHIA monthly report each cow is classified on projected milk production into one of:
- a. more than 5 categories
 - b. 5 categories
 - c. less than 5 categories
18. The number of DHIA herds in your county currently is
- a. less than 10
 - b. 10-20
 - c. 20-30
 - d. over 30

19. From 1960 to 1969 the average Tennessee cow increased milk production
- a. less than 1000 lbs. milk
 - b. 1000-2000 lbs. milk
 - c. 2000-3000 lbs. milk
 - d. more than 3000 lbs. milk
20. The average Tennessee DHIA cow in 1970 produced
- a. less than 9000 lbs. milk
 - b. 9000-10000 lbs. milk
 - c. 10000-11000 lbs. milk
 - d. more than 11000 lbs. milk
21. The number of Grade A producers in 1969 for your county was:
- a. under 30
 - b. 30-50
 - c. 50-80
 - d. over 80
22. On the DHIA herd summary page the average percent days in milk on a herd basis should be
- a. 75-80
 - b. 80-85
 - c. more than 85
 - d. less than 75
23. DHIA supervisors with 20 herds and 1000 cows usually have a gross monthly income of
- a. less than \$300
 - b. \$300 - \$399
 - c. \$400 - \$500
 - d. more than \$500

24. The herd summary provides average days dry for the herd. The desirable average days dry for most economical year production is:
- a. less than 50 days
 - b. 50-60 days
 - c. 70-80 days
 - d. more than 80 days
25. From the herd summary the average days open is provided. If all breeding dates are reported the desirable number of days open should be
- a. less than 50 days
 - b. 50-75 days
 - c. 80-100 days
 - d. over 100 days
26. Situation - Herd A - average August 1971 on 292 Holstein cows - 11170M - 426F. The herd feed program per cow for the past 12 months included: (1) 11 tons silage, (2) 1.8 tons hay, (3) 2.3 tons grain - forage provided at rate of 2.1 lbs. hay equivalent per 100 lbs. body weight. Would this quantity of feed be considered:
- a. adequate
 - b. inadequate
 - c. more than is needed
 - d. not enough information provided
27. Studies have shown that a record of a single days production from the third through the eighth month of lactation would help a dairyman predict the good producers from the poor producers ____ percent of the time.

- a. 23%
 - b. 33%
 - c. 63%
 - d. 83%
28. The following information was taken from the following reports (DHIA Herd Summary 202 and Monthly Report DHIA 200). Check one of the following which is not a problem situation:
- a. Holsteins @ 1330 lbs. body weight
 - b. average of 97 days dry
 - c. 80% days in milk
 - d. average age of first calf heifers @ 35 months
 - e. 36 of 292 cows bred four or more times
29. From a herd analysis study, cows which should be considered as cows to cull (least profitable) are rated:
- a. A
 - b. B
 - c. C
 - d. D
 - e. E

III. ARTIFICIAL BREEDING, SIRE SELECTION AND GENETICS

30. Which of the following is not taken into consideration in a USDA Sire Summary
- a. records per daughter
 - b. number of herd mates
 - c. records of herd mates
 - d. number of herds in which daughters are located
 - e. conception rate

31. Given the following information on five bulls, select the most desirable ranking

<u>Bull</u>	<u>Predicted Milk</u>	<u>Predicted Fat</u>	<u>Repeatability</u>
A	+ 677	+ 8	95%
B	+1163	+41	33%
C	+1479	+62	66%
D	+ 169	+25	85%
E	+ 524	+17	33%

<u>Rankings:</u>	<u>(a)</u>	<u>(b)</u>	<u>(c)</u>	<u>(d)</u>	<u>(e)</u>
	A	B	C	C	A
	B	C	E	B	D
	C	A	A	A	C
	D	E	B	E	B
	E	D	D	D	E

32. The best definition of repeatability of a sire's summary is:
- high conception rate
 - the confidence level of the estimate of future daughters performance
 - that the sire has a high plus proof
 - that the type of his daughters average higher than breed average
33. Identification is essential for production records to be used
- 10%
 - 35%
 - 42%
 - 64%
34. The percentage of dairy cows bred artificially to dairy bulls in Tennessee in recent years has been:
- under 15%
 - 16 - 35%
 - 36 - 45%
 - over 45%

35. Heritability in dairy cattle is highest for:
- type
 - milk production
 - fat percentage
 - longevity
36. In sire selection most consideration should be given to:
- feet and legs
 - longevity
 - milk production
 - fat test
37. The predicted difference of a sire means:
- repeatability is above 50%
 - the difference between daughter's production and the production of the daughter's dams
 - an educated guess at sires performance
 - a measure of a sire's genetic value
38. Maximum annual genetic improvement in milk production is about:
- 2 percent
 - 6 percent
 - 15 percent
 - 25 percent
39. Given the following information on four sires for future use in AI, select the Sire Summary likely to change most

<u>Sire</u>	<u>Predicted Milk</u>	<u>Predicted Fat</u>
a. 25 daughters in one herd	+1025	+35
b. 10 daughters in 10 herds	+1025	+35
c. 10 daughters in one herd	+1025	+35
d. 30 daughters in 2 herds	+1025	+35

40. Given the following information on four sires for future use in AI, select the Sire Summary likely to change least

<u>Sire</u>	<u>Predicted Milk</u>	<u>Predicted Fat</u>
a. 25 daughters in one herd	+1025	+35
b. 10 daughters in 10 herds	+1025	+35
c. 10 daughters in one herd	+1025	+35
d. 30 daughters in 2 herds	+1025	+35

41. Heritability is the fraction of the observed variance in a trait (say the ability to produce milk) which results from difference between individuals due to heredity. In the case of milk production, it is in the range of:

- | | |
|--------------|---------------|
| a. .20 - .30 | c. .80 - 1.00 |
| b. .40 - .60 | d. not known |

42. In Holstein, black color is dominant to red. If a red Holstein bull were mated to a group of red cows the resultant calves would be:

- | | |
|-----------------------|----------------------------------|
| a. 3/4 black, 1/4 red | c. 1/2 black, 1/2 red |
| b. all red | d. we would have to wait and see |

IV. DAIRY FARM PLANNING AND MANAGEMENT

43. The basic reason for making a farm plan for a dairy farm is
- to adjust the size of the business
 - to use the available labor more efficiently
 - to use the available resources more efficiently
 - to use the available capital more efficiently
44. A farm plan can best be described as:
- a set of guidelines for the operation of the farm

- b. a blueprint for running the farm
 - c. a schedule of changes to be made
 - d. a guide for efficient use of farm labor
45. The budgeting process in farm planning is defined as:
- a. an allocation of funds to the different farm enterprises
 - b. a record analysis system for farming
 - c. an allocation of resources
 - d. an allocation of labor and capital to the different farm enterprises
46. The major consideration in developing a dairy farm plan is:
- a. the concentration of dairy farms in the community
 - b. the amount of labor available
 - c. the desires of the family
 - d. the amount of feed produced
47. When developing a dairy farm plan it is essential to know:
- a. price of concentrates
 - b. the land resources available
 - c. the current price of milk
 - d. the availability of credit
48. In discussing dairy farm planning with a farmer, we can tell him that he can expect a return per cow to land labor and capital of about
- a. \$180
 - b. \$250
 - c. \$420
 - d. \$620

49. The capital requirement per cow exclusive of land on a dairy herd of about 50 cows is about:
- a. \$600
 - b. \$800
 - c. \$1000
 - d. \$1500
50. In developing a dairy farm plan, how many cows can be substituted for one acre of burley tobacco without sacrificing labor or net income?
- a. 2
 - b. 3
 - c. 5
 - d. 7

V. PRODUCTION OF, QUALITY, AND QUANTITY OF FEED FOR DAIRY HERD

51. Which of the following crops made into silage best fits this description: Produced in summer, harvested in late summer, (August and September), direct cut, has high grain content does't need a preservative, produces high tonnage, is easy to crop
- a. grain sorghum
 - b. sorghum-sudangrass hybrid
 - c. corn
 - d. hybrid silage sorghum
52. Which of the following crops made into silage best fits this description: Produced in spring, summer and fall, has high digestible protein content, usually wilted, produces a relatively high tonnage, mostly made into hay except for first cutting, doesn't need a preservative when wilted.
- a. red clover
 - b. timothy
 - c. orchardgrass
 - d. alfalfa

53. Which moisture content is most desirable for corn silage?
- a. 60-64%
 - b. 65-70%
 - c. 71-75%
 - d. 76-80%
54. Which is the recommended stage to harvest corn for silage?
- a. roasting ear (milk) to dent
 - b. dough to early dent
 - c. dough to full dent
 - d. full to hard dent
55. It would be more desirable to put drier silage 65% moisture and below into upright silos rather than bunker type silos because:
- a. the leaves can be caught and held better inside the upright silo
 - b. less segregation of plant parts occurs in an upright silo
 - c. it is easier to add extra water into an upright silo
 - d. the air can be excluded easier in an upright silo
56. Fast filling and sealing of silos lowers spoilage losses, this is most important because
- a. temperature is increased
 - b. acid production time is lengthened
 - c. acid production time is shortened
 - d. silage packs tighter
57. Which of the following crops for hay would have the highest digestible protein content if all were cut at the recommended stage to harvest?
- a. alfalfa
 - b. red clover
 - c. annual lespedeza
 - d. orchardgrass

58. What is the most important factor in producing quality hay?
- a. early cutting
 - b. early raking
 - c. loose baling
 - d. fast conditioning
59. Which of the following forage crops would lose quality faster than the other crops after all crops reach the recommended stage to harvest?
- a. oats
 - b. crimson clover
 - c. red clover
 - d. orchardgrass
60. Quality pasture is important in a dairy operation because
- a. the cows produce more milk when pasture is used along with hay and silage
 - b. the cows tend to get sore feet on concrete and need to use some pasture
 - c. pastures are convenient for small herds
 - d. cows like to graze pastures better than eating hay in dry lot
61. The primary reason pastures are generally higher quality than hay or silage is because
- a. the cows can select and graze the higher quality pasture plants
 - b. the pasture plants are grazed at a younger stage than the hay or and silage is harvested
 - c. the crops used for pasture are higher quality than the hay and silage plants
 - d. farmers manage pastures better than hay and silage crops

62. When should cows be allowed to graze sorghum-sudangrass hybrids? When they reach a height of:
- a. 6 inches
 - b. 12 inches
 - c. 18 inches
 - d. 24 inches
63. When should cows be allowed to graze Pearlmilletts? When they reach a height of:
- a. 6 inches
 - b. 12 inches
 - c. 18 inches
 - d. 24 inches
64. Alfalfa, which used to be called the queen of forages, is not being grown on many farms today.
- a. alfalfa is too costly to produce, therefore, should not be considered in a farm plan
 - b. alfalfa cannot be produced economically because of the alfalfa weevil
 - c. alfalfa can be produced economically today and should be considered in the dairy farm plan
 - d. alfalfa is subject to so many problems such as, insects and diseases, that it is unprofitable to produce
65. Small grain are used for pasture in fall, winter and spring. When oats, barley, wheat, or rye are planted about September 1, is there any practical difference in their yield before cold weather starts? Pick the highest producing one.
- a. oats
 - b. barley
 - c. wheat
 - d. rye
 - e. no difference

66. Pick the best combination of practices which will help produce the maximum amount of fall grazing.
- a. early seeding, winter hardy variety, and heavy seeding rate
 - b. winter hardy variety, high phosphorus rate and heavy seeding rate
 - c. heavy seeding rate, high phosphorus rate and heavy nitrogen rate
 - d. high phosphorus rate, early seeding, and heavy seeding rate
 - e. heavy nitrogen rate, early seeding, and heavy seeding rate

VI. ABNORMAL MILK

67. Milk high in leucocytes is considered to be abnormal. Generally, a contributing factor to this abnormality is:
- a. udder infection
 - b. advanced stage of lactation
 - c. old cow
 - d. Lepto
 - d. all the above
68. Milk containing a large number of psychrophilic bacteria will:
- a. not necessarily mean high acidity or soured milk
 - b. always contain high acid
 - c. always possess a malty flavor
 - d. have no quality meaning
69. To control rancid milk on the market:
- a. all mastitic cows must be treated
 - b. inactivate the lipase as soon as possible
 - c. the milk should be pasteurized to destroy the rancid flavor
 - d. induce excessive agitation to activate the lipase

70. Leucocytes are:
- a. white blood cells
 - b. Streptococcus agalactae bacteria
 - c. Straphylococcus aureus organisms
 - d. red blood cells
71. The official test used to determine the number of leucocytes per milliliter of milk is:
- a. The California Mastitis Test
 - b. Electronic Coulter Counter
 - c. Modified White Side Test
 - d. Wisconsin Mastitis Test
72. A high California Mastitis Test reading will affect:
- a. pounds of milk
 - b. percentage solid-not-fat
 - c. percentage of butterfat
 - d. all the above
73. Mr. Jones received a notice stating that his permit to sell Grade "A" milk has been suspended because of high leucocyte count. Mr. Jones was not familiar with what a high leucocyte count meant; therefore, he came to you for an explanation. Mr. Jones understood why his permit was suspended after you told him that:
- a. his milk contained 1,500,000 or more somatic cells per milliliter on three of the last five tests
 - b. improper refrigeration increased the count
 - c. the veterinarian had recently treated five cows in the herd for mastitis

- d. the bacteria count had exceeded 100,000 per milliliter
three times on the last five tests
74. You are convinced that Mr. Lows must eliminate one time consuming practice in the milking parlor since his son will be leaving for college. Your advice would be to eliminate:
- a. teat dipping
 - b. dipping milkers between each cow
 - c. washing the cows udder
75. It has been estimated that poor milking procedures and mastitis cost the average Tennessee dairyman milking a 50 cow herd:
- a. \$250 to \$500 per year
 - b. \$750 to 1,500 per year
 - c. \$2,500 to \$3,000 per year
 - d. \$3,500 to \$4,000 per year
76. Mr. Brown spends approximately 9 minutes per cow in the milking parlor at each milking. He has noticed a gradual increase in the leucocyte count and a slight hemorrhaging at the teat end. Under these conditions what would be the first thing you would advise Mr. Brown to do:
- a. increase the amount of vacuum
 - b. discontinue teat dipping
 - c. have the milking system checked out under load
 - d. sell all infected cows
77. A dairyman milking 50 cows and using 3 machines should change standard narrow-bore inflations:
- a. every 100 to 120 days
 - b. every 30 to 40 days
 - c. every 75 to 80 days
 - d. none of the above

78. One of the best ways to prevent spread of mastitis in a dairy herd is to
- a. use a strip cup to detect early inflammation
 - b. milk infected cows last
 - c. dip teats in a compatible disinfectant solution after each milking
 - d. thoroughly wash udders before each milking

VII. MILKING MANAGEMENT

79. Where should the controller be located?
- a. at end of vacuum line
 - b. between pump and first stall cock
 - c. in the center of vacuum line
 - d. no difference
80. What is the function of the pulsator?
- a. message and insure proper circulation in the teat
 - b. open the sphincter muscle in the teat and allow milk to flow
 - c. both a and b
 - d. neither a or b
81. A gauge on the vacuum line tells you the following:
- a. how much vacuum is on the line
 - b. how much vacuum is on the teats
 - c. how much vacuum is on the entire system
 - d. all of the above
82. If vacuum on the line is 15 inches, the vacuum at the teat will probably be which of the following?
- a. 9 inches
 - b. 11 inches
 - c. 13 inches
 - d. 14 inches

83. What minimum diameter should the milk line be with 2 or 3 units operating?
- a. 3/4 inch
 - b. 1 inch
 - c. 1 1/2 inches
 - d. 2 inches
84. What minimum diameter should the milk line be with 4 to 6 units operating?
- a. 1 inch
 - b. 1 1/2 inches
 - c. 2 inches
 - d. 2 1/2 inches
85. What is the diameter of a narrow bore teat cup liner?
- a. 1/2 inch
 - b. 3/4 inch
 - c. 1 inch
 - d. 1 1/4 inches
86. How much time should lapse between washing udder and attaching unit?
- a. 10 seconds
 - b. 30 seconds
 - c. 1 minute
 - d. 2 minutes
 - e. 3 minutes
87. How many minutes are required for most cows to milk out?
- a. 2 minutes
 - b. 3 minutes
 - c. 5 minutes
 - d. 8 minutes
88. Mr. Smith wants to milk from 100 to 120 cows. Two people will do the milking most of the time. However, at times there will be only one. Mr. Smith would like for his men to spend not over 2 hours per milking (4 hours per day) in the milking parlor. Which of the following parlors would you recommend as a first choice for the most efficient use of labor:
- a. double 3 side opening with 3 units
 - b. double 3 side opening with 6 units

- c. double 3 tandem walk through with 3 units
- d. double 3 tandem walk through with 6 units
- e. double 6 herringbone with 6 units

VIII. BUILDING AND FARMSTEAD PLANNING

89. A major advantage of free stall housing is that
- a. cows are confined to one stall by a stanchion
 - b. manure disposal is through an underground drainage system
 - c. cows rest more
 - d. less bedding material is needed
90. Concrete alleys in a free stall barn should always
- a. be sloped toward the east end of the building
 - b. have no slope for drainage
 - c. have a slope of approximately 1/4" per foot
 - d. have a slope of 3/4" or more per foot
91. Concrete alleys in a free stall barn should have a width of at least
- | | |
|------------|------------|
| a. 6 feet | c. 12 feet |
| b. 10 feet | d. 14 feet |
92. The ideal orientation of a loafing barn would be that the open side is
- a. toward the wind for better ventilation
 - b. away from the wind
 - c. right angles to the wind
 - d. not affected by the wind
93. University of Tennessee recommendations are for feed bunks to
- a. have roof only over feed bunk

- b. have no roof
 - c. have a roof extending completely over cows eating
 - d. have a galvanized steel roof
94. The silo location with respect to the feed bunk should in most cases be
- a. so that if the center line of the feed bunk were projected it would pass through the center of the silo
 - b. so that if the center of the feed bunk were projected it would pass 10 feet from the silo chute
 - c. so that the center line of the feed bunk would pass approximately 1 1/2 feet from the side of the silo with the silo chute 40 degrees from the center line
 - d. the center line of the feed bunk would pass approximately 1 1/2 feet from the side of the silo with the silo chute at the point closest to or directly over the center line of the bunk
95. Generally, the most important factor in planning a system of dairy buildings is
- a. slope and topography of the site
 - b. wind direction
 - c. water supply source
 - d. proximity to public roads
96. Most dairymen in planning a dairy layout should be most concerned with
- a. the initial investment
 - b. labor requirements
 - c. manure disposal
 - d. choosing brands of equipment

97. Which of the following items is an error in developing a dairy system?
- a. sloping all paved areas downward to a central point
 - b. providing a windbreak when possible
 - c. using a lagoon for waste disposal
 - d. providing no paving for the main alleyways and loafing areas
98. University of Tennessee recommendations for paving dairy areas are
- a. use hot mix asphalt on grade
 - b. use hot mix on a base of 6" crushed stone
 - c. use 4" to 6" of good quality concrete on a firm base
 - d. use soil cement
99. The major factor to be considered in selecting the diameter of the silo is:
- a. to remove not less than 3" to 4" of silage per day during hot weather
 - b. to remove not less than 1" to 2" of silage per day during hot weather
 - c. to minimize the cost of storage per ton
 - d. to keep the height as low as possible

IX. WASTE DISPOSAL

100. The average 1000 lb. dairy cow will produce ____ pounds of manure (solid and liquid) daily
- a. 60 lbs.
 - b. 80 lbs.
 - c. 100 lbs.
 - d. 120 lbs.

101. One of the following methods is not a practice recommended for animal waste disposal.
- a. liquid storage to land
 - b. dry storage to land
 - c. stabilization in lagoon
 - d. underground disposal field
102. The least fly problem will be encountered in:
- a. dry storage and field spreading
 - b. slurry storage and field spreading
 - c. lagoon disposal
 - d. slotted floor and pit
103. In slurry storage the minimum capacity of the storage tank should be:
- a. 10 days
 - b. 30 days
 - c. 50 days
 - d. 70 days
104. The slurry in a holding tank should be agitated:
- a. once each week
 - b. twice each week
 - c. once every two weeks
 - d. once a month
105. Assuming that one half of the original nitrogen is effectively incorporated in the soil when using a liquid disposal system one ton of manure will supply
- a. three pounds of N
 - b. thirty pounds of N
 - c. three hundred pounds of N
 - d. three hundred and thirty-three pounds of N

106. The area needed to spread the manure from a 100 cow herd is approximately:
- a. 14 acres
 - b. 28 acres
 - c. 100 acres
 - d. 280 acres
107. A lagoon is an all-inclusive term commonly given to a water impoundment in which organic wastes are:
- a. filtered to prevent pollution
 - b. composted for organic matter
 - c. processed for fertilizer
 - d. stored or stabilized
108. The most common type of lagoon for animal waste disposal is one which has predominantly:
- a. aerobic bacteria
 - b. anaerobic bacteria
 - c. facultative bacteria
 - d. all three types of bacteria
109. A lagoon should be constructed in a soil of:
- a. low permeability
 - b. medium permeability
 - c. high permeability
 - d. permeability is not an important factor
110. The location of a lagoon is not generally affected by:
- a. wind direction
 - b. location of nearby houses
 - c. construction equipment
 - d. source of waste

111. A lagoon should be managed such that the amount of water is:
- a. gradually built up with loading
 - b. varied up and down
 - c. half full before loading
 - d. full before loading
112. The volume requirement for an anaerobic lagoon in a dairy operation is:
- a. 1 cubic foot per pound of animal
 - b. 4 cubic feet per pound of animal
 - c. 7 cubic feet per pound of animal
 - d. 10 cubic feet per pound of animal
113. The overflow (effluent) from a lagoon:
- a. can be directed to a stream
 - b. is of no concern
 - c. is alright for animals to drink
 - d. should be spread on land
114. Sludge or solids accumulation in the bottom of a lagoon serving a dairy system will be about:
- a. 6 cubic feet per year per animal
 - b. 12 cubic feet per year per animal
 - c. 18 cubic feet per year per animal
 - d. 24 cubic feet per year per animal

X. EXTENSION DAIRY PROGRAM DEVELOPMENT

115. Extension learning-teaching theory and research do not support which of the following statements?

- a. it is necessary to select key ideas or practices from dairying subject matter and focus on them if agents are to assist dairymen most effectively
 - b. since dairymen learn best through trial and error, agents must arrange teaching situations so as to include the opportunity for them to make mistakes in each area
 - c. the nature of the setting affects learning and dairymen will generally react favorably when learning in the presence of live animals, barns, equipment, and other realia.
 - d. it is desirable to give dairymen a chance to evaluate their ability to select cows needing culling and to practice other skills; therefore, such opportunities should be provided
 - e. individual dairymen have different problems; therefore personal attention may be necessary as follow-up after dairy meetings conducted by agents in the county
116. Which of the following is not one of the four formal stages of the "Tennessee County Extension Program Development Cycle"?
- a. annual planning
 - b. reporting
 - c. teaching
 - d. evaluation
 - e. long-range planning
117. When planning the dairy part of the county Extension program, a formal planning process is suggested. Which one of the following steps is not normally included when formulating the Plan of Work Projection (POWP)?

- a. stating objectives and/or goals
 - b. selecting the most promising alternative
 - c. accepting the consequences
 - d. analyzing the facts
 - e. coding the primary parts
118. Which of the following does research not tell us regarding the selection and use of Extension teaching methods?
- a. the greater the number (from 6 to 9) of teaching methods used to try to reach and teach dairymen in a county, generally the more quickly a particular practice or practices will be adopted
 - b. the more personal the method of contact selected and used with dairymen in a county, the greater the economic cost involved when computed on an individual agent basis
 - c. the closer dairymen are to adoption of a recommended dairy production and/or marketing practice, the greater the advantage of the agent emphasizing use of radio, TV and news articles
 - d. dairymen adopt practices at different rates and times and, regardless of where they are in the adoption process, they tend to be influenced most by their neighbors and friends
 - e. none of the above
119. What is the important difference between the present approach taken to planning the dairy part of the county Extension program and that used prior to 1961?
- a. Plan of Work Projections (POWPs) were formerly made with the aid of a dairy study committee in the county, whereas

decisions now are made only by the agents responsible for dairy work

- b. POWPs were formerly developed by agents, whereas decisions now are made by a dairy study committee in the counties based on their observations of greatest need
 - c. POWPs were formerly based on county surveys of recommended practices in dairying considered together with other facts supplied by dairy and other specialists, whereas another approach is now used
 - d. POWPs now are based on dairy practice checklist data, other situational facts made available by agents and specialists and considerations of a dairy study committee and agents, whereas informal agent observations were relied upon earlier
 - e. none of the above
120. The factor or factors which influence the number of dairymen to include in a random sample survey is:
- a. total number of dairymen in the population
 - b. uniformity of the dairymen
 - c. statistical accuracy desired
 - d. resources available (time, money, equipment)
 - e. all the above
121. Which one of the following procedures is not an accepted one in the development of the dairy part of the county Extension Plan of Work (POW)?

- a. select one or more dairy priority 5-year objectives to be given attention during the year being planned
 - b. with the assistance of dairymen, write a situational statement including relevant, reliable and current facts
 - c. choose those tasks to be included and attach appropriate codes for tasks, purposes, subjects, audiences and I.C.
 - d. set forth probable start and finish dates and man-days to be devoted to each line item task included in the document
 - e. consider and identify evaluative techniques that may be useful when attempting to measure progress toward tasks and priority 5-year objectives
122. When using every "nth" number to select a sample of 30 from a population of 240 dairymen
- a. we would use every 6th number
 - b. the names of dairymen must be listed and numbered
 - c. we would begin with the first number and select every "nth" number thereafter
 - d. all three of the above
 - e. none of the above
123. The handsorting technique of tabulating data:
- a. requires expensive office equipment
 - b. requires tabulation sheets
 - c. is done by recording answers on a tally sheet
 - d. is done by sorting answers into categories and stacking record forms into piles containing the same answer
 - e. none of the above

124. Findings of a random sample dairy survey:

- a. may be applied to all dairymen in the county
- b. may be applied only to the sample
- c. are more reliable than surveys which include the total population
- d. all of the above
- e. none of the above

IX. EXTENSION COMMUNICATIONS

125. "Circular letter" as used in Extension work, means:

- a. any letter sent from the Extension office
- b. letter that goes to two or more persons
- c. letter circulated at result demonstration
- d. multiple copies of letters to administrators
- e. none of the above

126. The chief advantage of a circular letter is:

- a. it can be produced at low cost
- b. it gives full details of a practice
- c. it conveys specific information to a specific group
- d. conserves the agent's time
- e. all of the above

127. A circular letter has special value because

- a. it is under greater control of Agent than most channels
- b. it reaches more people than other channels
- c. it is easier to prepare than other communication pieces
- d. it commits the recipient to action
- e. all of the above

128. Which of the following is not an advantage of using newspapers in Dairy Extension work?

- a. high readership
- b. prestige of printed word
- c. low cost
- d. specific audience
- e. all of the above

129. There are about 50 dairy farmers in your county, which is a good agricultural county. For example, there are three major feed and farm supply dealers. There is a weekly paper that covers most of the county and the local radio stations can be heard by nearly everyone in the county.

You are interested in helping these dairymen improve the quality of forage grown, harvested and stored, and want to use your time devoted to this wisely yet bring about changes as quickly as possible.

Your immediate objective is to get dairymen to understand what quality in forage means and to understand how they can find out the quality of their forage. There are a number of ways to go about getting this job done.

In order to reach this immediate objective and use your time and effort efficiently as well as effectively, which one of the following:

- a. radio
- b. newspaper
- c. circular letter
- d. exhibits at feed dealers
- e. publications

130. The most important point in your dairy news story should
- a. follow an introductory statement
 - b. give all details in same paragraph
 - c. be in the first sentence
 - d. be repeated in summary paragraph
131. Radio is most effective as a communications channel for:
- a. evaluating dairy practices
 - b. creating awareness and interest in a practice
 - c. presenting details
 - d. discussing at length various points
132. Which word is best suited for beginning a question on a radio interview?
- a. do
 - b. are
 - c. have
 - d. how

XII. GENERAL

133. The total number of farms in Tennessee reported selling milk in 1969 was about
- a. 2,000
 - b. 7,500
 - c. 15,000
 - d. 30,000
134. Of the number in question 133, what percent was selling manufacturing milk?
- a. 50
 - b. 60
 - c. 70
 - d. 80
135. The sale of milk in Tennessee in 1969 brought to dairymen about:
- a. \$6 million
 - b. \$20 million
 - c. \$50 million
 - d. \$100 million

The Tennessee Extension Agriculture Economic Department just recently published and sent you a copy of the Farm Business Analysis for 1970. According to this Tennessee Farm Business Analysis for Grade A Dairy Farms participating in the Agricultural Resource Development Program: (pertaining to questions 136-139)

136. The average investment per cow for all Grade A farms in the study was about

- | | |
|-----------|-----------|
| a. \$1310 | c. \$2619 |
| b. \$1914 | d. \$3913 |

137. The average milk sale per cow for all Grade A farms in the study was

- | | |
|----------|----------|
| a. \$374 | c. \$624 |
| b. \$494 | d. \$736 |

138. The average milk sales per dollar invested for all Grade A farms in the study was

- | | |
|-----------|-----------|
| a. \$.33 | c. \$.57 |
| b. \$.46 | d. \$.71 |

139. The average silage tons consumed per cow on all Grade A farms in the study was

- | | |
|------------|------------|
| a. 8 tons | c. 12 tons |
| b. 10 tons | d. 14 tons |

140. Approximately how many cows producing 11,000 lbs. of milk would it take to give a dairy farmer \$10,000 labor and management returns

- | | |
|-------|--------|
| a. 38 | c. 60 |
| b. 50 | d. 100 |

141. Vibriosis, a disease of cattle which causes early abortions, is
- a. spread only by natural breeding
 - b. due to improper artificial insemination
 - c. partially preventable by vaccination
 - d. dangerous to man
142. For cows to calve in early September (1 to 15), they should be bred from
- a. January 1 to 15
 - b. December 5 to 20
 - c. November 25 to December 9
 - d. November 10 to 25
143. Cows normally reach their peak lactation yields when their age at calving is
- a. 3 to 4 years
 - b. 5 to 7 years
 - c. 8 to 9 years
 - d. 10 to 11 years
144. Which of the following nitrogen fertilizers would be the most economical buy for use on corn land: nitrate of soda (16% Nitrogen) at \$51 per ton; cyanamid (21% Nitrogen) at \$61 per ton; ammonium nitrate (33% Nitrogen) at \$80 per ton, or ammonium sulfate (20.5% Nitrogen) at \$60 per ton or urea (45% Nitrogen) at \$109 per ton?
- a. Nitrate of soda
 - b. Cyanamid
 - c. Ammonium nitrate
 - d. Ammonium sulfate
 - e. urea
145. After budgeting through the present plan used on your dairy farm, you decide to find out how efficient your business is under this program. Dollar return per \$1 of feed fed is an indicator of the efficiency of your livestock feeding. If

the livestock net increase were \$10,052 including \$5,000 or milk sales, and the dollars of feed fed were \$6679 including both homegrown and purchased feeds, what would your dollar return per \$1 of feed fed by?

- | | |
|-----------------|---------------------|
| a. about \$1.20 | d. about \$1.95 |
| b. about \$1.50 | e. other than above |
| c. about \$1.80 | |

Name _____ County _____ Date _____

1. A B C D E

2. A B C D E

3. A B C D E

4. A B C D E

5. A B C D E

6. A B C D E

7. A B C D E

8. A B C D E

9. A B C D E

10. A B C D E

11. A B C D E

12. A B C D E

13. A B C D E

27. A B C D E

28. A B C D E

29. A B C D E

30. A B C D E

31. A B C D E

32. A B C D E

33. A B C D E

34. A B C D E

35. A B C D E

36. A B C D E

37. A B C D E

38. A B C D E

39. A B C D E

53. A B C D E

54. A B C D E

55. A B C D E

56. A B C D E

57. A B C D E

58. A B C D E

59. A B C D E

60. A B C D E

61. A B C D E

62. A B C D E

63. A B C D E

64. A B C D E

65. A B C D E

14. A B C D E

15. A B C D E

16. A B C D E

17. A B C D E

18. A B C D E

19. A B C D E

20. A B C D E

21. A B C D E

22. A B C D E

23. A B C D E

24. A B C D E

25. A B C D E

26. A B C D E

40. A B C D E

41. A B C D E

42. A B C D E

43. A B C D E

44. A B C D E

45. A B C D E

46. A B C D E

47. A B C D E

48. A B C D E

49. A B C D E

50. A B C D E

51. A B C D E

52. A B C D E

66. A B C D E

67. A B C D E

68. A B C D E

69. A B C D E

70. A B C D E

71. A B C D E

72. A B C D E

73. A B C D E

74. A B C D E

75. A B C D E

76. A B C D E

77. A B C D E

78. A B C D E

- | | | |
|----------------|----------------|----------------|
| 79. A B C D E | 105. A B C D E | 131. A B C D E |
| 80. A B C D E | 106. A B C D E | 132. A B C D E |
| 81. A B C D E | 107. A B C D E | 133. A B C D E |
| 82. A B C D E | 108. A B C D E | 134. A B C D E |
| 83. A B C D E | 109. A B C D E | 135. A B C D E |
| 84. A B C D E | 110. A B C D E | 136. A B C D E |
| 85. A B C D E | 111. A B C D E | 137. A B C D E |
| 86. A B C D E | 112. A B C D E | 138. A B C D E |
| 87. A B C D E | 113. A B C D E | 139. A B C D E |
| 88. A B C D E | 114. A B C D E | 140. A B C D E |
| 89. A B C D E | 115. A B C D E | 141. A B C D E |
| 90. A B C D E | 116. A B C D E | 142. A B C D E |
| 91. A B C D E | 117. A B C D E | 143. A B C D E |
| | | |
| 92. A B C D E | 118. A B C D E | 144. A B C D E |
| 93. A B C D E | 119. A B C D E | 145. A B C D E |
| 94. A B C D E | 120. A B C D E | 146. A B C D E |
| 95. A B C D E | 121. A B C D E | 147. A B C D E |
| 96. A B C D E | 122. A B C D E | 148. A B C D E |
| 97. A B C D E | 123. A B C D E | 149. A B C D E |
| 98. A B C D E | 124. A B C D E | 150. A B C D E |
| 99. A B C D E | 125. A B C D E | 151. A B C D E |
| 100. A B C D E | 126. A B C D E | 152. A B C D E |
| 101. A B C D E | 127. A B C D E | 153. A B C D E |
| 102. A B C D E | 128. A B C D E | 154. A B C D E |
| 103. A B C D E | 129. A B C D E | 155. A B C D E |
| 104. A B C D E | 130. A B C D E | 156. A B C D E |

APPENDIX C

TABLE XX

DATA ON BACKGROUND AND TRAINING FACTORS

Respondent Number	1*	2	3	4	5	6	7
1	M.S.	2.79	41	3	23	9	5.00
2	B.S.	1.96	4	0	24	8	4.00
3	M.S.	1.93	6	3	18	3	5.62
4	M.S.	2.49	9	0	11	11	6.25
5	M.S.	2.93	4	12	17	16	7.25
6							
7	M.S.	3.40	14	34	22	6	2.12
8	B.S.	2.78	7	0	22	16	4.88
9	B.S.	2.09	8	0	24	22	4.88
10	M.S.	2.45	46	3	21	10	10.00
11	M.S.	3.08	6	3	37	35	6.88
12	B.S.	2.07	9	0	17	8	4.00
13	M.S.	2.66	7	3	24	22	1.88
14	B.S.	2.86	31	3	35	24	18.00
15	M.S.	2.17	6	3	17	15	9.38
16	B.S.	3.27	6	0	37	37	1.62
17	M.S.	2.92	9	0	13	2	7.50
18	M.S.	2.13	6	3	17	3	4.62
19	M.S.	2.50	6	6	11	4	2.88
20	B.S.	2.54	48	0	13	6	.75
21	M.S.	2.97	6	3	25	18	3.62
22	B.S.	1.94	3	3	32	16	2.62
23	M.S.	2.83	6	3	7	3	4.50
24	B.S.	2.69	7	0	20	1	19.88
25	M.S.	1.98	9	0	5	2	5.88
26	B.S.	3.34	3	0	22	16	1.00
27	B.S.	2.06	3	3	32	28	0.00
28	M.S.	1.98	9	15	14	4	3.25
29	M.S.	2.45	29	3	15	2	3.25
30	M.S.	2.54	0	15	14	10	0.00
31	B.S.	2.19	6	0	16	6	1.75
32	B.S.	3.26	6	3	43	37	2.50
33	B.S.	2.24	6	0	37	36	3.38
34	M.S.	2.52	6	0	8	2	1.25
35	B.S.	1.97	6	0	31	14	2.12
36	M.S.	3.08	6	0	32	31	4.75

TABLE XX (continued)

Respondent Number	1*	2	3	4	5	6	7
37	M.S.	3.55	3	0	29	13	5.50
38	M.S.	3.24	6	15	12	12	9.00
39	B.S.	2.05	6	0	19	15	1.00
40	B.S.	2.86	6	0	31	20	5.62
41	B.S.	2.29	6	0	18	7	20.62
42	B.S.	2.67	7	0	22	4	4.50

*Refer to key to number headings following these tables.

TABLE XXI
DATA ON COUNTY SITUATION FACTORS

Respondent Number	8*	9	10	11	12
1	3.6	23	553,210	16	2
2	5.8	64	861,589	31	2
3	23.4	232	2,620,955	75	2
4	4.4	56	948,370	22	3
5	14.8	153	1,186,710	47	2
6					
7	17.2	633	1,890,658	61	2
8	30.2	424	1,853,228	75	2
9	35.8	645	2,429,698	51	3
10	27.3	75	1,345,955	33	4
11	30.5	393	2,435,322	97	2
12	11.4	302	1,574,368	47	3
13	41.5	608	3,081,133	124	3
14	15.3	410	811,232	32	3
15	23.9	518	1,862,672	78	2
16	17.8	364	1,605,630	46	3
17	26.9	486	2,296,978	74	2
18	18.9	369	1,373,290	61	2
19	17.5	254	1,177,019	48	2
20	28.6	4	256,298	14	2
21	29.2	88	1,421,265	99	2
22	18.0	37	697,878	32	3
23	26.4	14	248,506	20	2
24	48.1	264	2,773,207	140	2
25	34.8	122	1,795,461	97	2
26	27.3	256	1,285,961	45	2
27	22.2	22	317,222	23	2
28	19.4	466	916,879	8	2
29	17.5	456	1,100,409	20	2
30	29.5	223	608,439	15	2
31	22.3	160	916,754	41	2
32	22.0	241	758,096	15	1
33	26.1	221	1,540,061	70	2
34	25.3	274	963,636	36	2
35	21.5	547	1,398,089	33	3
36	21.9	68	902,266	51	2
37	25.6	83	1,662,467	70	3
38	36.4	1563	5,842,213	139	3
39	31.4	69	1,192,781	59	2
40	26.0	293	1,406,888	46	3
41	33.5	700	3,086,803	104	2
42	15.1	394	833,478	29	2

*Refer to key to number headings following these tables.

TABLE XXII
DATA ON INTERESTS AND ATTITUDES FACTORS

Respondent Number	13	13a	13b	13c	13d	13e
1	25	5	5	5	5	5
2	28	5	5	6	7	5
3	28	6	5	5	5	7
4	20	3	4	4	5	4
5	33	6	5	8	8	6
6						
7	29	5	6	5	6	7
8	35	7	7	8	6	7
9	39	8	8	8	8	7
10	38	8	8	8	6	8
11	31	6	5	7	6	7
12	33	6	7	6	8	6
13	40	8	8	8	8	8
14	34	7	7	6	7	7
15	34	7	6	7	7	7
16	30	5	5	6	7	7
17	25	4	3	5	6	7
18	27	6	7	3	6	5
19	31	6	6	7	6	6
20	33	7	7	6	6	7
21	35	8	6	7	7	7
22	34	6	6	8	7	7
23	21	4	2	4	4	7
24	39	8	8	8	7	8
25	38	8	7	8	7	8
26	34	7	7	6	7	7
27	28	6	6	4	5	7
28	34	7	7	6	7	7
29	26	5	6	5	5	5
30	29	6	5	5	6	7
31	30	5	5	5	8	7
32	33	8	6	7	7	5
33	33	7	6	7	6	7
34	21	5	6	5	5	6
35	33	8	7	7	5	6
36	19	5	5	2	3	4
37	39	7	8	8	8	8
38	40	8	8	8	8	8
39	32	5	6	7	6	8
40	30	6	6	6	6	6
41	40	8	8	8	8	8
42	15	3	4	3	4	1

*Refer to key to number headings following these tables.

TABLE XXIII
SCORES ON MULTIPLE-CHOICE TEST

Respondent Number	15*	16	17	18	19	20	21	22	23	24	25	26	27
1	1	6	1	7	14	4	0	6	7	7	5	4	60
2	6	6	5	5	15	5	2	10	10	6	7	4	81
3	13	9	6	5	11	8	6	10	10	5	7	8	99
4	3	6	7	4	11	3	1	8	7	5	6	0	62
5	7	8	7	5	16	9	6	8	11	3	7	3	90
6													
7	8	4	9	5	12	3	2	10	7	8	4	6	72
8	12	3	10	7	11	4	1	7	7	9	4	7	85
9	10	8	5	7	10	3	2	10	7	2	6	4	73
10	11	4	3	3	10	6	2	7	6	5	3	1	60
11	7	4	2	2	10	1	6	7	7	6	7	4	62
12	8	4	5	4	10	2	4	10	7	3	3	3	62
13	8	4	5	4	12	4	1	8	5	6	5	3	66
14	6	7	1	4	13	4	2	11	6	4	6	4	67
15	7	8	3	3	12	7	0	8	7	8	3	5	69
16	10	5	3	4	11	0	4	3	8	4	7	6	64
17	9	5	7	1	11	7	3	6	6	7	5	6	74
18	8	5	5	4	8	3	4	7	11	4	4	3	67
19	7	5	4	5	11	-1	1	7	7	6	6	8	66
20	8	3	8	5	12	2	4	6	8	5	8	4	73
21	8	7	8	7	12	3	7	10	11	6	8	6	94
22	4	1	1	4	7	3	1	7	4	3	6	3	44
23	8	6	5	4	10	7	1	6	7	8	4	3	69
24	8	4	6	7	10	3	0	6	6	4	6	6	65

TABLE XXIII (continued)

Respondent Number	15*	16	17	18	19	20	21	22	23	24	25	26	27
25	10	5	7	8	12	4	2	11	12	7	8	7	93
26	10	4	7	2	11	7	5	10	8	6	7	1	80
27	4	3	0	4	8	2	4	4	11	4	6	4	54
28	7	5	8	5	12	0	4	10	10	8	8	5	82
29	10	8	11	4	13	3	4	7	8	4	7	4	83
30	11	8	5	4	10	4	1	10	5	5	7	4	74
31	7	4	5	5	14	-1	1	11	8	6	6	7	73
32	8	7	8	3	15	0	1	8	7	3	7	4	71
33	5	4	4	8	7	3	1	8	7	4	7	5	64
34	10	6	5	5	8	5	0	11	10	9	7	5	80
35	2	4	4	2	10	4	4	7	8	5	6	4	59
36	6	8	4	3	12	2	1	8	4	6	3	3	60
37	10	5	4	4	14	6	1	11	7	4	8	3	76
38	4	9	4	4	15	3	5	11	8	5	7	5	81
39	10	4	3	3	10	-2	2	10	5	5	4	1	54
40	10	8	9	7	11	4	1	11	7	8	7	4	86
41	11	9	6	5	11	3	2	10	8	6	6	6	84
42	7	8	4	4	7	4	5	8	8	5	7	5	73

*Refer to key to number headings following these tables.

TABLE XXIV
DATA ON WORK RELATED FACTORS

Respondent Number	28a*	28b	28c	29a	29b	29c	30	31	32	33	34
1	9	3	12	68	104	172	14	168	95	263	36
2	14	3	17	165	308	473	28	197	70	267	26
3	18	8	26	164	389	553	21	130	48	178	27
4	20	10	30	244	151	395	13	192	68	260	26
5	17	6	23	123	154	277	12	192	69	262	26
6											
7	29	4	33	251	343	594	18	139	91	230	40
8	18	15	33	129	1392	1521	46	161	101	262	38
9	23	12	36	166	554	720	20	168	57	225	25
10	13	4	16	149	962	1111	14	157	99	256	39
11	30	25	55	684	1779	2463	45	161	74	234	32
12	36	22	56	362	365	727	13	193	50	243	21
13	72	14	86	2343	2489	4831	56	206	55	261	21
14	18	23	39	123	483	596	15	180	86	266	32
15	21	19	41	231	685	922	22	156	76	232	33
16	21	2	23	168	217	385	17	141	109	250	44
17	20	16	36	185	963	1148	32	188	79	267	30
18	30	4	34	689	393	1082	32	143	22	164	13
19	35	2	37	472	209	681	18	207	52	260	20
20	12	2	14	326	20	346	25	207	50	257	19
21	93	3	95	2278	392	2670	28	211	59	270	22
22	37	5	41	1544	156	1700	43	154	96	250	39
23	14	6	20	200	99	299	15	163	111	274	41
24	121	11	132	2749	1270	4019	30	240	102	340	30

TABLE XXIV (continued)

Respondent Number	28a*	28b	28c	29a	29b	29c	30	31	32	33	34
25	66	15	81	1318	890	2208	29	270	104	374	28
26	12	1	13	108	186	294	15	104	150	253	59
27	32	2	34	175	62	232	7	218	51	268	19
28	26	3	29	228	115	343	12	165	99	264	37
29	8	3	12	52	292	544	28	202	58	260	22
30	32	11	43	307	771	1075	21	235	64	299	21
31	39	4	42	272	144	416	10	242	32	274	12
32	18	3	21	169	97	266	12	231	51	288	18
33	19	3	22	251	62	313	14	214	79	293	27
34	19	13	31	380	500	780	25	194	86	281	31
35	39	7	46	274	380	654	19	187	68	255	27
36	16	6	22	428	117	545	25	104	144	248	58
37	10	6	15	104	832	936	63	121	102	224	46
38	70	15	85	17	1950	3662	43	163	104	267	34
39	29	2	31	174	89	263	9	181	66	247	27
40	45	11	56	742	840	1582	29	170	93	264	35
41	77	22	99	6	499	1015	10	186	68	254	27
42	20	2	22	226	107	333	15	172	100	272	37

* Refer to key to number headings following these tables.

KEY TO NUMBER HEADINGS ON DATA SHEET IN
TABLES XX, XXI, XXII, XXIII, XXIV

Table XX Background and Training Factors

1. Highest degree earned
2. Undergraduate grade point average
3. Number of hours undergraduate credits in dairying
4. Number of hours of graduate credits in dairying
5. Number of years of experience in Extension
6. Number of years of experience in present position
7. Number of man-days dairy specialists spent in county

Table XXI County Situation Factors

8. Percent of farm income in county where assigned received from dairying
9. Number of dairy farms in the county
10. Income from dairying
11. Number of Grade A farms in county
12. Number of Men Extension Agents assigned to the county

Table XXII Interest and Attitude Factors

13. Total score on interest and attitude scale
- 13a. Agent's personal interest in dairying
- 13b. Self-confidence of agent in his dairy subject-matter competency
- 13c. Agent perception of the ease of working with dairymen or receptiveness of dairymen to his assistance
- 13d. Job satisfaction derived from his feeling of accomplishment in the dairy program

- 13e. Agent perception of the relative importance of dairying in the county

Table XXIII Score on Multiple-Choice Test

15. Nutrition and feeding
16. Dairy records and record keeping
17. Artificial breeding, sire selection and genetics
18. Farm planning and management principles
19. Production of quality feed
20. Abnormal milk
21. Milking management
22. Buildings and farmstead planning
23. Waste disposal
24. Extension Dairy Program Development
25. Extension communication
26. General dairying
27. Total multiple-choice test score

Table XXIV Work Related Factors

- 28a. Man-days agents devoted to individual contact methods with dairy clientele
- 28b. Man-days agents devoted to group and mass media methods with dairy clientele
- 28c. Total man-days agents devoted to dairy educational work
- 29a. Number of individual contacts made by agents with dairy clientele
- 29b. Number of group contacts made by agents with dairy clientele
- 29c. Total number of contacts made with dairy clientele

30. Number of contacts per man-days devoted to dairy work.
31. Total man-days worked by agent out-of-office
32. Total man-days worked by agent in-office
33. Total man-days worked by agent
34. Percent in-office is of total time worked by agent

TABLE XXV

EFFECTIVENESS RATING SCORES OF AGENTS, ON CONDUCTING THE DAIRY
EDUCATIONAL PROGRAM IN SELECTED TENNESSEE COUNTIES BY
DISTRICT SUPERVISORS, ASSOCIATE SUPERVISORS, AND
DAIRY SPECIALISTS

Respondent Number	Super- visors	Associate Supervisors	Dairy Spec. A	Dairy Spec. B	Dairy Spec. C	Dairy Spec. D	Dairy Spec. E
1	119	141	134		116	122	
2	114	137	73		88	116	
3	129	138	97		139	123	
4	110	141	120		95	116	
5	125	144	148	128	151	127	
6							
7	104	101	66	110	61	114	106
8	133	122	128	104	112	118	135
9	124	148	91	101	66		114
10	126	107	149	131	115	118	128
11	105	81	69	89	70	111	119
12	159	131	151	134	144	123	134
13	117	133	88	93	107	117	112
14	99	125	125		91	118	113
15	122	119	93		136	118	124
16	115	87	92	93	62	116	111
17	127	135	94	99	94	118	117
18	103	53	94	88	96		
19	137	143	122	117	97		127
20	118	106	97	90	73		
21	97	86	99	106	113	117	
22	63	89	72	95	69		
23	120	119	118	112	108		
24	151	146	153	135	150	123	
25	134	153	113	109	142		
26	151	150	129	138	118		130
27	54	62	57	75	65		
28	119	116	95	114	92		127
29	127	123	143	93	93		128
30	133	144	146	143	83		131
31	105	109	60	60	89		117
32	83	95	66	90	78		116
33	106	89	61	59	76		
34	135	142	127	90	111		
35	116	103	110	118	117		
36	110	84	62	74	114		
37	140	147	126	140	149		

TABLE XXV (continued)

Respondent Number	Super- visors	Associate Supervisors	Dairy Spec. A	Dairy Spec. B	Dairy Spec. C	Dairy Spec. D	Dairy Spec. E
38	152	148	152	150	155	121	
39	103	94	83	70	90		
40	149	145	152	121	146	118	
41	133	122	145	122	148	122	
42	137	140	152	148	133	118	

TABLE XXVI

MINIMUM, MEAN, MAXIMUM AND RANGE OF THE FACTORS INCLUDED IN THE STUDY

Selected Factors	Minimum	Mean	Maximum	Range
Highest degree earned	1.0	1.54	2.0	1.0
Undergradage grade point average	1.9	2.58	3.6	1.7
No. hrs. undergrad. credit hrs. dairy	0.0	10.20	48.0	48.0
No. hrs. grad. credit dairy	0.0	3.39	34.0	34.0
No. yrs. Extension	5.0	21.63	43.0	38.0
No. yrs. present position	1.0	13.51	37.0	36.0
No. man-days spec. in county	0.0	5.24	21.0	21.0
Percent county farm income dairy	4.0	23.76	48.0	44.0
No. dairy farms in county	14.0	293.31	999.0	985.0
No. dollars (1000) dairy	249.0	1508.07	5842.0	5593.0
No. Grade A dairy farms in county	8.0	54.71	140.0	140.0
No. men Ext. agents in county	1.0	2.29	3.0	4.0
Score on interest in dairy	3.0	6.22	8.0	5.0
Self confidence	2.0	6.07	8.0	6.0
Receptiveness	2.0	6.15	8.0	6.0
Dairy job satisfaction	3.0	6.32	8.0	5.0
Importance of dairying	1.0	8.00	7.0	7.0
Total interest and attitude scale	15.0	31.12	40.0	25.0
Effectiveness rating score	63.0	113.05	146.0	83.0
Total multiple-choice score	44.0	72.15	99.0	55.0
Score--nutrition section	1.0	7.76	13.0	12.0
Score--record keeping	1.0	5.88	9.0	8.0
Score--artificial breeding & genetics	0.0	5.22	11.0	11.0
Score--farm planning	1.0	4.56	8.0	7.0
Score--quality feed	7.0	11.20	16.0	9.0
Score--abnormal milk	0.0	3.51	9.0	9.0
Score--milking management	0.0	2.54	7.0	7.0
Score--building planning	3.0	8.39	11.0	8.0
Score--waste disposal	4.0	7.63	12.0	8.0
Score--Ext. program development	2.0	5.46	9.0	7.0
Score--Ext. communications	3.0	5.98	8.0	5.0
Score--general dairying	0.0	4.34	8.0	8.0
Man-days devoted to dairy work ind.	8.0	31.05	99.0	91.0
Man-days devoted to dairy work other	1.0	9.05	33.0	32.0
Man-days devoted to dairy work total	12.0	40.00	132.0	120.0
No. of individual contacts--dairy	52.0	508.51	2749.0	2697.0
No. of group contacts--dairy	20.0	522.20	2089.0	2069.0
No. of total contacts--dairy	172.0	1028.02	4031.0	3859.0
No. of contacts per man-day	7.0	23.27	63.0	56.0
Man-days out-of-office	104.0	180.80	270.0	166.0
Man-days in-office	22.0	78.95	150.0	128.0
Man-days total	164.0	259.90	374.0	210.0
Percent in-office time is of total	12.0	30.37	59.0	47.0

TABLE XXVII

INTERCORRELATION BETWEEN VARIABLES (N=43)

[illegible]

TABLE XXVII (continued)

Variable Number*	11	12	13	14	15	16	17	18
1	.15	-.04	-.13	-.20	-.16	-.20	.03	-.18
2	.18	-.02	-.04	-.08	-.01	.03	-.02	-.02
3	-.30	.23	.06	.16	-.02	-.15	-.01	.02
4	-.01	-.01	-.01	.01	-.02	.09	.13	.06
5	-.06	.11	.20	.11	.11	.03	-.08	.12
6	.00	.08	.21	.04	.14	.07	.03	.14
7	.48	.17	.30	.29	.30	.26	.23	.34
8	.67	.01	.60	.46	.48	.28	.64	.57
9	.46	.14	.30	.36	.24	.32	.15	.32
10	.84	.24	.42	.42	.46	.44	.42	.51
11		.05	.42	.35	.46	.39	.48	.50
12			.17	.35	.28	.22	.22	.30
13				.82	.73	.56	.60	.88
14					.61	.55	.46	.80
15						.71	.65	.88
16							.55	.80
17								.76
18								
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TABLE XXVII (continued)

Variable Number*	19	20	21	22	23	24	25	26
1	.18	.24	.02	.27	.10	-.13	.22	.30
2	.20	.11	.06	.15	.16	-.18	.38	.09
3	.06	-.11	-.08	-.09	-.01	.05	.17	.01
4	.01	.13	-.06	.04	.18	-.01	.23	-.01
5	-.46	-.37	-.20	-.19	-.32	-.10	-.05	-.24
6	-.49	-.33	-.17	-.11	-.31	-.08	.00	-.28
7	.40	.13	.07	.35	-.08	.11	.13	.20
8	.13	.17	.44	-.04	.13	.15	-.14	-.01
9	.25	.20	.08	.28	.17	-.09	.08	-.04
10	.35	.27	.13	.26	.06	.04	.16	.08
11	.23	.25	.17	.10	.05	.14	.06	.09
12	.22	-.27	-.07	-.10	-.29	-.07	-.11	.11
13	.12	.19	.17	-.06	.05	.25	.16	-.04
14	.19	.05	.18	-.18	.03	.23	.06	-.17
15	.24	.13	.18	-.15	.03	.25	.22	.03
16	.19	.21	.16	-.08	.06	.17	.39	-.07
17	.01	.08	.32	-.28	-.06	.11	.09	.04
18	.17	.14	.21	-.18	.02	.23	.24	-.06
19		.48	.28	.47	.26	.11	.26	.46
20			.52	.57	.67	.37	.41	.36
21				.21	.45	.10	-.05	.17
22					.25	.11	.35	.33
23						.24	.28	.07
24							.00	-.10
25								.08
26								
27								
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TABLE XXVII (continued)

Variable Number*	27	28	29	30	31	32	33	34
1	.06	.06	.13	.33	-.08	.01	-.04	-.02
2	.05	-.43	-.21	.11	.10	-.05	-.05	.02
3	-.04	-.21	-.11	-.01	-.12	-.16	-.28	-.10
4	.12	.18	.03	.16	-.03	.13	.04	-.12
5	.04	-.20	-.27	-.37	.06	-.12	-.10	-.08
6	.04	-.21	-.24	-.31	.04	-.20	-.10	-.05
7	-.11	.10	-.11	-.06	-.11	.14	.39	.71
8	-.06	.10	-.15	.05	.08	.20	.59	.43
9	.16	.19	-.05	.08	-.05	.29	.29	.40
10	.18	.23	-.03	-.01	.01	.27	.54	.51
11	.09	.14	-.01	.08	-.03	.34	.71	.59
12	-.03	.05	-.29	-.24	-.17	-.37	.05	.14
13	.05	.20	.08	-.18	.16	.13	.48	.29
14	-.03	.28	.02	-.23	.06	-.02	.33	.26
15	-.06	.17	-.07	-.16	.19	.11	.40	.32
16	.05	.37	.09	-.28	.21	.09	.39	.29
17	-.08	.14	-.07	.06	.02	.14	.38	.32
18	-.01	.23	-.02	-.23	.13	.10	.49	.33
19	.01	.33	.04	.16	.12	.06	.16	.40
20	.34	.49	.58	.31	.46	.46	.17	.06
21	.05	.26	.06	.13	.04	.20	.01	.11
22	.11	.32	.14	.05	.07	.14	.04	.17
23	.12	.22	.23	.27	.22	.19	.08	-.05
24	-.21	.21	.29	.07	.26	.41	.31	.04
25	.04	.27	.13	.04	.18	.07	-.03	-.03
26	.07	.09	.12	.15	-.09	-.14	-.22	.10
27		-.03	.51	-.25	.34	.04	.06	-.16
28			.11	.15	.22	.04	.18	.15
29				.09	.45	.30	.09	-.20
30					-.15	.29	.01	.06
31						.24	.14	-.16
32							.31	.17
33								.47
34								
35								
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TABLE XXVII (continued)

$r = .49$ significant at the .001 level

$r = .39$ significant at the .01 level

$r = .30$ significant at the .05 level

$r = .26$ significant at the .10 level

Key to Variable Numbers

1. Degree
2. Undergraduate grade point average
3. Hours undergraduate credit dairying
4. Graduate credit dairying
5. Years in Extension
6. Years in present position
7. Man-days dairy specialist in county
8. Percent of county farm income - dairy
9. Dairy farms in county
10. Income from dairying in county
11. Grade A dairy farms in county
12. Men agents assigned to county
13. Personal interest in dairying
14. Self-confidence in dairying
15. Receptiveness of dairy clientele
16. Job satisfaction in dairy work
17. Importance of dairying
18. Score on total interest and attitude scale
19. Effectiveness rating
20. Multiple-choice test
21. Nutrition and feeding
22. Dairy records and record keeping
23. Artificial breeding, sire selection and genetics
24. Farm planning and management principles
25. Production of quality feed
26. Abnormal milk
27. Milking management
28. Building and farmshed planning
29. Waste disposal
30. Extension Dairy Program Development
31. Extension communication
32. General dairying
33. Man-days devoted to dairy work with individual methods
34. Man-days devoted to dairy work with group and mass media methods
35. Man-days devoted to dairy work--total

TABLE XXVII (continued)

- 36. Number of dairy contacts individual
- 37. Number of group contacts with dairy clientele
- 38. Total number of contacts with dairy clientele
- 39. Number of dairy contacts per man-day expended
- 40. Man-days spent out-of-office
- 41. Man-days spent in-office
- 42. Total man-days worked per year
- 43. Percent in-office time is of total time worked

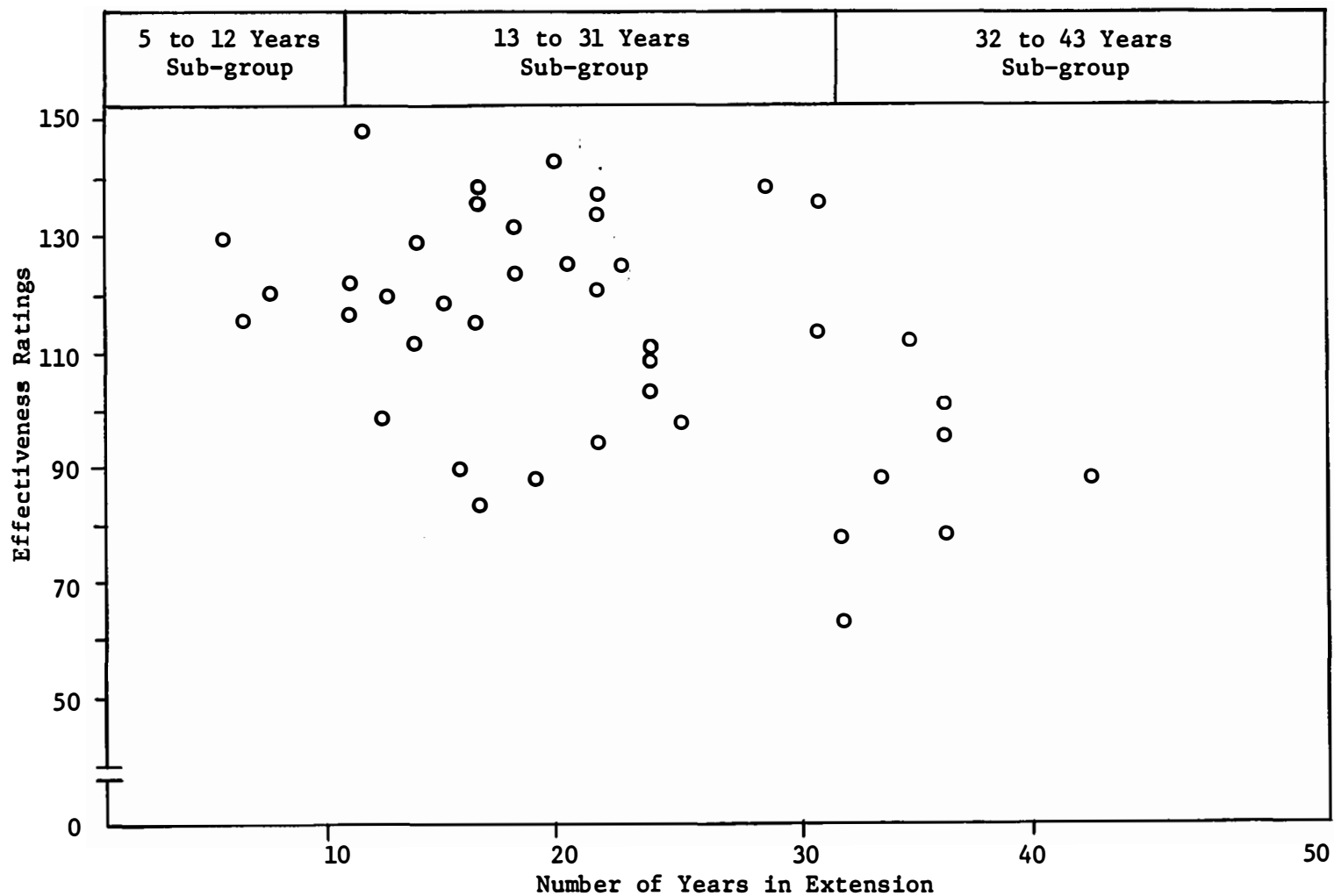


Figure 1. Scattergram showing agents' effectiveness rating in relation to number of years in Extension.

VITA

Rural Allen Peace was born in Decatur, Tennessee, on September 16, 1930. He attended elementary school at Fairview and was graduated from Meigs County Consolidated High School in 1950. The following September he entered The University of Tennessee and in December, 1954, he received a Bachelor of Science Degree in Vocational Agricultural Education. He received a commission in the U.S. Army at this time through The University of Tennessee ROTC Program. After two years in the U.S. Army, the author was employed by the Tennessee Cooperative Extension Service in June, 1957.

After working as Assistant County Agent in Marion County for two years and three months, he returned to The University of Tennessee where he obtained a Master of Science Degree in Agronomy in 1961, and has been employed by the Tennessee Cooperative Extension Service since June, 1961. During this time the author held the position of Assistant County Agent in Adult Extension work until December, 1962, Specialist in Tributary Area Development from January, 1963, until June, 1963, District Supervisor of Agricultural Programs from August, 1963, until June, 1971, and Associate District Supervisor until the present. He completed a course in Administration and Supervision at the University of Wisconsin in 1964 and a course in Statistics at Tennessee Technological University in 1968.

He re-entered the Graduate School at The University of Tennessee in February, 1969, for a five-week short course and in September, 1969,

through September, 1970, completed his year in residence and received his Doctorate of Education degree with a major in curriculum and instruction in June, 1972. He is a member of the Phi Delta Kappa Professional Educational fraternity

He is married to the former Nancy Arrissia Coffee of Livingston, Tennessee. They have two children, Christie and Alan.