

ABSTRACT OF THESIS

MEASURING FARM PROGRESS OF PLAN A VETERANS
TAKING INSTITUTIONAL ON-THE-FARM TRAINING

Submitted by

E. J. F. Early

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In partial fulfillment of the requirements
for the Degree of Master of Education
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ABSTRACT OF THESIS

The aim of vocational education in agriculture is to train present and prospective farmers for proficiency in farming, with the view of assisting them to grow progressively into the farming business.

The present investigation was conducted to measure what progress has been made by institutional on-the-farm trainees in becoming established in farming.

Congress recognized the need and value of veterans of World War II becoming established in farming; therefore, money was appropriated for the establishment of the institutional on-the-farm training program for the purpose of establishing veterans in farming. Under the Colorado Plan for Institutional On-the-Farm Training, the State Board for Vocational Education became responsible for the instruction and supervision, but very little was done to determine whether progress had been made by veterans toward establishment in farming.

The writer therefore proposed to study the following problem:

The problem

What farm progress is being made by veterans enrolled in the institutional on-the-farm training program?

Problem analysis.--To aid in solving the main problem, the following questions were answered:

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1. What is the scope and plan of operation of the institutional on-the-farm training program?

2. What farm progress was made from beginning of farm operation after discharge until date of enrollment in the institutional on-the-farm training program?

3. What farm progress has been made from the date of enrollment up to the present time?

The first problem above was solved by securing a copy of the Colorado plan for operation of the institutional on-the-farm training program.

In order to secure the information concerning the second and third problems above, a data-gathering device was developed which sought to determine the status of the veteran immediately prior to enrollment and what progress had been made toward establishment in farming at the time of this study. This data-gathering device was a list of evaluative criteria which was developed on the assumption that gains in farming status; gains in the number of approved practices used in the various farm enterprises, soil use, fertility and erosion control and farm mechanics; improved farm living conditions; and increase in assets would be an indication of the degree to which a veteran in the institutional on-the-farm training had become established in farming.

With the form of the evaluative sheet decided upon, items were constructed which were grouped under the appropriate headings. Each division of the evaluation sheet was then presented to specialists in technical agriculture and farm mechanics in each department concerned on the Colorado Agricultural and Mechanical College campus for checking of the authenticity of the recommended practices included under each area.

A group of 50 veterans upon which to administer the evaluative sheet was chosen from the Speiser Supervisory District in northeastern Colorado. These veterans were self-employed and enrolled in training centers in Brush, Greeley, Eaton, and Fort Collins. It was decided to use only those veterans who had been in training for a period of not less than one year, as it was assumed that sufficient time would have elapsed throughout all productive enterprise cycles to allow true progress to have been made.

Of these 50 veterans it was found that 25 had formerly enrolled in vocational agriculture and 25 had not formerly enrolled in vocational agriculture. Of the group that had formerly taken vocational agriculture, three were past 30 years of age; and of the group that had not taken vocational agriculture, nine were past 30 years of age. Seventeen of the 25 veterans who had formerly enrolled in vocational agriculture had completed at least the eleventh

grade in high school, whereas only eight of the 25 veterans included in this study who had not formerly enrolled in vocational agriculture had completed the eleventh grade.

As the establishment in farming of a group of farmers may have been related to previous vocational agriculture training, it was deemed advisable to classify the survey forms into the two groups mentioned. The data were then compiled and analyzed separately.

In order to collect the data, the writer accompanied the institutional on-the-farm supervisors, individually, to the farm of one of the veterans who was enrolled in that particular center. An evaluation form was completed by the supervisor in the presence of the writer, who answered questions and further explained each item of the form as needed.

The data from the completed survey forms were tabulated and analyzed in terms of the problem with the following findings:

1. In every division there was shown to be an advancement in farming status, moving up the agricultural ladder from hired hand to farm owner-operator status from the time of enrollment of this group of 50 veterans in institutional on-the-farm training to the time of this study.
2. There was an increase of slightly more than three approved practices per man from the time of enrollment to the time of this study.

3. The greatest per cent of adoption of all possible listed approved practices at the time of this study was found to be in the potato enterprise, with 79.4 per cent carried out.

4. There was an increase in every enterprise in the number of listed approved practices in use at the time of the study over the number in use prior to enrollment.

5. Progress was shown in family living as indicated by an increase in the use of home conveniences adopted by the veterans at the time of this study over the number in use prior to enrollment.

6. An increase of over 75 per cent in assets was found in the group formerly enrolled in vocational agriculture at the time of this study over their assets prior to enrollment, and an increase of over 42 per cent in assets was found in the group that had not formerly enrolled in vocational agriculture, at the time of this study, over their assets prior to enrollment.

Recommendations

An analysis of the findings together with a review of literature in Chapter II sustains the following recommendations concerning the institutional on-the-farm training program:

1. That more consideration be given the use of efficiency factors in the institutional on-the-farm training program. Little or no progress was evident in this study on the use of efficiency factors.

2. That a follow-up study be made of the 50 veterans included in this study within the next two years to determine the degree of future progress made toward establishment in farming.

3. That a more complete guidance program be employed for young men interested in farming as a vocation, since no attempt has been made in this study to evaluate this hypothesis.

4. That future studies be made with this group of men in the following areas: the effect of available working capital, available family labor, influence of supervisory visits, length of time enrolled in institutional on-the-farm training, and the number of years of vocational agriculture training in high school as related to the progress in establishment in farming.

5. That further study be made in an attempt to evaluate the work of the various instructors as to effectiveness of instruction and field supervision.

6. Also that further study be made in an attempt to evaluate the effectiveness of the institutional on-the-farm training program as related to progress in establishment in farming.

T H E S I S

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Submitted by

E. J. F. Early

In partial fulfillment of the requirements
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Colorado
Agricultural and Mechanical College
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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY
SUPERVISION BY E. J. F. EARLY
ENTITLED MEASURING FARM PROGRESS OF PLAN II VETERANS
TAKING INSTITUTIONAL ON-THE-FARM TRAINING
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Permission to publish this thesis or any part of it
must be obtained from the Dean of the Graduate School.

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TABLE OF CONTENTS

<u>Chapter</u>		<u>Page</u>
I	INTRODUCTION	9
	The problem	12
	Problem analysis	12
	Delimitations	12
	Definition of terms	12
II	REVIEW OF LITERATURE	13
	Need for evaluative criteria	14
	Summary and implications	18
	Objectives as a guide for establishing criteria for measurement	19
	Summary and implications	21
	Measurement criteria based on approved practices	21
	Summary and implications	30
III	METHODS AND MATERIALS	33
	Data-gathering device	33
	Selection of group surveyed	36
	Characteristics of the group	37
	Problems and procedures in gathering the data	38
IV	ANALYSIS OF DATA	40
	Beef production	44
	Dairy production	46
	Hog production	46
	Sheep production	49
	Poultry production	51
	Corn production	53
	Small grain production	53
	Family garden production	56
	Sugar beet production	58
	Potato production	58
	Soil use, fertility and erosion control	61
	Farm mechanics progress	64
	Farming status	69

TABLE OF CONTENTS.--Continued

<u>Chapter</u>	<u>Page</u>
IV ANALYSIS OF DATA.--Continued	
Farm living	71
Assets	73
Summary	79
V DISCUSSION	81
Beef production	83
Poultry production	84
Small grain production	85
Sugar beet production	86
Potato production	87
Farming status	88
Farm living	89
Assets	91
Summary	92
Suggestions for further study	93
VI SUMMARY	95
Recommendations	97
APPENDIX	99
BIBLIOGRAPHY	124

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1 NUMBER OF APPROVED PRACTICES CARRIED OUT BEFORE AND AFTER INSTITUTIONAL ON-THE-FARM TRAINING BY 50 VETERANS INCLUDED IN THIS STUDY	43
2 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 24 VETERANS REPORTING ON THE BEEF ENTERPRISE . .	45
3 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 40 VETERANS REPORTING ON THE DAIRY ENTERPRISE .	47
4 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 33 VETERANS REPORTING ON THE HOG ENTERPRISE . .	48
5 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 8 VETERANS REPORTING ON THE SHEEP ENTERPRISE .	50
6 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 28 VETERANS REPORTING ON THE POULTRY ENTERPRISE	51
7 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 46 VETERANS REPORTING ON THE CORN ENTERPRISE . .	54
8 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 50 VETERANS REPORTING ON THE SMALL GRAIN ENTERPRISE	55
9 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 37 VETERANS REPORTING ON THE FAMILY GARDEN ENTERPRISE	57
10 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 33 VETERANS REPORTING ON THE SUGAR BEET ENTERPRISE	59
11 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 15 VETERANS REPORTING ON THE POTATO ENTERPRISE .	60
12 NUMBER OF APPROVED PRACTICES CARRIED OUT BY 50 VETERANS REPORTING ON SOIL USE, FERTILITY AND EROSION CONTROL	62

LIST OF TABLES.--Continued

<u>Table</u>		<u>Page</u>
13	NUMBER OF APPROVED PRACTICES CARRIED OUT BY 50 VETERANS REPORTING ON FARM MECHANICS PROGRESS	65
14	FARMING STATUS OF 25 VETERANS FORMERLY ENROLLED IN VOCATIONAL AGRICULTURE	70
15	FARMING STATUS OF 25 VETERANS NOT FORMERLY ENROLLED IN VOCATIONAL AGRICULTURE	71
16	PROGRESS IN FARM LIVING AS SHOWN BY 25 VETERANS FORMERLY ENROLLED IN VOCATIONAL AGRICULTURE .	72
17	PROGRESS IN FARM LIVING AS SHOWN BY 25 VETERANS NOT FORMERLY ENROLLED IN VOCATIONAL AGRICULTURE	74
18	ASSETS OF 50 VETERANS INCLUDED IN THIS STUDY PRIOR TO AND AT THE TIME OF THE STUDY	75

Chapter I
INTRODUCTION

The aim of vocational agricultural education is to train present and prospective farmers for proficiency in farming with the view of assisting them in growing progressively into the farming business.

Since the passage of the Smith-Hughes Act of 1917, the road to establishment in farming has been greatly shortened by organized programs of instruction for all-day and young-farmer groups. This instruction, supplemented by carefully planned follow-up and supervision on farms, has greatly assisted these two groups over the years to gain proficiency in farming, grow progressively into the farming business and avoid many of the pitfalls of the trial and error methods. Because of the effectiveness of this program, Congress recognized the need and value of a similar program for discharged veterans of World War II who wished to become established on farms and to learn while earning. Such a program was designed to extend the same benefits and privileges to young men interested in the farming occupation as were extended to other groups interested in learning a trade, a business or attending college. Therefore, Congress passed legislation which provided for institutional

on-the-farm training. Under this plan it became the joint responsibility of the State Boards for Vocational Education and the Veterans Administration to put this program into effect in the several states.

Under the Colorado plan for institutional on-the-farm training the Veterans Administration has assumed the responsibility for furnishing the money as appropriated by Congress. The State Board for Vocational Education became responsible for the instruction and supervision.

The instruction consists of a total of 300 hours per year; 200 hours, or an average of four hours per week, are to be devoted to classroom instruction. During this class time the veteran attends lectures and discussions on general and current agricultural problems in the community. For 100 hours per year, or eight hours per month, the instructor gives the veteran on-the-farm instruction and supervision. During the farm instruction the veteran and instructor discuss and attempt to solve personal problems of the veteran and individual farm problems. Single veterans receive \$90.00 per month and married veterans receive \$110.00 per month for subsistence allowance, provided minimum requirements are met.

As pointed out by Lemon (22), the frequency and timeliness of visits were found to be important factors in the progress made by students in the development of supervised farm programs. This emphasizes the need for super-

vision on the farms of trainees in veterans' training.

In Colorado the instructors in the institutional on-the-farm training program are direct employees of the State Board for Vocational Education. They are men who have had the necessary agricultural experience, technical training, or both. District supervisors are also employees of the Colorado State Board for Vocational Education. They spend their time in the field assisting the instructors in setting up their courses and putting them into effect.

Each year the local veterans' training committee is required to recommend to the Veterans Administration and State Board for Vocational Education whether each veteran's training be continued or interrupted. This recommendation is to be based on the progress the veteran is making. His academic progress is based on the principles set up as in other academic work, but the farm progress is little more than a guess at present. Since this work was started only three years ago, there has been very little thought given to measuring the veterans' farm progress on a sound basis; therefore, it is necessary to measure farm progress of veterans taking institutional on-the-farm training, and, since the all-day and young-farmer groups in the regular vocational agriculture program so closely parallel this training, it is thought that the same measurement of farm progress could be of value.

The problem

What farm progress is being made by veterans enrolled in the institutional on-the-farm training program?

Problem analysis.--To aid in solving the main problem, the following questions were answered:

1. What is the scope and plan of operation of the institutional on-the-farm training program?
2. What farm progress was made from beginning of farm operations, after discharge, until date of enrollment in the institutional on-the-farm training program?
3. What farm progress has been made from the date of enrollment up to the present time?

Delimitations.--This study is limited to the Speiser Supervisory District in northeastern Colorado. The criteria for measurement were checked by specialists in technical agriculture and farm mechanics for each area involved in the study in measuring the farm progress. At least 50 veterans who had been in training a year or more were given this criteria for measurement.

Definition of terms.--Institutional on-the-farm training is the term used to designate the farm training which veterans receive through the State Board for Vocational Education in cooperation with the Veterans Administration.

By farm progress is meant progress in establishment in farming, enterprise progress, soil use, fertility and erosion, farm living, farm mechanics and net worth.

Chapter II

REVIEW OF LITERATURE

In a review of the literature pertaining to the problem of measuring farm progress the writer found numerous closely related studies and several that were akin to this study within limited phases. In many cases an attempt was made to measure the effectiveness of teaching vocational agriculture and the extent of the adoption of approved practices, but very little work has been done in attempting to measure the over-all farm progress in all phases, for either the all-day boys' or the adult-farmer group.

Many of the studies and articles concluded in the past show various methods of measurement of farm progress. These previous studies referred to form a very good foundation and background by giving direction to the problem of measurement of the over-all progress in all phases of the farming business.

A review of previous studies which have been made is presented under these three sections: (1) need for evaluative criteria, (2) objectives as a guide for establishing criteria for measurement, and (3) measurement criteria based on approved practices.

Need for evalu-
ative criteria

To date not much work has been done in the field of agricultural education in formulating criteria for evaluating and measuring the over-all farm progress. Therefore, if an analysis and formulation of criteria for the evaluation and measurement of farm progress were carried out, a valuable contribution would be made in the field of agricultural education. Such criteria could be used in the veterans' institutional on-the-farm training program as well as for the regular all-day, young-farmer and adult programs. The need for such criteria has been recognized by leaders in this field. This statement is substantiated by the review of the literature that is presented below.

Brunner (6), 1943, in setting up the criteria for a study for evaluating programs of preparation for teachers of vocational agriculture first made a review of literature in the field and then set up the criteria of measurement. These criteria were submitted to specialists in the field for criticism. After summarizing the criticisms, the criteria were revised until they met general approval of the jury. They were then recommended to be used as the instrument for evaluating programs of preparation for teachers of vocational agriculture.

The criteria for measurement were divided into 12 sections which listed items of "information needed," calling

for data and facts. The 12 sections also listed "observational guide items" of provisions, conditions, and characteristics deemed essential. The number of items in all cases varied considerably. Provisions were also made for the evaluators to add comments.

The observational scale which was proposed by Brunner may be condensed into objective form as follows:

Scale of fulfillment	Scale of points
A fulfilled to outstanding degree	5 highly satisfactory
B fulfilled to satisfactory degree	4 very good
C average fulfillment	3 average
D planned but not satisfactory results	2 poor
E unsatisfactory	1 very poor

The symbol of N was used when it did not apply.

In a review of the Brunner study, "Criteria for Evaluating Programs of Preparation for Teachers of Vocational Agriculture," Humpherys (20), 1944, stated that:

.....it is not too much to say that education, like industry, will witness growth only to the extent of its ability to make a critical evaluation of its enterprise and to adjust its organization procedures in the light of such an evaluation. (20:54)

Rhoda (27) wrote in 1944 that, if evaluations are made on classroom work only, we are thereby actually encouraging the boy to neglect his farming program. He was also of the opinion that a good program of evaluation should do eight things, which may be listed as follows:

1. Measure progress toward specified goals.
2. Measure in relation to real-life situations rather than artificial situations.
3. Teach students to evaluate own efforts fairly.
4. Develop favorable attitudes toward honest evaluation of their own efforts.
5. Serve as a teaching device and encourage students to do better work.
6. Measure each student against his own goals and provide for individual differences.
7. Measure attitudes and information and determine what has been taught.
8. Emphasize various phases of student behavior in proportion to importance.

On the evaluation sheet used by Rhoda, 80 per cent of the evaluation of the all-day program was given to the farming program, where he listed one column of accomplishments and another column of things not done but that could and should have been done. He then allotted 15 per cent for classroom work and five per cent to the Future Farmers of America.

Moffett (24), in 1947, outlined the value of a veterans' training committee and stated that the committee met every six months. At these committee meetings, from a report by the instructor as to the progress made by the veteran in his farm training program, the committee made

recommendations as to whether the veteran's continued training was justified. In the opinion of the writer valid criteria for measurement of veterans' progress would greatly increase the usefulness and effectiveness of committees such as referred to by Moffett.

Duck (14), 1948, discussed the use of goals and efficiency standards in the farming program and wrote that, through the use of efficiency standards, students learn to measure the performance of livestock and crop enterprises; also, that new practices would be uncovered and that costly practices would be brought to light and eliminated.

That there is a desperate need for work in evaluation in agricultural education was pointed out by Hamlin (18), 1948, when he wrote that "We need evaluation worse than ever. We still have little systematic evaluation that we can defend." He also stated, "We still lack the specific tools and the detailed techniques for evaluation useable under practical conditions." Hamlin further emphasized the need for evaluation when he wrote, "Adequate evaluation requires much time for research in developing procedures," and "Evaluation is too complex to deal with it in the oversimplified ways we have used." He also said, "We may not obtain perfection in it, but we can possibly improve it." (18:235-6)

In further emphasizing the importance of evaluation in agricultural education, Hamlin wrote, "We can

realize its importance. Agricultural education will usually be no better than the evaluations applied to it. We cannot improve agricultural education without improving evaluation." Then, in summary, he stated, "We shall never have a better chance to start work on evaluation than we have now in the situation that has developed because of the program for farm veterans." (18:237)

Summary and implications.--It was emphasized by the above studies that factors used in evaluation, such as approved practices and efficiency factors, are very important in measuring progress, but before these factors are used their value should be checked by specialists in the field. It was also brought out that the classroom is not the only place where evaluation should be made; Rhoda (27) suggested that 80 per cent of the evaluation of the all-day program be applied to supervised farm practice and only 15 per cent to the classroom work with five per cent to the Future Farmers of America.

It was pointed out by Moffett (24) that the committee on veterans' training was requested to make recommendations on the justification of the veteran's continued training; however, there is very little at present upon which to base measured progress. Further emphasis as to the need for evaluation was made by Hamlin (18) and Humpherys (20) when they stated that the present tools of evaluation in agricultural education are inadequate and that

the program is no better than the tools with which it is evaluated.

Objectives as a guide
for establishing cri-
teria for measurement

This section of the review of literature deals with those studies in which some direction was given to the problem of measuring farm progress by the formulation and use of objectives as a guide to setting up measuring criteria for the various phases of farming. It is obvious that such objectives are necessary to clearly define and give directions to the several phases of the farming business in which progress can and should be measured.

In an article in 1940 Cook (8) suggested the following criteria for evaluating individual achievements in a farm mechanics program:

1. Development of appreciation, ideals, interests and attitudes.
2. Development of good habits.
3. Development and understanding of farm mechanics information.
4. Development of managerial abilities of farm mechanics needed on the farm.
5. Development of abilities in planning.
6. Development of self-confidence.

In an article in the Agricultural Education Maga-

zine, Deyoe (11), in 1942, while suggesting a plan for evaluating outcomes of supervised programs in all-day and part-time classes, listed three headings for consideration. One of these headings was "objectives of supervised farm practice in terms of outcome," such as "to contribute to improved living on the farm." Another heading was "evidence that objectives are being realized," such as "adoption of approved practices"; a third heading was "methods for securing evidence," such as "inspection of records as to completeness and accuracy." (11:146)

Lawson (21), in 1946, outlined the objectives of vocational education in agriculture for veterans. In his article he listed such general objectives as to develop a high degree of efficiency as a farm operator and development of abilities such as getting started and advancing toward a self-managing farm operation, to produce plant and animal products efficiently, and to conserve soil and other natural resources. He further emphasized that goals and objectives should be developed on the individual veteran basis.

A study was made by Duck (15) in 1947 to develop objective measurements of departments of vocational agriculture. In the study he listed such factors as improvement projects per boy, units of stock per boy, number of acres per boy and labor income per boy. He then gave the number reported and the rank of that number in comparison to other departments in that area.

Summary and implications.--Since our ultimate objective in agricultural education is that of establishment in farming, it is necessary that we measure progress toward this goal. It was pointed out that we need to lay a good foundation of developing the farm mechanics phase of farming by developing the proper attitudes, habits and skills.

It was also pointed out that we need to develop goals and measure the progress toward these goals of a self-employed operator. It was further emphasized that each individual set up his own goals and objectives, and that individual progress should be based on individual accomplishments.

These studies clearly emphasize that it is very desirable to use goals and objectives as criteria for measurement of the progress toward establishment in farming. It is the opinion of the writer that goals should be set up by the individual, with the assistance of the instructor, and that criteria of measurement of progress toward these goals be established in all phases of the farm program as a guide for student and instructor alike.

Measurement cri-
teria based on
approved practices

In the past approved practices have been the basis of most of the work that has been done toward the measurement of farm progress. While incomplete in some enterprises,

these farm practices have given direction over the years to the instructor with respect to course content and where to place instructional emphasis. The student, too, has been able to use stated, approved practices as points of departure in carrying out and improving farming practices on an individual basis.

Davidson (9), in 1925, made a study of the farm shop and agricultural engineering activities on Kansas farms in which farmers participated on their farms. Nine different divisions of activities were set up on a check sheet to determine farmer participation. The results of the study were as follows:

1. Farm carpentry, 92 per cent participated.
2. Blacksmithing, 58 per cent participated.
3. Soldering, 50 per cent participated.
4. Harness repair, 95 per cent participated.
5. Plumbing, 92 per cent participated.
6. Motor mechanics, 82 per cent participated.
7. Farm machinery repair, 92 per cent participated.
8. Concrete work, 72 per cent participated.
9. Miscellaneous jobs, 95 per cent participated.

A study was made by Ayers (5), in 1929, for the purpose of measuring the effectiveness of instruction in agricultural evening classes by means of changes in approved practices made by the members attending the classes.

Through a case study of each of the 484 members, involving practices that should be done and those that were actually done after instruction, it was found that 62 per cent of the 1,445 changes in practices that needed to be made were put into effect.

A score card, for the purpose of project evaluation, was set up on the basis of judgments of experienced workers in agricultural education by Wilson (33) in 1929. He applied the score card to 450 projects; then results were statistically analyzed and revised in the light of this try-out. He presented the score card as a workable, scientific device of measurement for evaluating project work.

Bunyard (7), in 1930, attempted to work out a criteria for measuring the outcomes of evening class instruction in dairying on the basis of the amount of participation, supervised practice, and cooperation. It was found that 70 per cent of the members adopted new farm practices that were traceable to the evening school instruction.

In a study to find the effect of evening schools in influencing farmers to carry out approved practices in western Arkansas, Hull (19) found in 1930 that in 17 schools, 62.1 per cent of all possible approved practices were carried out. He further found that 79.5 per cent of all possible approved practices were carried out in cotton,

which was the major enterprise.

Mobley (23) in a study made in 1930 to evaluate evening school instruction used as his criteria of measurement changed practices which were suggested in class instruction and adopted by the farmers in attendance. The only enterprise measurement used was that of cotton. It was found that farmers modify practices that they are already using more readily than they adopt new practices. It was also found that a large number did not use practices which they had proposed to use.

A study was made by Swaney (30) in 1930 of the results of vocational agriculture as measured by the number of approved practices which were adopted. He carried his study out on 126 farms, 16 farms upon which former students of vocational agriculture lived; 20 farms of boys who were enrolled at that time in vocational agriculture; 23 farms in communities having vocational agriculture, but which had not been reached directly by vocational agriculture; and 67 farms in communities which were not maintaining vocational agriculture departments. It was found that on the farms of former and present vocational agriculture students the number of approved practices which were adopted exceeded the number of approved practices which were adopted on the farms of the other groups.

In a study by Shofner (29), in 1933, an attempt was made to assign relative values to improved practices

which were adopted by farmers who were enrolled in adult evening schools. A questionnaire was sent to vocational agriculture instructors in Louisiana, asking for data on improved practices done by farmers enrolled in evening school classes as a result of the instruction. A list of improved practices was then compiled and relative values assigned to each approved practice.

In an attempt to evaluate the influence of certain factors in supervised farming practices on the continuance of a boy in agricultural occupations, Todd (32) made a study in 1936 in which he found that the more years a boy spent in vocational agriculture the greater the probability that he would enter farming. The range in entering farming was from 43 per cent of those who were enrolled in vocational agriculture classes for one year to 61 per cent of those who were enrolled in vocational agriculture classes for four years. It was also found that the more time a boy spent on his supervised farming the more likely he was to enter farming.

Ten teachers and 246 boys were studied by Dowell (13), in 1938, to discover ways and means of improving supervised home project programs. Criteria were set up for measurement, based upon such factors as crop yields per acre and animal production per head. It was found that the size of the class was inversely related to the quality of the program, with high quality being found in small classes.

High quality was also found where projects were regarded as of basic importance.

Grant (17), in 1938, made a study to determine which recommended practices were and were not being used. He examined 71 records of 4-H boys and found that two approved practices were not used as much as others and none were used as much as should be.

A study was made by Addison (1) in 1939 to compare the number of approved practices adopted by farmers who attended evening school in Texas in 1931-33 before the government farm program, with the number of approved practices adopted by farmers in Texas who attended evening school in 1933-35 after the program was initiated. It was found that the average number of approved practices adopted by each farmer in 1931-33 was more than two and that the number of approved practices adopted in 1933-35 was less than one. In some cases there was less than 25 per cent of the expected approved practices adopted by individual members. He implied, therefore, that the government farming program had actually reduced farming efficiency.

Robinson (28), in 1940, made a study of the efficiency of supervised farm practice work, using the evaluative criteria set up by the National Committee on Standards for Vocational Agriculture Education. As a result of his study the following facts were revealed:

1. Record keeping was the most efficiently done.

21

2. Making preliminary plans was the least efficiently done of all phases.

3. Provisions for instruction on farm practices were done with a moderate degree of efficiency.

4. Most teachers did job planning well.

5. Due to lack of purpose there was low efficiency in visitation.

Deyoe (12) in an article in 1943 wrote that the achievement of goals such as "weight of litter at 56 days," "annual butterfat production per cow," "feed per 100 pounds (or per pound) of gain," and "bushels per acre" is progress toward efficiency and measurement of growth toward establishment in farming. Then, in addition, with regard to the use of goals in agricultural education, he wrote, "With all, regardless of the level of their achievements at a given time, they are motivated to strive for still higher accomplishment through the discovery and utilization of approved practices which make such progress possible." (12:188)

It was pointed out by Deyoe (10) in an article in 1944 that approved practices are those which, either through experimental evidence or through successful use on some farms, or both, have been accepted as having superior merit. He also emphasized that, if approved practices are to be used, they should first be validated by the approval of a technical expert in the field.

Frutchev (16), in 1945, wrote an article

regarding measurement of understanding in agriculture and stated that understanding is the essential objective of agricultural education. He further stated that understanding manifests itself by (1) the attainment of satisfactory results; (2) the choosing of approved practices; and (3) the use of those approved practices. He was of the opinion that, if one obtains a high production, as measured by pounds of milk per cow, and does it efficiently, as measured by pounds of feed per pound of milk, it indicates that he understands what it takes to produce a satisfactory result.

A questionnaire was sent to 34 vocational agriculture teachers in Ohio by Lemon (22), 1946, in a study to evaluate selected programs of supervised practice as a basis for improvement. Some of the recommendations made by Lemon are paraphrased as follows:

1. Teacher's visits should be made at critical times of the project.
2. Extra visits should be made with beginning students.
3. Some encouragement visits should be made.
4. Visits should be made after school and Saturday's.
5. A minimum of seven visits per boy should be made.
6. A record of visits should be kept.

Wiseman (34) reported in an article in the Agri-cultural Education Magazine in 1947 a study which he had made to check the use of the standardized tests to measure the high school students' achievements in animal husbandry in South Dakota. Seventeen vocational agriculture instructors cooperated in the school year of 1943-44, giving the Deyoe tests. It was found that a full nine months' period should have been used instead of five months between tests. It was further found that about one-third of those students made substantial gains, that one-third made small gains, while one-third made the same score or registered loss. He also found that the best gains were made where the initial scores were somewhat average. This study substantiates the fact that training of at least nine months or longer is necessary in order to measure individual progress in the business of farming.

Swanson (31) wrote, in 1949, that in evaluating an institutional on-the-farm training program, the evaluation must be confined to individual progress on the individual farm. He suggested that the evaluation be based on the following six items:

1. Financial progress.
2. Recognition and adoption of approved practices.
3. Farm organization (number and kind of livestock and acres).

4. Production levels such as the pounds of butterfat per cow, and feed per 100 pounds of gain.

5. Efficiency factors such as crop yield index.

6. Level of living as indicated by home conveniences and homestead beautification.

Summary and implications.--In the studies reviewed, which involved evaluation in agricultural education, the majority of the evaluative criteria have been based upon the adoption of approved practices. However, it was pointed out by Ayers (5), Bunyard (7), Hull (19), Mobley (23), Grant (17) and Addison (1) that seldom are as many practices adopted or changes made in farming practices as are desirable. Swaney (30) found that more progress was made on those farms that were influenced by former and present vocational agriculture students. Todd (32) further discovered that the more vocational agriculture courses a boy takes, the more likely he is to become established in farming.

Robinson (28) made use of the evaluative criteria as developed by the National Committee on Standards for Vocational Education in Agriculture (25) to study the efficiency of supervised farm practice work, and found that record keeping and job planning were well done; that provisions for instruction on farm practices were done with a moderate degree of efficiency; and that preliminary planning and visitation were done with a low degree of efficiency.

Use of validated score card was made by Wilson (33) for evaluation of project work, while Schofner (29) attempted to assign relative values to improved practices undertaken by farmers in evening school classes.

A criterion of measurement was developed by Dowell (13) using such factors as crop yield per acre and animal production per head, which are some of the factors of criteria used by the writer in this survey form as a basis for measuring farm progress.

Davidson (9) used the approved practice method in measuring farm mechanics progress and participation which constitutes a considerable portion of the basis used in setting up measurement criteria for this study.

It was pointed out by Deyoe (12), Frutchey (16) and Lemon (22) that the use of approved practices in the supervised farming program does form a basis for much improvement of farming practices. The adoption of improved and approved practices for each enterprise was used to a large degree by the writer along with other items such as financial progress and progress in standards of living as the basis for measuring farm progress of veterans in institutional on-the-farm training. These same factors listed above were, in the main, also suggested by Swanson (31).

Wiseman (34) in his study determined further that a training period of at least nine months is necessary in order to measure progress in the business of farming. In

this study one year or more of training was used as the basis of selection of trainees in the institutional on-the-farm training program in the attempt to measure farm progress of these trainees.

Chapter III
METHODS AND MATERIALS

The presentation of methods and materials utilized to measure farm progress includes (1) a description of the data-gathering device; (2) the selection of the group surveyed; and (3) problems and procedures in gathering the data.

Data-gathering device

During the fall of 1947 the writer was responsible for the supervision of the training of 75 veterans taking institutional on-the-farm training in addition to, and in connection with, the regular vocational agriculture duties in Missouri. At about this time a committee consisting of two laymen, the county agent, and a vocational agriculture teacher was formed to determine whether continued training of the veteran was justifiable, in light of the progress which the veteran was making. It was easy enough to measure the classroom progress by the use of established devices, but the measurement of farm progress was very inaccurate and speculative.

The data-gathering device used in this study was a list of evaluative criteria which was developed on the assumption that the gains in farming status, gains in the

number of approved practices used in the various farm enterprises, gains in the farm living as revealed by the adoption of home conveniences, and gains in financial status would be indications of the degree to which a veteran in the institutional on-the-farm training program had become established in farming.

In order to develop a useable set of criteria a trial survey form was developed. The trial survey form was submitted to two visiting summer session faculty members of Colorado Agricultural and Mechanical College: Professor L. R. Humpherys, Head of the Agricultural Education Department at Utah State College, and Dr. G. P. Deyoe, Teacher Trainer in the Agricultural Education Department at the University of Illinois. Through consultation with these men it was decided that the survey form of evaluative criteria should be organized in the following seven divisions:

I. Personal information sheet, which included data that it was thought might have influence on the progress a veteran was making, such as the number of dependents, extent of the veteran's education, and length of service.

II. Progress in establishment in farming, including those steps through which a veteran might move toward becoming established in farming, such as:

1. Hired hand.
2. In partnership.
3. Renter-operator.

4. Owner-operator.

III. Enterprise measurement, using approved practices, efficiency factors and animal units of the following enterprises:

1. Beef cattle.
2. Dairy cattle.
3. Hogs.
4. Sheep.
5. Poultry.
6. Corn.
7. Small grains.
8. Family gardens.
9. Sugar beets.
10. Potatoes.

IV. Soil use, fertility and erosion, which included those approved practices recommended by soil technicians at Colorado Agricultural and Mechanical College as desirable procedures.

V. Farm living progress, including those factors which lead toward a higher standard of living and efficiency on the home farm.

VI. Farm mechanics progress, as based on those farm mechanics jobs that add to the efficient operation of a modern-day farm and its equipment.

VII. Increase in assets, including the entire assets of the veteran such as inventory, checking account,

savings, and home furnishings.

In the various enterprise sheets there are three main columns for consideration, as follows:

1. Prior to enrollment date.
2. At present.
3. Plan to do by end of training.

Each main column is broken into three sub-headings: (1) never, (2) sometimes, and (3) always.

With the form of the evaluative sheet decided upon, items were constructed which were grouped under the appropriate headings. Each division of the evaluation sheet was then presented to specialists in the field, in each department concerned on the Colorado Agricultural and Mechanical College campus, for checking of the authenticity of the recommended practices included under each area. The evaluative sheet was then revised according to the suggestions of the experts.

Selection of group surveyed

To select a group upon which to administer the evaluative sheet, the Colorado State Supervisor of Agricultural Education was consulted. He suggested that a group of veterans taking institutional on-the-farm training in the Speiser supervisory area of northeastern Colorado be used. Mr. Alfred T. Speiser, supervisor of the institutional on-the-farm training in the Speiser area, was contacted.

He suggested that a study of the veterans in the training centers of Brush, Greeley and Fort Collins would yield a good cross-section of the farm progress of veterans in northeastern Colorado. It was later decided to add the training center at Eaton to obtain a greater number of veterans who had been enrolled for at least one year of institutional on-the-farm training.

As was reported in the previous chapter, Wiseman (34) indicated in his study that measurement of farm progress was not effective for those who had less than nine months' training. The veterans chosen for this study were limited to those who had received one or more years of training in the institutional on-the-farm program. It was assumed that sufficient time would have elapsed throughout all productive enterprise cycles to allow true progress to have been made. The group was further limited to those veterans who were self-employed because it was felt that the farming activities of employed veterans would be dominated considerably by their employers.

Characteristics of the group.--Finally, on the basis of the procedure for selection outlined previously, the group of 50 veterans used as the basis of this study was selected. Of these 50 veterans it was found that 25 had formerly taken vocational agriculture training and 25 had not formerly taken vocational agriculture. Of the group that had taken vocational agriculture, three were

past 30 years of age; of the group that had not taken vocational agriculture, nine were past 30 years of age. Seventeen of the 25 veterans who had formerly enrolled in vocational agriculture had completed at least the eleventh grade in high school, whereas only eight of the 25 veterans included in this study, who had not formerly enrolled in vocational agriculture, had completed the eleventh grade.

Because the establishment in farming of a group of farmers may have been related to previous vocational agriculture training, it was deemed advisable to analyze the data obtained from those who had formerly enrolled in vocational agriculture separately from the data from those not formerly enrolled in vocational agriculture. For this reason the survey forms, when returned, were classified into the two groups mentioned and data compiled and analyzed separately.

Problems and procedures in gathering the data

Several personal visits to the farms of institutional on-the-farm veteran trainees were made by Mr. Speiser and the writer to appraise the accuracy, ease, and clarity of the survey form. As a result of these visits it was found to be a workable and understandable survey form and, therefore, the gathering of data was immediately begun in earnest.

After each instructor had reviewed one evaluative sheet with the veteran, the instructor was asked if he would like to participate in the study to the extent of completing an evaluation sheet on each of his self-employed veterans. In every instance the instructor expressed a desire to continue as he felt that the evaluation sheet was not only meeting a need of measuring farm progress but also serving as a teaching device while making his farm visitations.

It was found that it took about three hours to complete each evaluation sheet for each veteran. This was quite time-consuming for both the veteran and the instructor and delayed the summarizing of the study to some degree, but it was decided to take the necessary time to complete the work in a thorough manner.

After the instructors in each of the training centers referred to previously had completed the sheets on each self-employed veteran in their center, the data were forwarded to the writer for summarizing.

Chapter IV
ANALYSIS OF DATA

As described in Chapter III, this chapter deals with two groups of institutional on-the-farm trainees. One group of 25 veterans had vocational agriculture training and the other group of 25 veterans did not have training in vocational agriculture. An attempt is made in this study to discover whether institutional on-the-farm trainees who have had one year or more of training are making farm progress and improving their status toward the goal of establishment in farming; therefore, the following is an analysis of the data covering the four areas of the study: progress in farming status toward establishment in farming; measurement of adoption of approved practices and improvement in efficiency in the various enterprises, soil use, fertility and erosion control, and farm mechanics; improved farm living conditions; and increase in assets.

A summary of the approved practices adopted by the 50 veterans enrolled in institutional on-the-farm training, who are included in this study, is shown in Table 1. The enterprises are listed, and the number of men engaged in each enterprise is given for both the 25 men formerly enrolled in vocational agriculture and the 25 men not for-

merly enrolled in vocational agriculture. The total number of practices adopted by each group prior to enrollment, and at the time of this survey, is also shown. The degree of application of the total number of approved practices adopted by both groups prior to enrollment in institutional on-the-farm training and at the time of this study was obtained by totaling the number of practices adopted prior to enrollment and at the time of this study, and computing the percentage these amounts were of the total. The difference between the percentage of practices completed prior to enrollment and those completed at the time of the survey shows the extent of progress gained within each enterprise. For example, in the beef enterprise the total number of approved practices adopted by both groups prior to enrollment was 62, which was 25.8 per cent of the total 240 possible approved practices listed. At the time of the survey the two groups had adopted 100 of the total possible 240 approved practices, or 41.7 per cent. As 25.8 per cent of the total listed practices were adopted prior to enrollment, and 41.7 had been adopted at the time of the survey, a gain of 15.9 per cent in the number of approved practices is shown.

It is apparent from Table 1 that the greatest percentage of gain in the number of possible listed practices was in the sheep enterprise where a gain of 29.5 per cent was shown. The percentage of gain in practices

adopted in other enterprises was as follows: hogs, 25.7 per cent; poultry, 23.8 per cent; dairy cattle, 21.5 per cent; small grains, 20.9 per cent; corn, 20.6 per cent; potatoes, 17 per cent; farm mechanics, 17 per cent; beef cattle, 15.9 per cent; vegetable gardening, 14.2 per cent; sugar beets, 11.9 per cent; and soil use, fertility and erosion, 11.5 per cent.

It is further shown by the data in Table 1 that, of a total of 7,646 possible approved practices listed, 2,625 approved practices were adopted by this group of 50 veterans prior to enrollment and 3,928 practices were adopted at the time of this study. This is an increase of 17 per cent of the total number of possible approved practices. Prior to institutional on-the-farm training, the 25 veterans formerly enrolled in vocational agriculture had adopted an average of 6.5 practices per man, whereas an average of 6.2 practices per man had been adopted by the 25 veterans who had not formerly enrolled in vocational agriculture.

In the following sections, approved practices have been used as a measuring device in measuring progress in establishment in farming. It was emphasized by Deyoe (10) in Chapter II that, when approved practices have had the approval of a technical expert in the field, then they are useful devices for evaluation. Therefore, these practices that are used in this study were approved by experts in the respective fields on the campus of Colorado

Table 1.--NUMBER OF APPROVED PRACTICES CARRIED OUT BEFORE AND AFTER INSTITUTIONAL ON-THE-FARM TRAINING BY 50 VETERANS INCLUDED IN THIS STUDY.

Enterprise	Twenty-five veterans formerly enrolled in vocational agriculture			Twenty-five veterans not formerly enrolled in vocational agriculture			Degree of application of total number of approved practices			
	Num-ber men	Total prior	Total Pres-ent	Num-ber men	Total prior	Total Pres-ent	Num-ber men	Per cent of all-- present	Per cent of all-- prior	Per cent of gain
Beef cattle	11	38	49	13	24	51	24	41.7	25.8	15.9
Dairy cattle	19	65	112	21	84	140	40	52.5	31.0	21.5
Hogs	17	32	99	16	42	77	33	44.4	18.7	25.7
Sheep	5	10	33	3	0	3	8	40.9	11.4	29.5
Poultry	13	84	135	15	112	194	28	58.8	35.0	23.8
Corn	23	94	129	23	101	161	46	63.3	42.4	20.6
Small grains	25	152	199	25	141	209	50	74.2	53.3	20.9
Vegetable gardening	16	85	108	21	122	148	37	74.4	60.2	14.2
Sugar beets	16	97	119	17	86	107	33	62.3	50.4	11.9
Potatoes	8	58	75	7	45	56	15	79.4	62.4	17.0
Soil use, fertility and erosion	25	251	349	25	281	413	50	38.1	26.6	11.5
Farm mechanics	25	347	494	25	274	468	50	48.1	31.1	17.0
Total	203	1313	1901	211	1312	2027				
Average approved practices adopt- ed prior--per veteran			6.5			6.2				
Average approved practices adopt- ed at time of study--per veteran			9.4			9.6				

Agricultural and Mechanical College.

Beef production

The data in Table 2 show that, of the 24 men carrying out approved practices in beef production, those in which noticeable progress was made were "providing fresh water at all times," "vaccinated at an early age," and "feeding balanced rations." Prior to enrollment 12 of the men carried out the practice of providing fresh water while, after institutional on-the-farm training, 16 of the men were carrying out this practice.

Prior to enrollment nine men carried out the practice of castrating at an early age, while at present 15 men carry out the practice.

The practice of feeding a balanced ration was carried out by five men prior to and 11 men subsequent to enrollment.

Those practices shown in the above table in which little or no progress was made were "marketing on a high price level" and "vaccinating heifers for bangs."

There being 10 approved practices listed, and since 24 veterans were engaged in beef production, it was possible, therefore, that these 10 approved practices could have been put to use a total of 240 times by these 24 men. The 24 men carried out 100 of the 240 approved practices, which was slightly more than 41 per cent of the possible use of approved practices.

Table 2.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 24 VETERANS REPORTING ON THE BEEF ENTERPRISE.

Approved practices	Prior to enrollment	At present
1. Provide fresh water at all times	12	16
2. Castrate and vaccinate at early age	9	15
3. Control flies	8	13
4. Feed balanced ration	5	11
5. Use high quality, registered bulls	7	10
6. Control grubs	6	9
7. Provide year-round pasture	4	8
8. Test for bangs	3	6
9. Vaccinate heifers for bangs	4	6
10. Market on high price level	4	5
11. Others	0	1

Total of listed approved practices adopted	62	100
Total possible uses of the listed approved practices		240 ¹
Per cent of possible uses of the listed approved practices adopted prior		25.8
Per cent of possible uses of the listed approved practices adopted at time of study		41.7
Per cent of gain		15.9

¹240 total possible uses of approved practices obtained by multiplying number of men engaged in beef production by number of approved practices listed.

Dairy production

The number of men using the various approved practices in the dairy enterprise is shown in Table 3. It is apparent from this table that, from the period prior to enrollment of these 40 men in institutional on-the-farm training to the present time, the approved practices of "using high quality, registered bulls," "feeding balanced rations," and "separating cow from calf before the end of the first week" were adopted by more men than were any other approved practices. It is also shown in the table that, since enrollment, a smaller number of men have adopted the approved practices of "keeping individual records," "testing for T. B.," and "providing year-round pasture system" than have adopted other practices.

As there were 40 veterans engaged in dairy production and 12 approved practices listed, it was possible, therefore, that these 12 approved practices could have been put to use a total of 480 times by these 40 men. The 40 men carried out 252 of the 480 practices, which was slightly more than 52 per cent of the possible use of approved practices.

Hog production

Table 4 contains the tabulation of the approved practices in the hog enterprise. The data in this table show that the greatest gain in the use of approved practices was made in the area of feeding. Prior to enrollment

Table 3.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 40 VETERANS REPORTING ON THE DAIRY ENTERPRISE.

Approved practices	Prior to enrollment	At present
1. Feed legume hay	26	33
2. Provide fresh water at all times	23	31
3. Separate cow from calf before end of first week	20	31
4. Control flies	16	28
5. Test for T. B.	20	25
6. Test for bangs	15	24
7. Use high quality, registered bulls or of approved ancestry	8	18
8. Vaccinate heifer calves for bangs	6	17
9. Control grubs	7	16
10. Feed balanced ration	1	12
11. Provide year-round pasture system	5	7
12. Keep individual production records	0	5
13. Others	2	5

Total of listed approved practices adopted	149	252
Total possible uses of the listed approved practices		480 ¹
Per cent of possible uses of the listed approved practices adopted prior	31.0	
Per cent of possible uses of the listed approved practices adopted at time of study	52.5	
Per cent of gain	21.5	

¹480 total possible uses of approved practices obtained by multiplying number of men engaged in dairy production by number of approved practices listed.

Table 4.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 33 VETERANS REPORTING ON THE HOG ENTERPRISE.

Approved practices	Prior to enrollment	At present
1. Provide fresh water at all times	13	22
2. Vaccinate pigs before 40 pounds	7	19
3. Feed balanced ration	3	17
4. Raise pigs on clean ground	9	17
5. Castrate pigs before weaning	8	17
6. Farrow in clean, disinfected quarters	7	16
7. Creep feed pigs or full feed sows and litters	7	16
8. Select sows from records of performance	7	14
9. Breed to high quality registered boar	4	13
10. Flush and breed to drive for high market	5	11
11. Ear mark litters	2	7
12. Use pig brooker	2	6
13. Others	0	1

Total of listed approved practices adopted	74	176
Total possible uses of the listed approved practices		396 ¹
Per cent of possible uses of the listed approved practices adopted prior	18.7	
Per cent of possible uses of the listed approved practices adopted at time of study	44.4	
Per cent of gain	25.7	

¹396 total possible uses of approved practices obtained by multiplying number of men engaged in hog production by number of approved practices listed.

in institutional on-the-farm training, only three of the 33 veterans were feeding a balanced ration, whereas at present 17 have adopted this practice. It may also be observed that 19 of the veterans at present are vaccinating their pigs before they become 40 pounds in weight, while only seven did this previous to enrollment. Practices adopted by the least number of men were those of "selecting sows from records of performance" and "flushing and breeding to drive for high market."

Of the 396 possible uses of approved practices, these 33 men have reported that they have adopted 176 or slightly more than 44 per cent of the possible number that could have been adopted.

Sheep production

The approved practices adopted in the sheep enterprise are tabulated in Table 5. It was found that only one of the eight men in sheep production was docking and castrating at an early age, as was the case of the practice of breeding for early lambs. However, since enrolling in institutional on-the-farm training, five additional men have adopted these practices. Very little consideration has been given to the practice of keeping breeding records and weight-of-fleece records.

Thirty-six, or slightly more than 40 per cent, of the possible 88 uses of the listed approved practices on sheep had been adopted by the eight men raising sheep.

Table 5.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 8 VETERANS REPORTING ON THE SHEEP ENTERPRISE.

Approved practices	Prior to enrollment	At present
1. Provide fresh water at all times	3	7
2. Dock and castrate at an early age	1	6
3. Breed for early lambs	1	6
4. Carrying out worm control program	1	3
5. Feed balanced ration	1	3
6. Creep feed lambs	1	3
7. Breed to high quality, registered buck	0	2
8. Flush ewes	2	2
9. Follow external parasite control program	0	2
10. Keep breeding records	0	1
11. Record weight of fleece of ewes	0	1

Total of listed approved practices adopted	10	36
Total possible uses of the listed approved practices		88 ¹
Per cent of possible uses of the listed approved practices adopted prior	11.4	
Per cent of possible uses of the listed approved practices adopted at time of study	40.9	
Per cent of gain	29.5	

¹88 total possible uses of approved practices obtained by multiplying number of men engaged in sheep production by number of approved practices listed.

Poultry production

The number of approved practices adopted by the 28 men engaged in the poultry enterprise is tabulated in Table 6. Prior to enrollment for the institutional on-the-farm training, eight, ten, nine, and twelve of the men, respectively, adopted the following four approved practices: purchased stock from a high quality hatchery, did not brood over 300 chicks for brooder stoves, culled regularly, and used damaged eggs at home. At the time of this study the number of men who had adopted these practices in order in which they are listed above is 22, 18, 18, and 20, respectively. Very little improvement can be seen in the adoption of the practices of using artificial lights and gathering and marketing the eggs.

Slightly more than 58 per cent, which is 329 of the 560 possible approved practices on the basis of use, have been adopted.

Table 6.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 28 VETERANS REPORTING ON THE POULTRY ENTERPRISE.

Approved practices	Prior to enrollment	At present
1. Provide adequate floor space, feeders and waterers	17	24
2. Purchase stock from a hatchery with a definite breed improvement and disease control program, bred for either egg production or broiler production	8	22
3. Use starting, growing and laying meshes	15	22
4. Keep eggs in cool, moist, odor-free place	15	21

Table 6.--Continued.

Approved practices	Prior to enrollment	At present
5. Use cracked and badly soiled eggs at home	12	20
6. Brood not over 300 chicks per brooder stove	10	18
7. Provide clean range, segregated from mature poultry	12	18
8. Use built-up litter in brooding, rearing and laying	11	18
9. Cull regularly to eliminate slow developing birds and poor layers	9	18
10. Have adequate ventilation in all types of houses	13	18
11. Start chicks before April	10	17
12. Provide adequate nests with clean, deep nesting material--1 nest per 5 layers	9	16
13. Provide adequate perches from 2 weeks on, screened to keep birds off crop-pings. (Except for broilers which have no roosts.)	7	15
14. Provide 3-4 square feet of floor space per layer	8	15
15. Clean dirty eggs with sandpaper or steel wool	8	14
16. Cull laying flock intensively in June and September	11	13
17. Use water heaters to prevent freezing in cold weather	8	12
18. Gather eggs at least twice a day in wire baskets	5	11
19. Market eggs twice a week	7	10
20. Use artificial lights for layers	1	7

Total of listed approved practices adopted	196	329
Total possible uses of the listed approved practices		560 ¹
Per cent of possible uses of the listed approved practices adopted prior	35.0	
Per cent of possible uses of the listed approved practices adopted at time of study	58.8	
Per cent of gain	23.8	

¹560 total possible uses of approved practices obtained by multiplying number of men engaged in poultry production by number of approved practices listed.

Corn production

The data in Table 7 show that, of the 46 men carrying out approved practices in corn production, those in which noticeable progress has been made were "using an adapted hybrid seed," "using well prepared seed bed," and "replanting if necessary." Prior to enrollment 19 of the men carried out the practice of using an adapted hybrid seed while, after institutional on-the-farm training, 39 of the men were carrying out this practice. Prior to enrollment 23 men carried out the practice of replanting if necessary, while at present 36 men are so engaged. The practice of using a well prepared seed bed was carried out by 29 men prior to and 40 men subsequent to enrollment.

Those practices shown in which little progress was made were "planting on the contour" and "repairing planter before starting."

Two hundred and ninety, or slightly more than three-fifths, of the 460 possible uses of the listed approved practices on corn have been adopted by those men engaged in corn production.

Small grain production

The tabulations from Table 8 reveal that, of the 50 men engaged in small grain production, 35 were using clean seed prior to enrollment in institutional on-the-farm training and 49 are now so engaged. Forty-nine men have

Table 7.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 46 VETERANS REPORTING ON THE CORN ENTERPRISE.

Approved practices	Prior to enrollment	At present
1. Control weeds	32	42
2. Plant before June 1st	33	40
3. Use well-prepared seed bed	29	40
4. Use an adapted hybrid seed	19	39
5. Repair planter before starting; check accuracy of planting	31	38
6. Replant if necessary	23	36
7. Store in dry, well-ventilated, rat-proof crib or silage storage	12	22
8. Follow rotation of corn after legumes	7	14
9. Apply fertilizer to balance legumes plowed under	4	12
10. Plant on the contour	1	2
11. Others	4	5

Total of listed approved practices adopted	195	290
Total possible uses of the listed approved practices		460 ¹
Per cent of possible uses of the listed approved practices adopted prior	42.4	
Per cent of possible uses of the listed approved practices adopted at time of study	63.3	
Per cent of gain	20.9	

¹460 total possible uses of approved practices obtained by multiplying number of men engaged in corn production by number of approved practices listed.

Table 8.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 50 VETERANS REPORTING ON THE SMALL GRAIN ENTERPRISE.

Approved practices	Prior to enrollment	At present
1. Check, repair and adjust grain drill	37	49
2. Clean seed	35	49
3. Prepare firm seed bed	37	46
4. Treat for smut	28	45
5. Seed proper amounts	35	45
6. Sow near recommended date	37	45
7. Sow recommended, disease- and rust-resistant varieties	23	34
8. Control weeds and insects	21	32
9. Control weevil in stored grain	16	25
10. Pasture only when dry and plants are of sufficient size	15	19
11. Fertilize	4	11
12. Others	5	8

Total of listed approved practices adopted	293	408
Total possible uses of the listed approved practices		550 ¹
Per cent of possible uses of the listed approved practices adopted prior	53.3	
Per cent of possible uses of the listed approved practices adopted at time of study	74.2	
Per cent of gain	20.9	

¹550 total possible uses of approved practices obtained by multiplying number of men engaged in small grain production by number of approved practices listed.

adopted the practice of checking, repairing and adjusting their grain drill, whereas only 37 were so doing prior to enrollment. A change of from 28 prior to enrollment to 45 has been made in the number who have adopted the practice of "treating for smutt." It would appear that little consideration has been given to the use of fertilizer as 11 of the 50 men were using fertilizer regularly at the time the data was collected and only four men used this practice regularly prior to enrollment.

Of the 550 possible uses of approved practices, these 50 men have reported that they have adopted 408, or nearly three-fourths, of the possible number that could have been adopted.

Family garden production

Table 9 is a summation of the approved practices which were adopted by the 37 veterans who were growing vegetable gardens. Thirty have adopted the practice of controlling weeds and thinning vegetables, whereas only 22 were following this practice prior to enrollment. Twenty-nine have adopted the practice of providing supplemental water for irrigation when needed, as contrasted with the 24 prior to enrollment. Not much consideration has been given to fall plowing of the garden area, as only seven were so doing prior to enrollment and only nine have now adopted this practice. Five were rotating their garden

Table 9.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 37 VETERANS REPORTING ON THE FAMILY VEGETABLE GARDEN ENTERPRISE.

Approved practices	Prior to enrollment	At present
1. Control weeds when young and thin vegetables	22	30
2. Provide supplemental water for irrigation when needed	24	29
3. Select level to gently sloping site	24	29
4. Fertilize with liberal amounts of barnyard manure	22	26
5. Plant varieties recommended for your community	20	24
6. Plan garden to meet needs of family; fresh vegetables in season plus vegetables for processing and storing	22	24
7. Fence garden area against poultry and livestock	20	23
8. Effectively control insects and diseases	17	22
9. Make succession plantings	15	20
10. Plan garden on paper previous to planting	9	12
11. Plow in fall to provide clean, mellow seed bed	7	9
12. Rotate garden space with poultry range	5	8

Total of listed approved practices adopted	207	256
Total possible uses of the listed approved practices		344 ¹
Per cent of possible uses of the listed approved practices adopted prior		60.2
Per cent of possible uses of the listed approved practices adopted at time of study		74.4
Per cent of gain		14.2

¹344 total possible uses of approved practices obtained by multiplying number of men engaged in family vegetable garden production by number of approved practices listed.

space with the poultry range prior to enrollment and eight have now adopted this practice.

Of the possible 344 uses of approved practices by these 37 men, 256 were adopted, which is about three-fourths of the possible number that could have been adopted by this group.

Sugar beet production

The number of men using the various approved practices in the sugar beet enterprise is shown in Table 10. The number of approved practices adopted by the 33 men who are engaged in the sugar beet enterprise is very noticeable in the approved practices of "using recommended seed varieties" and "controlling weeds." Twenty-seven of these men have adopted these practices at the time of this survey and 25 were so engaged prior to enrollment. Only 10 men have adopted the approved practice of fall plowing and only four men had adopted this practice prior to enrollment.

Two hundred and twenty-six, or less than two-thirds, of the 363 possible uses of the listed approved practices on sugar beets have been adopted by those men engaged in sugar beet production.

Potato production

The data in Table 11 show the number of approved practices that were adopted by the 15 men who were engaged

Table 10.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 33 VETERANS REPORTING ON THE SUGAR BEET ENTERPRISE.

Approved practices	Prior to enrollment	At present
1. Use recommended seed varieties	25	27
2. Control weeds	25	27
3. Control pests and diseases	22	26
4. Blocking and thinning	22	25
5. Use well-prepared seed bed	22	24
6. Beets topped and hauled to dump same day dug	17	19
7. Sugar beets follow in rotation after a cultivated crop that followed a legume turned under	12	18
8. Full utilization of beet tops	15	18
9. Apply commercial fertilizer as recommended	6	17
10. Plant before April 10th	12	14
11. Plow in fall	4	10
12. Others	1	1

Total of listed approved practices adopted	183	226
Total possible uses of the listed approved practices		363 ¹
Per cent of possible uses of the listed approved practices adopted prior		50.4
Per cent of possible uses of the listed approved practices adopted at time of study		62.3
Per cent of gain		11.9

¹363 total possible uses of approved practices obtained by multiplying number of men engaged in sugar beet production by number of approved practices listed.

Table 11.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 15 VETERANS REPORTING ON THE POTATO ENTERPRISE.

Approved practices	Prior to enrollment	At present
1. Use recommended storage and market practices	11	15
2. Control diseases	13	15
3. Seed proper amounts	13	15
4. Control pests and insects	13	15
5. Control weeds	14	15
6. Grow potatoes in a recommended rotation	11	14
7. Prepare firm seed bed	12	14
8. Plant recommended, certified, disease-resistant varieties	7	11
9. Fertilize properly	3	10
10. Treat seed before planting	4	4
11. Plow ground in fall	1	1
12. Others	1	2

Total of listed approved practices adopted	103	131
Total possible uses of the listed approved practices		165 ¹
Per cent of possible uses of the listed approved practices adopted prior	62.4	
Per cent of possible uses of the listed approved practices adopted at time of study	79.4	
Per cent of gain	17.0	

¹165 total possible uses of approved practices obtained by multiplying number of men engaged in potato production by number of approved practices listed.

in potato production. Fifteen men have adopted the following five of the 11 approved practices that were listed: controlling diseases, controlling weeds, seeding proper amounts, controlling pests and insects, and using recommended storage and market practices. Prior to enrollment in the institutional on-the-farm training program, 11 were using recommended storage and market practices, 14 were controlling weeds, and 13 were following the other three practices which were listed above. Only one is fall plowing, which was the case prior to enrollment. This table further shows that only four men were treating the seed before planting, which is the same number following this practice before training.

One hundred and thirty-one, or nearly 80 per cent, of the 165 possible approved practices listed were adopted by the 15 men engaged in potato production.

Soil use, fertility
and erosion control

The practices in soil use, fertility and erosion control adopted by the 50 men are shown by the data in Table 12. Thirty-nine, 37, and 37 of the veterans, respectively, have adopted the practices of "crop irrigation," "plowing under all crop residue on irrigated land," and "having one-fourth to one-third of the tillable land in legumes under irrigation farming." Prior to training 33 men were practicing crop irrigation, 27 were plowing under

Table 12.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 50 VETERANS REPORTING ON SOIL USE, FERTILITY AND EROSION CONTROL.

Approved practices	Prior to enrollment	At present
1. Practice crop irrigation	33	39
2. Have 1/4 to 1/3 of tillable land in legumes under irrigation farming	22	37
3. Plow under all crop residue on irrigated land	27	37
4. Plow under green manure in the fall or in late spring	22	34
5. Spread manure on land after being produced	26	32
6. Practice good crop residue management	19	31
7. Reorganize farm irrigation system as needed	21	31
8. Adapt irrigation methods to soil and land conditions on farm	26	30
9. Construct or enlarge permanent ditches or dikes	22	28
10. Arrange fields to take advantage of similar soil types, fertility, slopes, etc.	19	27
11. Use surface drainage when needed	21	27
12. Use timely tillage	20	26
13. Perform gully control	20	26
14. Install small irrigation structures, siphons, pipe, flumes, tile lines, weirs, drop boxes, chutes, checks, division boxes, etc.	15	26
15. Seed legumes for green manure in small grains	17	25
16. Use high-analysis fertilizers (scope--pounds)	10	25
17. Follow protective tillage when needed; blank listing, chiseling on the contour or at right angles to the prevailing wind or pit cultivation	19	24
18. Level land when needed	17	22
19. Use good, trashy tillage	13	22
20. Maintain a stand of trees and shrubs in windbreaks	16	22
21. Seed brome grass with alfalfa if to be used for pasture	11	16
22. Plant trees and shrubs	10	16
23. Establish grassed water ways (scope--number)	12	14

Table 12.--Continued.

Approved practices	Prior to enrollment	At present
24. Reinforce manure with fertilizer	7	14
25. Construct or enlarge drainage ditches	10	14
26. Use soil-saving dikes where needed	12	14
27. Use fertilizer on pastures (renovate) if needed	4	13
28. Practice deep subsoiling of crop land	10	13
29. Improve wild life area	8	12
30. Establish perennial cover on steep slopes	9	12
31. Use over-winter cover crops	6	10
32. Use tile drainage when needed	7	10
33. Reclaim alkali	5	10
34. Protect levees and banks and channelize	10	10
35. Line ditches or irrigated reservoirs	3	5
36. Strip crop on the contour	1	3
37. Cross-slope farm (row crops) where contouring is impractical	2	3
38. Contour farm row crops	0	1
39. Contour farm close-drilled crops	0	1
40. Build broad-base terraces (slope--feet)	0	0

Total of listed approved practices adopted	532	762
Total possible uses of the listed approved practices	2000 ¹	
Per cent of possible uses of the listed approved practices adopted prior	26.6	
Per cent of possible uses of the listed approved practices adopted at time of study	38.1	
Per cent of gain	11.5	

¹2000 total possible uses of approved practices obtained by multiplying number of men engaged in soil use, fertility and erosion control by number of approved practices listed.

all crop residue on irrigated land and 22 had one-fourth to one-third of the tillable land in legumes under irrigation farming practice. None of the members of this group had adopted the practice of building broad-base terraces. Prior to enrollment none were following contour farming practices and only one was so engaged at the time of this survey.

Slightly more than 38 per cent, which is 762 of the 2000 possible approved practices on the basis of use, have been adopted.

Farm mechanics progress

The data in Table 13 reveal the practices adopted by the 50 men in farm mechanics. This table has been divided into seven sections, as follows: farm power, farm machinery, farm carpentry, plumbing, rural electrification, metal work, and tool fitting.

In the farm power section, 37 of the veterans have practiced preventative maintenance, which is eight more than were so doing prior to enrollment in institutional on-the-farm training. Only three performed complete overhaul prior to enrollment, and five had adopted this practice at the time of this survey.

It is shown in the section on farm machinery that 37 of the 50 veterans adjust, repair and service farm machinery, as contrasted with the 22 who were doing so prior

Table 13.--NUMBER OF APPROVED PRACTICES CARRIED OUT BY 50 VETERANS REPORTING ON FARM MECHANICS PROGRESS,

Approved practices	Prior to enrollment	At present
1. Farm power (performed personally by trainee)--tractor, truck and auto		
a. Practices preventative maintenance	29	37
b. Selects proper type and size of power	20	33
c. Adjusts, repairs and services	19	31
d. Does own trouble shooting	24	30
e. Paints farm power as needed	21	27
f. Houses farm power adequately when not in use	13	20
g. Performs complete overhaul	3	5
2. Farm machinery (performed personally by trainee)		
a. Adjusts, repairs and services farm machinery	22	37
b. Practices preventative maintenance	22	33
c. Does own trouble shooting	21	32
d. Selects proper type and size of machinery	20	30
e. Protects exposed wearing parts with paint or grease (plow shares, shovels, cutter bars, etc.)	22	30
f. Paints farm machinery as needed	15	24
g. Performs complete overhaul	11	20
h. Houses farm machinery adequately when not in use	10	16
3. Farm carpentry (performed personally by trainee)		
a. Repairs own buildings (roof repairs, sagging doors, etc.)	23	32
b. Builds own equipment (feeders, bunks, hog houses, etc.)	18	28
c. Paints buildings	14	23
d. Constructs new buildings	8	11

Table 13.--Continued.

Approved practices	Prior to enrollment	At present
4. Plumbing (performed personally by trainee)		
a. Repairs leaks in tanks, pipes, cisterns, etc.	19	28
b. Fits and runs pipe	18	25
c. Repairs pumps	15	23
d. Replaces water hydrant	14	20
e. Installs self-watering devices for livestock	12	17
f. Plans and installs farm water pressure system	6	9
5. Rural electrification (Performed personally by trainee)		
a. Selects proper size and type of materials and wiring	21	30
b. Selects proper type and size of electric motors	18	28
c. Properly locates and installs yard light	14	21
d. Properly services farm motors	12	18
e. Installs service outlets and switches	7	17
f. Wires farm buildings	6	12
6. Metal work (performed personally by trainee)		
a. Does own drilling, matching, riveting, etc.	15	28
b. Does own soldering	14	26
c. Does own arc welding	4	19
d. Does own acetylene welding	4	11
e. Does own forging	5	11

Table 13.--Continued.

Approved practices	Prior to enrollment	At present
7. Tool fitting (performed personally by trainee)		
a. Replaces handles in tools	29	41
b. Sharpens own hand tools	23	34
c. Selects and uses proper tools for job	21	32
d. Fits own saws (hand and power)	9	13

Total of listed approved practices adopted	621	962
Total possible uses of the listed approved practices		2000 ¹
Per cent of possible uses of the listed approved practices adopted prior		31.1
Per cent of possible uses of the listed ap- proved practices adopted at time of study		48.1
Per cent of gain		17.0

¹2000 total possible uses of approved practices obtained by multiplying number of men engaged in farm mechanics progress by number of approved practices listed.

to enrollment.

Prior to enrollment 10 men were housing farm machinery adequately when not in use, as contrasted with the 16 men who are now employing this practice.

It is apparent from the section on farm carpentry that 32 veterans have adopted the practice of repairing their own buildings, and only 23 had adopted this practice prior to enrollment in institutional on-the-farm training.

Only eight men attempted to construct new buildings prior to enrollment, and after enrollment three additional veterans had adopted this practice.

The data from this table show that in farm plumbing 28 veterans were repairing leaks in tanks, pipes, cisterns, etc., at the time this survey was taken, which is an increase of nine more than were so engaged prior to enrollment. Only six of the 50 veterans had planned and installed farm water pressure systems prior to enrollment, and at the time of this study three additional veterans had adopted this practice.

In analyzing the data covering the rural electrification section of this study it was found that 30 of the 50 veterans selected the proper size and type of materials at the time this survey was made, as contrasted with 21 who were so engaged prior to enrollment. It was also found that only six of the 50 veterans had wired farm buildings prior to enrollment in institutional on-the-farm training, but that number has increased to 12.

Twenty-eight men have adopted the practice of doing their own drilling, matching, and riveting in the metal work section of farm mechanics. Prior to enrollment 15 had adopted this practice. Also prior to enrollment, four were doing acetylene welding, whereas seven additional veterans have now taken up this practice.

In the tool-fitting section it was found that 41 of the 50 veterans are replacing handles in tools, which is an increase of 12 men over the number who performed this practice prior to enrollment. The practice of veterans fitting their own hand saws has been adopted by 13 of the 50 veterans, which is four more than were so engaged prior to enrollment.

In the entire farm mechanics division it was found that, of the 2000 possible uses of approved practices, these 50 men reported that they have adopted 962, or nearly half, of the possible number that could have been adopted. This figure can be broken down as follows: 183, or slightly more than 50 per cent of the 350 possible approved practices, in farm power; 222, or slightly more than 55 per cent of the 400, in farm machinery; 94, or 47 per cent of the 200, in farm carpentry; 122, or 40 per cent of the 300, in plumbing; 126, or 42 per cent of the 300, in rural electrification; 95, or 38 per cent of the 250, in metal work; and 120, or 60 per cent of the 200, in tool fitting.

Farming status

The farming status of the 25 men formerly enrolled in vocational agriculture prior to enrollment in institutional on-the-farm training and at the time of this survey is shown in Table 14. In every division there was shown to

be an advancement in status. For example, there were six hired hands in the group prior to enrollment. At the time of this study none of the 25 veterans were hired hands. All had moved up the agricultural ladder to farm operator status. During the period covered by this study one man became an owner-operator, three additional men became renter-operators, and two additional men became partners.

Table 14.--FARMING STATUS OF 25 VETERANS FORMERLY ENROLLED IN VOCATIONAL AGRICULTURE.

Veteran's status in farming	Prior to enrollment	At present
Hired hand	6	0
Partnership	8	10
Renter-operator	7	10
Owner-operator	0	1
Not reported	4	4

The data in Table 15 show the farming status of the 25 men not formerly enrolled in vocational agriculture. At the time these men enrolled in institutional on-the-farm training, 12 of the 25 men were hired hands, whereas at the time of this study none of them were so engaged. The number of men who were operating partnerships increased by five, and those operating as renter-operators increased by three. Five of the men were owner-operators at the time of

this study, as contrasted with the four owner-operators prior to enrollment.

Table 15.--FARMING STATUS OF 25 VETERANS NOT FORMERLY ENROLLED IN VOCATIONAL AGRICULTURE.

Veteran's status in farming	Prior to enrollment	At present
Hired hand	12	0
Partnership	3	8
Renter-operator	6	9
Owner-operator	4	5
Not reported	0	3

Farm living

The progress made by the 25 veterans formerly enrolled in vocational agriculture in farm living is shown in Table 16. The greatest progress was found in the practice of electricity being brought to the farm. More than 42 per cent of those who did not have electricity on the farm prior to enrollment in institutional on-the-farm training are now using electricity on the farm, which leaves only four of the 25 without electricity. Gas has been brought into the homes of slightly more than 38 per cent of those homes that did not have gas for cooking prior to enrollment, bringing the total to over one-half of this group.

Landscaping the home grounds and grading and

Table 16.--PROGRESS IN FARM LIVING AS SHOWN BY 25 MEN FORMERLY ENROLLED IN VOCATIONAL AGRICULTURE.

Convenience	Installed or carried out prior to moving on this farm	Installed or carried out from time of moving on this farm to enrollment date	Installed or carried out from date of enrollment to date	Per ¹ cent possible	Total number with practice established	Number with practice not established
1. Running water in house	8	4	4	30.7	16	9
2. Electricity on farm	13	5	3	42.8	21	4
3. Modern sewage disposal	6	2	3	17.6	11	14
4. Built-ins	5	4	3	18.7	12	13
5. Landscaping the home grounds; trees, shrubs, flowers and lawn	6	3	6	37.5	15	10
6. Central heating system in home	8	1	2	12.5	11	14
7. Sidewalks	5	1	3	15.7	9	16
8. Grading and graveling roads and service yard	6	3	5	31.2	14	11
9. New buildings						
a. Home	7	2	1	6.25	10	15
b. Barn	8	1	1	6.25	10	15
c. Machine shed	3	1	3	14.3	7	18
d. Poultry house	6	1	1	5.5	8	17
e. Garage	4	3	0	0.0	7	18
f. Others	3	1	0	- -	4	--
10. Gas in home for:						
a. Cooking	3	4	7	38.8	14	11
b. Heating	2	2	1	6.25	5	20
11. Others	0	2	1	- -	3	--

¹Per cent who have adopted listed practice, since enrollment in institutional on-the-farm training, of those who had not adopted practice prior to enrollment.

graveling of the roads and service yards has been done by slightly more than 37 per cent and slightly more than 31 per cent, respectively, of those who had not done so prior to enrollment. More than 30 per cent of those who did not have running water in their homes prior to enrollment now have this convenience. There appears to have been the least amount of progress made in building new buildings and bringing gas into the homes for heating.

The data in Table 17 show the progress that has been made by the 25 veterans enrolled in institutional on-the-farm training who had not formerly enrolled in vocational agriculture. The greatest progress can be seen in the addition of electricity to the farm. Two-thirds of the farms that did not have electricity prior to enrollment did have electricity at the time of this survey, leaving only two without electricity. Three-fifths of the group who had not done so prior to enrollment now have graded and graveled roads and service yards, and one-half have landscaped the home grounds. Slightly less than 50 per cent have built-ins and over one-fourth of the group have gas for cooking, who did not have prior to enrollment. It is apparent that not too much progress has been made in the construction of new buildings and modern sewage disposal.

Assets

The data in Table 18 show that prior to enroll-

Table 17.--PROGRESS IN FARM LIVING AS SHOWN BY 25 VETERANS NOT FORMERLY ENROLLED IN VOCATIONAL AGRICULTURE.

Convenience	Installed or carried out prior to moving on this farm	Installed or carried out from time of moving on this farm to enrollment date	Installed or carried out from date of enrollment to date	Per ¹ cent possible	Total number with practice established	Number with practice not established
1. Running water in house	7	7	2	18.1	16	9
2. Electricity on farm	14	5	4	66.6	23	2
3. Modern sewage disposal	6	3	2	12.5	11	14
4. Built-ins	9	5	5	45.4	19	6
5. Landscaping the home grounds; trees, shrubs flowers and lawn	4	5	8	50.0	17	8
6. Central heating system in home	7	4	2	14.2	13	12
7. Sidewalks	4	2	3	15.7	9	16
8. Grading and graveling roads and service yard	3	7	9	60.0	19	6
9. New buildings						
a. Home	7	2	0	0.0	9	16
b. Barn	7	1	3	17.6	11	14
c. Machine shed	6	1	1	5.5	8	17
d. Poultry house	9	0	2	12.5	11	14
e. Garage	7	1	3	17.6	11	14
f. Others	0	0	0	- -	0	--
10. Gas in home for:						
a. Cooking	1	4	5	26.2	10	15
b. Heating	2	1	0	0.0	3	22
11. Others	0	0	2	- -	2	--

¹Per cent who have adopted listed practice, since enrollment in institutional on-the-farm training, of those who had not adopted practice prior to enrollment.

Table 18.--ASSETS OF 50 VETERANS INCLUDED IN THIS STUDY PRIOR TO AND AT THE TIME OF THE STUDY.

	Twenty-five veterans formerly enrolled in vocational agriculture		Twenty-five veterans not formerly enrolled in vocational agriculture	
	Total assets	Per man	Total assets	Per man
Prior to enrollment	\$130,910	\$5,236	\$127,540	\$5,101
At time of this study	\$229,124	\$9,165	\$181,472	\$7,258
Increase in assets	\$ 98,214	\$3,929	\$ 53,932	\$2,157
Per cent of increase	75.1	75.1	42.3	42.3

ment in institutional on-the-farm training an average of the assets of the 25 men formerly enrolled in vocational agriculture amounted to \$5,236. However, at the time of this study those assets had increased to \$9,165, which is an increase of \$3,929 per man, or an increase of 75 per cent over the assets on hand at the time of enrollment. Table 18 further shows that the average veteran included in this study, who had not formerly enrolled in vocational agriculture, had assets of \$5,101 prior to enrollment in institutional on-the-farm training. At the time of this study the average of the assets of each veteran in this group had increased to \$7,258, which was an increase of \$2,157. In terms of per cent this was an increase of 42.3 per cent in assets per veteran from the time of enrollment to the time this study was made.

To answer the question, "What is the scope and plan of operation of the institutional on-the-farm training program?", the following plan of operation as agreed upon by the State Board for Vocational Education and the Veterans Administration Training Service is given. All institutional on-the-farm training programs in Colorado must operate within the general provisions of this plan.

The Colorado State Board for Vocational Education offers two types of full-time courses of training for trainees on farms:

Plan I. A course of instruction wherein a veteran who lacks experience and skill to do adequately the usual and ordinary farm work, or who for

127

other reasons is not ready to assume agricultural self-proprietorship, enrolls with the institution and receives the on-farm portion of his training program on a farm under an employer-trainer. His employer's farm shall be of such size and character which (1) together with the group instruction part of the course will occupy the full time of the trainee, and (2) will permit instruction in all aspects of the management of a farm of the type for which a veteran is being trained.

1. Instruction shall consist of three parts:
 - a. Off-farm instruction of not less than two hundred (200) hours per year in agriculture and related subject matter, not less than eight (8) hours of which shall be given in any month.
 - b. On-farm instruction on his employer's farm of not less than fifty (50) hours of individual instruction per year (with at least one visit by the instructor to such farm each month). Such individual instruction shall be given by the instructor responsible for the veteran's institutional instruction.
 - c. Instruction from the employer-trainer in various aspects of farm management in accordance with the training schedule developed for the veteran by his instructor, working in cooperation with his employer.
2. The instruction, both on and off the farm, shall be given at the time, rate and in the manner best suited to the needs of the trainee as indicated by his individual training program and the prevailing conditions on the employer-trainer's farm in order to assist the veteran properly to organize, interpret, and apply instruction and information to his own needs and farm conditions. The instructor who visits the farm shall also be responsible for giving the off-farm instruction.
3. Close coordination with the employer-trainer must be paramount in all phases of instruction.

Plan II. A course of instruction wherein the veteran enrolls with the institution and receives the on-the-farm portion of his training program on a farm over which he has complete control of the operation through ownership, lease, management agreement, or other tenure arrangement, which fully protects his welfare. The farm must be of sufficient size and must be suitable for full time instruction in all farm management operations necessary to the particular type of farming agreed upon. The farm must be of sufficient size and of such character that its operation, together with the on-the-farm instruction and the off-farm instruction, will occupy the full time of the trainee. The size and quality of the farm must indicate that it will be sufficiently productive to assure the trainee a satisfactory income under normal conditions.

1. Instruction shall consist of two parts:
 - a. Off-farm instruction of not less than two hundred (200) hours per year in agriculture and related subject matter, not less than eight (8) hours of which shall be given in any month.
 - b. On-farm instruction of not less than one hundred (100) hours of individual instruction, not less than fifty (50) hours of which shall be on such farm (with at least two (2) visits to such farm each month). Such individual instruction shall be given by the instructor responsible for the veteran off-farm instruction and shall include instruction and home-study assignments in the preparation of budgets, inventories, and statements showing the production, use on the farm, and sale of crops, livestock, and livestock products. The other fifty (50) hours or more of the veteran's instruction may be given in groups on any farm or farms.
2. The instruction, both on and off the farm, shall be given at the time, rate, and in the manner best suited to the educational needs of the trainee, as indicated by his farm and home plan and by the operation of the plan. In order to assist the trainee to properly

organize, to interpret and to apply instruction and information to his own needs and farming conditions, the instructor who visits the farm must be responsible for the giving of the off-farm instruction.

Summary

The data in this chapter have been presented in an attempt to discover whether institutional on-the-farm trainees, who have had one year or more of training, are making farm progress and improving their status toward the goal of establishment in farming.

On the average, per enterprise, slightly more than six approved practices were adopted per veteran prior to enrollment and slightly more than nine approved practices were adopted at the time of this study. Those enterprises in which the highest per cent of total possible approved practices were carried out were potatoes, vegetable gardening, small grains and corn. In livestock they were poultry, dairy cattle and swine. Little use of approved practices was found in soil use and erosion control phases.

In the area of progress in farm living those practices in which the highest per cent of adopted practices was found were use of electricity on the farm, installing water system and landscaping the home farm.

At the time of this study all hired hands had moved to self-proprietorship from the status of hired hands at the time of enrollment.

A noted increase in assets was found in both the group that had formerly enrolled in vocational agriculture and the group that had not formerly enrolled in vocational agriculture prior to enrollment, with an increase of slightly more than 75 per cent for the former and slightly more than 42 per cent for the latter group.

Chapter V
DISCUSSION

The last section of Chapter IV answered the question, "What is the scope and plan of operation of the institutional on-the-farm training program?" A brief discussion of this plan is given in the following paragraph.

All 50 trainees in this study pursuing training under this program must conform to the provisions of this plan of operation. Under this plan the veteran has 200 hours off-farm instruction and 100 hours on-farm instruction. This makes for an effective training program. Technical and related information is given in classroom instruction. The trainee then has the necessary knowledge and skill to put into effective operation the improved practices he has been taught. This is done on his own farm or other farms under the supervision and with the help of the farm supervisor who is committed to giving at least 100 hours per year of on-farm instruction for each trainee.

In the remainder of this chapter the data presented in Chapter IV are discussed to solve the problem of "What farm progress is being made by veterans enrolled in the institutional on-the-farm training program?" This discussion has involved a group of 25 veterans who had

formerly enrolled in vocational agriculture and a group of 25 veterans who had not formerly enrolled in vocational agriculture.

In determining what farm progress was made by the two groups from the time of enrollment in institutional on-the farm training to the time of this study, this chapter is divided into the following four areas of the study: progress in farming status toward establishment in farming; measurement of adoption of approved practices and improvement in efficiency in the various enterprises, soil use, fertility and erosion control, and farm mechanics; improved farm living conditions; and increase in assets.

As cited in Chapter IV, the number of approved practices adopted at the time of this study showed an increase in all areas as compared with the number that had been adopted prior to enrollment in institutional on-the-farm training by the 50 veterans surveyed. Ayers (5), Bunyard (7), Hull (19), and Mobley (23) used approved practices and changes in practices used as a measurement of effectiveness of instruction. Deyoe (11) also suggested the use of the adoption of approved practices as measurement for evaluating outcomes of supervised practices. As confirmed by the above authorities, approved practices were used as a reliable basis of measurement of farm progress.

Therefore, for the purpose of this study, approved practices and the extent of their adoption was used as a basis for measurement of farm progress.

It is apparent that the greatest percentage of approved practices adopted was on the potato enterprise which, as pointed out in Chapter IV, is an important cash crop in Colorado. Even though more than three-fifths of the listed practices had been adopted prior to enrollment by these 50 veterans in this study, an increase in practices was shown to bring the percentage of practices adopted at the time of this study to 79.4 per cent. It is apparent from the data in Chapter IV that there was an increase in approved practices adopted in every instance, ranging from 29.5 per cent gain in the sheep enterprise to a gain of 11.5 per cent in soil use, fertility and erosion practices.

It is pointed out in Chapter IV that more approved practices were adopted per man by the veterans formerly enrolled in vocational agriculture prior to enrollment in institutional on-the-farm training than were adopted per man by the group who had not formerly enrolled in vocational agriculture. This is in line with the findings of Swaney. (30)

Beef production

Beef production, a leading enterprise in Colorado,

is receiving major emphasis in institutional on-the-farm training. Practices such as feeding balanced rations and vaccinating at an early age were the most frequently adopted by the 24 men engaged in beef cattle production.

The practice of "marketing on a high-price level" was least frequently adopted. A possible explanation of this is the lack of understanding and emphasis given it by instructors on this program. No attempt has been made to test this hypothesis. "Vaccination of heifers for bangs" ranked low in adoption, possibly because of the controversy still going among the members of the veterinary profession concerning the effectiveness of this practice.

This indicates that advancement in farming has been made in this major enterprise inasmuch as a marked increase of additional approved practices have been adopted.

Poultry production

More than half¹ of the farms in Colorado produce poultry products for sale; however, the bulk of poultry products in Colorado is produced on farms where the enterprise is carried on as a sideline. We find that most farms in Colorado do at least produce enough poultry and eggs for home consumption.¹ It was found in this study that over

¹Colorado Agricultural Statistics. Denver, Colorado, Colorado Cooperative Crop and Livestock Reporting Service, 1941.

half of the veterans were producing some poultry products for sale. It appears that much improvement has been made in the buying of the producing stock, as now nearly four-fifths of the 28 veterans who produce poultry products for sale are now purchasing from a source of high standards, whereas only slightly more than one-fourth had done so previous to enrollment in institutional on-the-farm training as shown in Chapter IV.

As further pointed out in Chapter IV, there has been much increase in attention to efficiency of production practices and marketing principles. It would appear that much more consideration is being given the poultry enterprise, as more than 50 per cent additional approved practices had been adopted at the time of this survey than were being carried out prior to enrollment. It appears that the veterans are giving increased consideration to approved practices in the poultry enterprise, and are therefore making progress toward efficiency in farming.

Small grain production

In this study small grains include wheat, barley, oats and rye. The cash from sales of wheat alone in Colorado exceeds that of all other crops raised. Addition of other small grains further enhances this importance. Practices which have been given the most consideration have been those of clean seed, treating for smutt, and checking to see

that the grain drill is in good operating condition. Since less than two-thirds of these men were following these approved practices prior to enrollment in institutional on-the-farm training, and 95 per cent of the 50 men are now so engaged, a definite step toward further establishment in farming has been made in this enterprise.

As pointed out previously in Chapter IV, nearly three-fourths of the total approved practices under the small grain enterprises were being carried out at the time of this study. It is thought that this marked increase in approved practices carried out by the 50 men at the time of this study as compared to prior to training is accounted for, in part at least, by the extensive educational programs and emphasis given to approved practices in the above named enterprise by existing educational agencies as veterans' instructors, agricultural teachers, extension service personnel, and crop improvement associations.

Sugar beet production

The crop of sugar beets constitutes the second most important cash crop produced in Colorado. As it is almost a necessity that sugar beets be grown on irrigated land, only 33 of the 50 men are engaged in sugar beet production. As stated in Chapter IV, nearly two-thirds of the possible approved practices listed had been adopted at the time this study was made. Even though a large number of ap-

proved practices had been adopted at the time of the study, a small increase was shown over the number that had been adopted prior to enrollment. A possible explanation of this small increase could be that the farmers who produce sugar beets are frequently visited, advised, and instructed by the field men of sugar beet companies, who are specialists in the production of sugar beets; therefore, the veterans apparently were highly established in sound beet production practices prior to enrollment and have made slight progress toward further establishment in farming through this enterprise.

Potato production

The production of potatoes constitutes an important cash crop in Colorado. The Colorado Agricultural Statistics report¹ states that the cash farm income from potatoes is 7.1 per cent of the total cash farm income from the sale of all crops. Slightly more than 90 per cent of the potatoes produced in Colorado are grown on irrigated land, which would indicate that potatoes are a specialized crop and why only 15 of the 50 veterans included in this study are producing potatoes. It appears from this study that much consideration is being given to practices which, if not adopted, tend to decrease yields, such as controlling of diseases, insects, and weeds.

It is probable that these veterans are studying

those recommended practices of storage and marketing, as 100 per cent of them had adopted these practices at the time of this study. This is pointed out in Chapter IV. It is also pointed out in Chapter IV that only slightly more than one-fourth of the veterans were treating seed before planting. It may be assumed, therefore, that there is some doubt as to the value of this practice or that there has been little training given to the methods of procedure. However, since nearly four-fifths of these listed approved practices were being carried out, it is apparent that much progress is being made toward further establishment in farming.

Farming status

The farming status of the 25 veterans included in this study who had formerly taken vocational agriculture prior to institutional on-the-farm training shows that considerable progress is being made toward establishment in farming. As indicated in Chapter IV, all of the six men who were working on farms as hired hands at the time of their enrollment have now moved into a class that further establishes them in farming. At the time of this study, as compared with the period immediately prior to enrollment, none of the 25 veterans were hired hands, and each of the higher steps toward establishment in farming had had an increase in numbers. It would therefore be assumed that

these men are becoming further established in farming as indicated in Chapter IV.

It was pointed out in Chapter IV that slightly less than half of the 25 veterans in this study who had not formerly enrolled in vocational agriculture were working as hired hands at the time they enrolled in institutional on-the-farm training. However, at the time this study was made, these 12 veterans had all moved up the agricultural ladder toward further establishment in farming. All of the more established divisions in this group of veterans had an increase of from one to five men at the time this study was made as compared to the condition that existed prior to enrollment. It would seem, then, that this group of 25 veterans was much more established in farming at the time of this study than at the time of their enrollment in institutional on-the-farm training.

Farm living

If it might be assumed that individuals are more contented to live on farms when they have more of the modern living conveniences, it would be apparent that the group of 25 veterans included in this study, who formerly enrolled in vocational agriculture, are becoming more established in farming than they were prior to enrollment. As pointed out in Chapter IV, over four-fifths of this group of 25 veterans are now using electricity on their farms;

only slightly less than three-fifths of the group are using gas for cooking; and it might be assumed that a portion of the two-fifths who are not using gas for cooking are using electricity, since such a large number are using electricity on the farm. It might also be observed that only slightly less than three-fifths of this group of veterans have taken considerable pride in their farm homes and farmstead in general in doing such practices as landscaping the home grounds, planting trees, shrubs, flowers and lawns, and grading and graveling roads and service yards. Deyoe (11), in his plan for evaluating outcomes of supervised practice programs in all-day and part-time classes, listed improved living on the farm as an area to be used as a basis for evaluating outcomes. Therefore, as there was a large increase of approved practices done at the time of this survey over the number being done prior to enrollment, by the 25 veterans formerly enrolled in vocational agriculture, it would appear they are making progress in farm family living and thus becoming more soundly established in farming.

The group of 25 veterans included in the study who had not formerly enrolled in vocational agriculture have given considerable attention to the modern conveniences for the farm family. At the time of the survey over 90 per cent were utilizing the conveniences which electricity brings to the farm and only slightly less than four-fifths of the group had built-ins. From the facts pointed out in

Chapter IV, it is evident that this group is giving considerable attention to home beautification and conveniences, and it would also appear that much progress has been made in adopting more farm living conveniences, which should further establish this group in farming.

Assets

Swanson (31) suggested the areas of (1) financial progress, (2) recognition and adoption of approved practices, and (3) level of living as indicated by home conveniences and homestead beautification as valuable criteria in evaluating the institutional on-the-farm training program. As institutional on-the-farm training and progress in establishment in farming may be very closely related, it would seem desirable to use this criteria in measuring farm progress. The progress in establishment in farming in the adoption of approved practices was pointed out in Table 1 of Chapter IV, and previously discussed in Chapter V.

The level of living was shown by the data in Tables 16 and 17 in Chapter IV and discussed in the section under farm living in Chapter V.

The data in Table 18 in Chapter IV reveals the financial progress made by the 50 veterans included in this study. It is apparent from the study that considerable increase has been made in assets, as the 25 veterans who had ~~not~~ formerly enrolled in vocational agriculture showed an

increase of slightly more than 75 per cent in assets at the time of this study, compared to their assets prior to enrollment. It is further pointed out in Chapter IV that the 25 men who had not formerly enrolled in vocational agriculture also showed an increase in assets from the time prior to enrollment in institutional on-the-farm training to the time of this study. The increase in assets of this group was slightly more than 42 per cent. As there has been a very high per cent of increase in assets of the veterans included in this study, it would be apparent that they have become more established in farming at the time of this study than they were prior to enrollment in institutional on-the-farm training.

Summary

The discussion in this chapter has shown that in some areas the findings of this study agree with the findings in previous studies, and combines both the previous studies and the findings of this study in measuring what farm progress has been made by the 50 veterans. It was found that progress toward establishment in farming has been made in all of the following areas which were included in the study: progress in farming status toward establishment in farming; measurement of adoption of approved practices and improvement in efficiency in the various enterprises, soil use, fertility and erosion control, and farm

mechanics; improved farm living conditions; and increase in assets.

Suggestions for
further study

1. That further study be made to show the effect of the institutional on-the-farm training program as related to the progress in establishment in farming of the trainees. No attempt has been made to evaluate the program in this study.

2. That further study be made regarding the influence of the length of time in the farming business in relation to establishment in farming.

3. That further study be made regarding the effect of available working capital as related to the progress in establishment in farming.

4. That further study be made regarding the influence of available family labor as related to the progress in establishment in farming.

5. That a follow-up study of the further progress these 50 men have made in farming be made within the next two years.

6. That a more complete guidance program for young men interested in farming as a vocation be developed.

7. That further study be made regarding the influence of the supervisory visits on the farms of the veterans as related to progress.

8. That further study be made to evaluate the various farm supervisors in the field.

9. That further study be made to evaluate the effect of the length of time in institutional on-the-farm training as related to establishment in farming.

10. That further study be made regarding the influence of the number of years of vocational agriculture training in high school in relation to the degree of establishment in farming.

Chapter VI

SUMMARY

One of the major aims of vocational education in agriculture, since the passing of the Smith-Hughes Act of 1917, has been to develop effective ability to make a beginning and advance in farming. However, prior to the time of this study, measurement of farm progress had not been done effectively; therefore, it was the purpose of this study to measure farm progress. The writer, being interested in the farm progress of veterans of World War II, proposed to study the following problem: What farm progress is being made by veterans enrolled in the institutional on-the-farm training program?

The solution of this problem seemed to rest on answering the following questions:

1. What is the scope and plan of operation of the institutional on-the-farm training program?

2. What farm progress was made from beginning of farm operations, after discharge, until date of enrollment in the institutional on-the-farm training program?

3. What farm progress has been made from the date of enrollment up to the present time?

It was decided to limit the study to the Speiser

Supervisory District in northeastern Colorado. Six centers were chosen, and, as the average enrollment in these centers is about 18, it was thought that about 100 veterans would be included. However, when those veterans who had not been in training a year or more and those who were not self-employed were eliminated, only 50 veterans were available for the study in these centers. It was then decided that these 50 veterans were typical of the area and should be included in the study.

With the aid of experts in subject matter and leaders in the field of agricultural education a survey form was developed. The survey form included four sections: progress in farming status toward establishment in farming; measurement of adoption of approved practices and improvement in efficiency factors in the various enterprises, soil use, fertility and erosion control, and farm mechanics; improved farm living conditions; and increase in assets. The form was then administered to the 50 veterans selected for this study by the writer and others. The data from the completed survey forms were tabulated and analyzed in terms of the problem, with the following findings:

1. In every division there was shown to be an advancement in status, moving up the agricultural ladder from hired hand to farm owner-operator status from the time of the enrollment of this group of 50 veterans in institutional on-the-farm training to the time of this study.

2. There was an increase of slightly more than three approved practices per man from the time of enrollment to the time of this study.

3. The greatest per cent adoption of all possible listed approved practices at the time of this study was found to be in the potato enterprise with 79.4 per cent carried out.

4. There was an increase in every enterprise in number of listed approved practice uses adopted at the time of the study over the number in use prior to enrollment.

5. Progress was shown in family living as indicated by an increase in the use of home conveniences adopted by the veterans at the time of this study over the number in use prior to enrollment.

6. An increase of over 75 per cent in assets was found in the group formerly enrolled in vocational agriculture at the time of this study over their assets prior to enrollment, and an increase of over 42 per cent in assets was found in the group that had not formerly enrolled in vocational agriculture at the time of this study over their assets prior to enrollment.

Recommendations

The following recommendations are made concerning the institutional on-the-farm training program:

1. That more consideration be given the use of

efficiency factors in the institutional on-the-farm training program. Little or no progress was evident in this study of the use of efficiency factors.

2. That a follow-up study be made of the 50 men included in this study within the next two years to determine the degree of further progress toward establishment in farming.

3. That a more complete guidance program be employed for young men interested in farming as a vocation. However, no attempt has been made in this study to evaluate this hypothesis.

4. That future studies be made with this group of men in the following areas: the effect of available working capital; available family labor; influence of supervisory visits; length of time enrolled in institutional on-the-farm training; and the number of years of vocational agriculture training in high school as related to the progress in establishment in farming.

5. Also that further study be made in an attempt to evaluate the work of the various instructors as to effectiveness of instruction and field supervision, and to determine the effectiveness of the institutional on-the-farm training program as related to progress in establishment in farming.

APPENDIX



TABLE OF CONTENTS

<u>Appendix</u>		<u>Page</u>
A	EVALUATIVE SHEET FOR MEASURING PROGRESS OF VETERANS TAKING INSTITUTIONAL ON-THE-FARM TRAINING	101
B	ORIGINAL DATA ON FILE IN LIBRARY	123

EVALUATIVE SHEET FOR MEASURING PROGRESS OF
VETERANS TAKING INSTITUTIONAL ON-THE-FARM TRAINING

(Not to be submitted to veterans who have been
in training less than one year.)

- I. Personal Information Sheet on Background, Family Status, Etc.
- II. Progress in Establishment in Farming:
 1. Hired Hand.
 2. In Partnership.
 3. Renter-Operator.
 4. Owner-Operator.
- III. Enterprise Measurement of the Following Enterprises:
 1. Beef Cattle.
 2. Dairy Cattle.
 3. Hogs.
 4. Sheep.
 5. Poultry.
 6. Corn.
 7. Small Grains.
 8. Family Gardens.
 9. Sugar Beets.
 10. Potatoes.
- IV. Soil Use, Fertility and Erosion.
- V. Farm Living Progress.
- VI. Farm Mechanics Progress.
- VII. Increase in Net Worth.

I. Personal Information:

1. Veteran's name: _____ °

2. C-number: _____ ° 3. Age: _____ °

4. Address: _____ °

5. School: _____ °

6. School address: _____ °

7. Dependents:

Name	Age	Relationship
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

8. Highest grade attained in school: _____ °

9. Was Vocational Agriculture offered in your high school? _____ °

10. Units of credit received in Vocational Agriculture: _____ °

11. Length of time in the service: _____ °

12. Date started farming after service: _____ °
(Month) (Year)

13. Date started farm training: _____ °
(Month) (Day) (Year)

14. Months of training received to date: _____ °

15. Approximate date expect to finish: _____ °
(Month) (Year)

II. Progress in Establishment in Farming:

Veteran's Status in Farming	Prior to Enrollment Date	At Present	Plan to Do by End of Training
1. Working as a hired hand:			
2. In partnerships: (Veteran's share of income)			
25% of income			
50% of income			
75% of income			
Other (state)			
3. Renter-operator: (Veteran's share of income)			
25% of income			
50% of income			
75% of income			
Other (state)			
4. Owner-operator:			
100% of income			
Other (state)			
5. Other: (State)			

Comments:

III. Enterprise Measurements:

Beef Cattle Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
1. Use high quality, registered bulls							
2. Provide year-round pasture							
3. Market on high price level			8				
4. Feed balanced ration							
5. Provide fresh water at all times							
6. Test for bangs							
7. Vaccinate heifers for bangs							
8. Castrate and vaccinate at early age							
9. Control flies							
10. Control grubs							
11. Others:							
12.							

Efficiency Factors on Beef Cattle	Prior to Enrollment Date	At Present	Plan to Do By End of Training
1. Per cent of calf crop dropped			
2. Pounds of feed fed per pound of gain			
3. Feed cost per pound of gain			
4. Others:			
Number of Animal Units in Beef Cattle			

Comments:

Animal Unit Equivalents:	Number of Animals Required to Equal One Animal Unit	Animal
	1	Dairy Cows
	2	Beef Breeding Cows
	3	Ewes
	16	Lambs to Market
	4	Feeder Calves
	4	Heifers
	3	Brood Cows from Breeding to Weaning
		Pigs
	5	Hogs from Weaning to Market

III. Enterprise Measurements: (Continued)

Dairy Cattle Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
1. Use high quality, registered bulls or of approved ancestry							N S A
2. Keep individual production records							
3. Feed balanced ration							
4. Provide year-round pasture system							
5. Provide fresh water at all times							
6. Test for bangs							
7. Test for T.B.							
8. Feed legume hay							
9. Separate cow from calf before end of first week							
10. Control flies							
11. Control grubs							
12. Vaccinate heifer calves for bangs							
13. Others:							
14.							
Efficiency Factors on Dairy Cattle	Prior to Enrollment Date			At Present			Plan to Do By End of Training
1. Pounds of feed per pound of butterfat							
2. Pounds of butterfat per cow							
3. Feed cost per pound of butterfat							
4. Other:							
Number of Animal Units in Dairy Cattle							

Comments:

III. Enterprise Measurements: (Continued)

Hogs	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
Approved Practices							
1. Breed to high quality registered boar							
2. Raise pigs on clean ground							
3. Farrow in clean, disinfected quarters							
4. Feed balanced ration							
5. Provide fresh water at all times							
6. Select sows from records of performance							
7. Vaccinate pigs before 40 pounds							
8. Castrate pigs before weaning							
9. Flush and breed to drive for high market							
10. Creep feed pigs or full feed sows and litters							
11. Use pig brooder							
12. Ear mark litters							
13. Others:							
14.							
Efficiency Factors on Hogs	Prior to Enrollment Date			At Present			Plan to Do By End of Training
1. Number of pigs per litter raised to 56 days							
2. Weight of litter at 56 days							
3. Feed cost per 100 pounds of pork produced							
4. Other:							
Number of Animal Units in Hogs							

Comments:

III. Enterprise Measurements: (Continued)

Sheep	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
Approved Practices							
1. Breed to high quality registered buck							
2. Carry out worm control program							
3. Feed balanced ration							
4. Provide fresh water at all times							
5. Flush ewes							
6. Breed for early lambs							
7. Dock and castrate at an early age							
8. Creep feed lambs							
9. Follow external parasite control program							
10. Keep breeding records							
11. Record weight of fleece of ewes							
12. Others:							
13.							
Efficiency Factors on Sheep	Prior to Enrollment Date			At Present			Plan to Do By End of Training
1. Per cent of lamb crop							
2. Average weight of lambs in 120 days							
3. Cost per pound of gain							
4. Pounds of wool per ewe							
5. Other:							
Number of Animal Units in Sheep							

Comments:

III. Enterprise Measurements: (Continued)

Poultry Approved Practices	Prior to Enrollment Date			At Present			Plan To Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
1. Purchase stock from a hatchery with a definite breed improvement and disease control program, bred for either egg production or broiler production							N S A
2. Start chicks before April							
3. Brood not over 300 chicks per brooder stove							
4. Provide adequate floor space, feeders & waterers							
5. Provide clean range, segregated from mature poultry							
6. Use starting, growing and laying meshes							
7. Use built-up litter in brooding, rearing and laying							
8. Cull regularly to eliminate slow developing birds and poor layers							
9. Cull laying flock intensively in June and September							
10. Provide 3-4 square feet of floor space per layer							
11. Provide adequate perches from 2 weeks on, screened to keep birds off droppings. (Except for broilers which have no roosts)							
12. Have adequate ventilation in all types of houses							
13. Use artificial lights for layers							
14. Use water heaters to prevent freezing in cold weather							
15. Provide adequate nests with clean, deep nesting material --1 nest per 5 layers							
16. Gather eggs at least twice a day in wire baskets							
17. Keep eggs in cool, moist, odor-free place							
18. Market eggs twice a week							

III. Enterprise Measurements: (Continued)

Poultry Approved Practices	Prior to Enrollment Date			At Present			Plan To Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
19. Clean dirty eggs with sand-paper or steel wool.							
20. Use cracked and badly soiled eggs at home							
Efficiency Factors on Poultry	Prior to Enrollment Date			At Present			Plan To Do By End of Training
1. Percentage of day-old chicks raised to laying age							
2. Percentage of pullets housed that during laying year							
a. were culled out							
b. died							
3. Annual egg production (total eggs divided by number of pullets housed)							
4. Feed cost per dozen eggs							
5. Other:							
Number of animal units in poultry							

III. Enterprise Measurements: (Continued)

Corn Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some- times	Always	Never	Some- times	Always	
1. Use an adapted hybrid seed							
2. Follow rotation of corn after legumes							
3. Plant on the contour							
4. Apply fertilizer to balance legume plowed under							
5. Plant before June 1st							
6. Control weeds							
7. Use well-prepared seed bed							
8. Replant if necessary							
9. Store in dry, well-ventilated rat-proof crib or silage storage							
10. Repair planter before starting; check accuracy of planting							
11. Others:							
12.							
Efficiency Factors on Corn	Prior to Enrollment Date			At Present			Plan to Do by End of Training
1. Bushels per acre (or tons of ensilage)							
2. Man hours per acre							
3. Cost per bushel							
4. Other:							
Number of animal units in corn							

Comments:

Crop Unit Equivalents:	<u>Acres</u>	<u>Crop</u>
	5	Corn
	8	Oats, Wheat, Barley, etc.
	12	Pastures
	5	Legume Hay
	2	Sugar Beets
	2	Potatoes

III. Enterprise Measurements: (Continued)

Small Grains Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
1. Sow recommended, disease- and rust-resistant varieties							
2. Treat for smut							
3. Clean seed							
4. Fertilize							
5. Sow near recommended date							
6. Control weeds and insects							
7. Prepare firm seed bed							
8. Pasture only when dry and plants are of sufficient size							
9. Seed proper amounts							
10. Check, repair and adjust grain drill							
11. Control weevil in stored grain							
12. Others:							
13.							
Efficiency Factors on Small Grains	Prior to Enrollment Date			At Present			Plan to Do By End of Training
1. Bushels per acre							
2. Man hours per acre							
3. Cost per bushel							
4. Other:							
Number of animal units in small grains:							

Comments:

III. Enterprise Measurements: (Continued)

Family Vegetable Garden Irrigated or Dryland Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some- times	Always	Never	Some- times	Always	
1. Select level to gently sloping site							
2. Fence garden area against poultry and livestock							
3. Fertilize with liberal amounts of barnyard manure							
4. Plow in fall to provide clean, mellow seed bed							
5. Plan garden on paper previous to planting							
6. Plan garden to meet needs of family; fresh vegetables in season plus vegetables for processing and storing							
7. Plant varieties recommended for your community							
8. Control weeds when young and thin vegetables							
9. Effectively control insects and diseases							
10. Provide supplemental water for irrigation when needed							
11. Make succession plantings							
12. Rotate garden space with poultry range							
13. Others:							
14.							
Efficiency Factors on Family Vegetable Garden	Prior to Enrollment Date			At Present			Plan to Do By End of Training
1.							
2.							
3.							
4.							

Comments:

III. Enterprise Measurements: (Continued)

Sugar Beets Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
1. Use recommended seed varieties							
2. Sugar beets follow in rotation after a cultivated crop that followed a legume turned under							
3. Apply commercial fertilizer as recommended							
4. Plant before April 10th							
5. Use well-prepared seed bed							
6. Blocking and thinning							
7. Control weeds							
8. Control pests and diseases							
9. Plow in fall							
10. Beets topped and hauled to dump same day dug							
11. Full utilization of beet tops							
12. Others:							
13.							
Efficiency Factors on Sugar Beets	Prior to Enrollment Date			At Present			Plan to Do By End of Training
1. Yield in tons per acre							
2. Cost per ton yield							
3. Other:							
Number of animal units in sugar beets							

Comments:

III. Enterprise Measurements: (Continued)

Potatoes	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
Approved Practices							
1. Plant recommended, certified, disease-resistant varieties							
2. Control insects and diseases							
3. Fertilize properly							
4. Control weeds							
5. Plow ground in fall							
6. Prepare firm seed bed							
7. Seed proper amounts							
8. Control pests and insects							
9. Treat seed before planting							
10. Grow potatoes in a recommended rotation							
11. Use recommended storage and market practices							
12. Others:							
13.							
Efficiency Factors on Potatoes	Prior to Enrollment Date			At Present			Plan to Do By End of Training
1. Yield in bushels per acre							
2. Cost per bushel yield							
3. Other:							
Number of animal units in Potatoes							

Comments:

IV. Soil Use, Fertility and Erosion:

Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
1. Have 1/4 to 1/3 of tillable land in legumes under irrigation farming							
2. Seed brome grass with alfalfa if to be used for pasture							
3. Arrange fields to take advantage of similar soil types, fertility, slopes, etc.							
4. Establish grassed water ways (scope--no.)							
5. Build broad-base terraces (scope--ft.)							
6. Use over-winter cover crops							
7. Use high-analysis fertilizers (scope--lbs.)							
8. Use fertilizer on pastures (renovate) if needed (scope)							
9. Spread manure on land after being produced							
10. Reinforce manure with fertilizer							
11. Seed legumes for green manure in small grains							
12. Plow under green manure in the fall or in late spring							
13. Plow under all crop residue on irrigated land							
14. Level land when needed							
15. Adapt irrigation methods to soil and land conditions on farm							
16. Reorganize farm irrigation system as needed							
17. Install small irrigation structures, siphons, pipe, flumes, tile lines, weirs, drop boxes, chutes, checks, division boxes, etc.							
18. Construct or enlarge permanent ditches or dikes							
19. Line ditches or irrigated reservoirs							

IV. Soil Use, Fertility and Erosion: (Continued)

Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some- times	Always	Never	Some- times	Always	
20. Construct or enlarge drainage ditches							
21. Use tile drainage when needed							
22. Use surface drainage when needed							
23. Practice deep subsoiling of crop land							
24. Practice crop irrigation							
25. Perform gully control							
26. Practice good crop residue management							
27. Use good trashy tillage							
28. Use timely tillage							
29. Improve wild life area							
30. Strip crop on the contour							
31. Contour farm row crops							
32. Contour farm close-drilled crops							
33. Cross-slope farm (row crops) where contouring is impractical							
34. Establish perennial cover on steep slopes							
35. Use soil-saving dikes where needed							
36. Follow protective tillage when needed; bank listing, chiseling on the contour or at right angles to the prevailing wind or pit cultivation							
37. Plant trees and shrubs							
38. Maintain a stand of trees and shrubs in windbreaks							
39. Reclaim alkali							
40. Protect levees and banks and channelize							
41. Others:							
42.							

Comments:

V. Farm Living Progress:

	Installed prior to moving on this farm	Installed from time of moving on this farm to enrollment date	Installed from date of enrollment to date	Plan to Install By End of Training
1. Running water in house				
2. Electricity on farm				
3. Modern sewage disposal				
4. Built-ins				
5. Landscaping the home grounds, trees, shrubs, flowers and lawn				
6. Central heating system in home				
7. Sidewalks				
8. Grading and graveling roads and service yard				
9. New buildings:				
a. Home				
b. Barn				
c. Machine Shed				
d. Poultry House				
e. Garage				
f. Other: (state)				
10. Gas in home for:				
a. Cooking				
b. Heating				
11. Others:				
12.				

Comments;

VI. Farm Mechanics Progress:

Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
1. Farm power (performed personally by trainee) (Tractor, truck and auto)							
a. Houses farm power adequately when not in use							
b. Practices preventive maintenance							
c. Adjusts, repairs and services							
d. Performs complete overhaul							
e. Selects proper type and size of power							
f. Does own trouble shooting							
g. Paints farm power as needed							
h. Others:							
i.							
2. Farm machinery (performed personally by trainee)							
a. Houses farm machinery adequately when not in use							
b. Practices preventive maintenance							
c. Adjusts, repairs and services farm machinery							
d. Performs complete overhaul							
e. Selects proper type and size of machinery							
f. Does own trouble shooting							
g. Paints farm machinery as needed							
h. Protects exposed wearing parts with paint or grease (plow shares, shovels, cutter bars, etc.)							
i. Others:							
j.							

VI. Farm Mechanics Progress: (Continued)

Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
3. Farm carpentry (performed personally by trainee)							
a. Constructs new buildings							
b. Builds own equipment (feeders, bunks, hog houses, etc.)							
c. Repairs own buildings (roof repairs, sagging doors, etc.)							
d. Paints buildings							
e. Others:							
f.							
4. Plumbing (performed personally by trainee)							
a. Plans and installs farm water pressure system							
b. Replaces water hydrant							
c. Repairs pumps							
d. Fits and runs pipe							
e. Installs self-watering devices for livestock							
f. Repairs leaks in tanks, pipes, cisterns, etc.							
g. Others:							
h.							
5. Rural electrification (performed personally by trainee)							
a. Wires farm buildings							
b. Properly locates and installs yard light							
c. Installs service outlets and switches							
d. Properly services farm motors							
e. Selects proper type and size of electric motors							
f. Selects proper size and type of materials and wiring							
g. Others:							
h.							

VI. Farm Mechanics Progress: (Continued)

Approved Practices	Prior to Enrollment Date			At Present			Plan to Do By End of Training N S A
	Never	Some-times	Always	Never	Some-times	Always	
6. Metal work (performed personally by trainee)							
a. Does own arc welding							
b. Does own acetylene welding							
c. Does own soldering							
d. Does own forging							
e. Does own drilling, matching, riveting, etc.							
f. Others:							
g.							
7. Tool fitting (performed personally by trainee)							
a. Sharpens own hand tools							
b. Replaces handles in tools							
c. Fits own saws (hand and power)							
d. Selects and uses proper tools for job							
e. Others:							
f.							

Comments:

VII. Increase or Decrease in Net Worth:

1. Do you keep complete farm records? Yes _____ No _____

2. Net worth when started farming after service in:

- a. Livestock \$ _____
- b. Equipment \$ _____
- c. Feed and field crops \$ _____
- d. Land \$ _____
- e. Savings \$ _____
- f. Checking account \$ _____
- g. Home furnishings \$ _____
- h. Others: (please state) _____ \$ _____

Total \$ _____

3. Net worth when started institutional on-the-farm training in:

- a. Livestock \$ _____
- b. Equipment \$ _____
- c. Feed and field crops \$ _____
- d. Land \$ _____
- e. Savings \$ _____
- f. Checking account \$ _____
- g. Home furnishings \$ _____
- h. Others: (please state) _____ \$ _____

Total \$ _____

4. Net worth at present in:

- a. Livestock \$ _____
- b. Equipment \$ _____
- c. Feed and field crops \$ _____
- d. Land \$ _____
- e. Savings \$ _____
- f. Checking account \$ _____
- g. Home furnishings \$ _____
- h. Others: (please state) _____ \$ _____

Total \$ _____

To substitute for animal unit equivalents on pages three and four of the evaluation sheet. 122

Time required to handle animals
or crops for a year in relation
to the hours required for a
dairy cow as one

Kind of Animal

Dairy cow	1.00
Dairy cow (milk retailed)	2.00
Beef cow (range) .....	.10
Beef feeders, steers, bulls, heifers. (dairy or beef) .....	.07
Ewes (range) .....	.035
Lambs (feeder) .....	.035
Sows (and pigs to weaning) .....	.30
Hogs (feeder) .....	.07
Poultry (hens) .....	.01
Poultry (chicks raised to 12 weeks) .	.005

Kind of crop

Corn (irrigated) .....	.10
Corn (dryland) .....	.035
Small grain (irrigated) .....	.08
Small grain (dryland) .....	.02
Vegetable gardens	1.00
Sugar beets .....	.60
Potatoes .....	.40

Multiply the number of animals or acres of crops by the factor given to get the equivalent units.

Note: These are comparative figures; normally about 17 of these "units" represent an average year's work.

Warren, Hudelson, & R. T. Burdick

APPENDIX B.--ORIGINAL DATA ON FILE IN LIBRARY.

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P-7 Early Thesis Study - 1949

Approved Poultry Practices

ase	No-1		No-2		No-3		No-4		No-5		No-6		No-7		No-8		No-9		No-10		No-11		No-12		No-13		No-14		No-15							
	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D	P	D				
1	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X			
2	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
3	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
4	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
5	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
6	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
7	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
8	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
9	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
10	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
11	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
12	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
13	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
14	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
15	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
16	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
17	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
18	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
19	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	
20	X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X		X	

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Approved

Small Grains

Practices

Efficiency Factors

Apr Units

-1-		-2-		-3-		-4-		-5-		-6-		-7-		-8-		-9-		-10-		-11-		-12-		Summary		-1-		-2-		-3-		-4-		Apr Units					
P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	70	85							1.8	1.4					
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	65	80							5.3	3.0					
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	60	85							1.2	1.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	60	70	80						1.8	1.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	63	75							1.6	1.6						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	60	75							2.3	1.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	60	75							4.0	5.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50	80														
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	45	35	80						2.8	2.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	60	90							1.0	2.4						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	48	62	90						4.8	7.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	60	90							.8	1.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	85	50	100						6.8	8.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	25	100						1.6	8.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50	15	100						4.0	8.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	40	40	100						1.2	1.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	35	65	100						2.8	8.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	21	37	100	35	30				3.0	3.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	14	40	60						0.2	0.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	40	40	50						2.4	1.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	40	40	60						1.6	2.00						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	30	50						2.4	1.5						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50	30	65						1	10						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	12	25	70						1.04	.8						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	28	37	100						0.4	2.00						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	55	42	75						2.0	2.4						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	60	70	80	12	11	9	30	27	55	1.28						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	55	75	80	10	8	8	30	27	25	2.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	20	25	80	8	8	8	30	27	25	2.4						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	50	60	10	10	10	37	30	25	1.68						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	50	60	70	10	10	10	37	35	30	2.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	01	01	07	10	10	10	37	35	30	1.70						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	60	65	80	5	5	5	30	27	26	1.6						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	75	100							1.04	1.6						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	80	80	80						1.6	1.6						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	15-60	75-80							2.36	2.36						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	12	38	02						2.4	2.4						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	00	10	10						1.6							
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	03	70	100						2.4	3.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	75	75							2.4	2.4						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	74	92							1.2	1.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	10	15	20						2.4	3.0						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	30	40						2.40	3.20						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	30	35	70						2.4	2.4						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	45	45	60						2	1.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	35	45							1.6	1.2						
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	25	50	50													

1731 1434 0344 112803 X 0 14716351 0 X 0 147211411 X 112223053705 X 0 344 1721 0 7320 4110 53704 X 0 14751015 X 11193628 0 635 03 X 0 344 053701 X 0 14711716 X 8255333045

45 49 26 45 46 45 49 10 8008

1 10 11 07 17 0 221 1 6 15 0 321 0 1 23 13 18 1 0 24 0 1 22 14 5 3 6 12 7 2 9 13 0 3 19 0 3 22 0 1 23 3 7 12 6 8 16 0 0 23 0 4 18 0 3 22 0 1 22 3 6 6 4 6 6 2 2 10 0 3 19 0 2 23 0 2 21 0 3 19 0 1 24 6 0 23 5 9 5 5 13 3 1 17 0 23 0 0 4 0 0 4

1 7 12 1 7 17 0 1 23 0 6 13 0 0 24 0 0 24 0 3 17 0 0 25 0 0 25 12 6 1 5 4 4 0 13 10 0 2 18 0 2 23 0 2 23 1 10 9 0 9 16 0 4 21 0 1 19 0 1 24 6 0 25 2 4 9 2 5 13 1 4 15 0 3 16 0 1 22 0 1 23 0 2 18 0 6 25 0 1 24 6 2 7 5 3 12 2 2 16 0 2 20 0 4 0 0 4

III P-10 Efficiency - Theoretical 1949

Practice Gardening

Efficiency Factors

Case No	-1-		-2-		-3-		-4-		-5-		-6-		-7-		-8-		-9-		-10-		-11-		-12-		Summary				
	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A	P	A
1	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
5	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
6	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
7	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
8	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
10	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
14	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
17	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
19	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
20	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
21	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
22	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
23	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
24	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
25	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
26	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
27	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
28	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
29	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
30	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
31	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
32	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
33	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
34	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
35	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
36	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
37	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
38	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
39	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
40	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
41	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
42	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
43	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
44	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
45	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
46	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
47	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
48	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
49	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
50	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
51	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
52	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
53	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
54	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
55	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
56	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
57	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
58	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
59	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
60	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

None None None

0.624	0.629	0.333	4.520	7.523	3.430	0.722	0.926	0.333	1.977	10.149	4.921	1.929	1.672	0.692	0.822	0.112	0.135	1.820	3.724	1.232	0.822	0.530	0.036	3.107	1.122	0.036	0.624	0.629	0.333	6.715	4.926	2.026	1.955	2.668	5.141
0.590	4.12	0.113	3.294	3.922	2.120	0.590	0.510	0.021	3.544	5.733	3.389	1.483	3.534	8.059	0.790	0.140	0.771	1.510	0.014	0.680	0.330	0.015	2.570	0.540	0.015	0.311	0.150	0.153	5.671	4.974	3.934	2.76			
0.115	0.217	0.220	1.311	3.214	1.210	0.213	0.416	0.120	6.535	7.616	1.310	1.584	7.351	3.031	0.415	0.121	1.113	2.214	1.218	0.214	0.217	0.421	1.510	1.711	0.021	0.313	0.514	0.316	3.210	2.313	1.217	2.112	1.314	3.710	

V-115 J. E. Early - Thesis Study - 1949

No.	No-1		No-2		No-3		No-4		No-5		No-6		No-7		No-8		No-9		No-9		No-9		No-9		No-10		No-10		Other			
	In	Pr	En	Pl	In	Pr	En	Pl	In	Pr	En	Pl																				
1	X																															
2	X																															
3	X																															
4	X																															
5	X																															
6	X																															
7	X																															
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49	X																															
50	X																															
51	X																															
52	X																															

15 11 6 4 27 10 7 4 12 5 2 1 4 9 8 16 10 8 14 16 15 5 4 14 9 3 6 27 9 10 14 16 14 4 15 15 2 4 7 9 2 4 13 15 1 3 10 11 4 3 9 3 1 0 4 4 8 12 10 4 3 1 12 0 2 3 2

8. 8 4 4 6 13 5 3 2 6 2 3 9 5 4 3 10 6 3 6 8 8 1 2 7 5 1 3 14 6 3 5 7 7 2 1 3 8 1 1 3 3 1 3 5 6 1 1 5 4 3 0 6 3 1 0 2 3 4 7 5 2 2 1 5 0 2 1 0

7 7 2 8 14 5 4 2 6 3 2 12 9 5 5 6 4 5 8 9 7 4 2 7 4 2 3 13 3 7 9 9 7 2 0 2 7 1 3 4 6 1 1 8 9 0 2 5 7 1 3 3 0 0 0 2 1 4 5 5 2 1 0 7 0 0 2 2

