1955

ANNUAL PROGRESS REPORT

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION PROJECTS

1. PROJECT: (Fund, number, and title): 895 Utilization of Barley and Oat Grazing for Sheep Production.

2. DEPARTMENTS AND COOPERATING AGENCIES: Animal Industry, Agronomy and N. C. Dept. of Agriculture

3. PERSONNEL: Lemuel Goode, W. W. Woodhouse, J. W. Hendricks, G. K. Middleton, E. R. Barrick and H. L. Lucas

4. NATURE OF RESEARCH AND PRINCIPAL RESULTS OF THE YEAR (Confidential information should be so marked):

Investigations studying the joint effect of three rates of grazing and varying lengths of grazing period on barley and oat yields were continued. Results continue to indicate that both barley and oats seeded early, approximately Sept. 1, can be grazed to March 1 without significantly reducing grain yield. A three year average of the per acre grain yield from barley plots is as follows: not grazed, 48.1 bu.; grazed to Dec. 1, 45.4 bu.; grazed to March 1, 43.0 bu.; grazed to March 15, 36.8 bu.; check plots, seeded October 1 and not grazed, yielded only 28.4 bu. per acre. The amount of barley grazing obtained to March 1 has varied from 0 to 400 ewe days per acre depending upon the growing season. Similar results were obtained from the oat plots.

Grazing rate, heavy, medium and light, does not seem to affect the amount of grazing obtained to March 1 because lightly grazed plots provided more February grazing.

5. APPLICATION OF FINDINGS (expressed in terms of measurable public benefits if and when justified):

Cumulative results indicate that a higher grain yield is obtained from barley and oats seeded September 1 than when seeded October 1. The fall and winter grazing usually resulting from early seeding will reduce the amount of harvested roughage required to winter livestock.

6. WORK PLANNED FOR NEXT YEAR:

The project will be continued through the spring of 1955.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

None

8. Prepared by _____ Approved _____ (Director).

Date _____ _____

ANNUAL PROGRESS REPORT

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION PROJECTS

1. PROJECT: (Fund, number, and title): S95-A133 - UTILIZATION OF BARLEY AND OAT GRAZING FOR SHEEP PRODUCTION

2. DEPARTMENTS AND COOPERATING AGENCIES: Animal Industry, Agronomy and N. C. Department of Agriculture.

3. PERSONNEL: Lemuel Goode, W. W. Woodhouse, J. W. Hendricks, G. K. Middleton, E. H. Hostetler and H. L. Lucas.

4. NATURE OF RESEARCH AND PRINCIPAL RESULTS OF THE YEAR (Confidential information should be so marked):

In order to reduce soil born diseases, all plots were fallowed during the 1952-53 grazing period. Thus there are no new results to report at this time. Seeding was resumed in the fall of 1953. Plots were ready to graze by early October, however, dry weather reduced the amount of fall forage produced.

5. APPLICATION OF FINDINGS (expressed in terms of measurable public benefits if and when justified):

None

6. WORK PLANNED FOR NEXT YEAR:

This project is to be closed at the end of spring grazing period in 1954 unless a statistical analysis indicates that more data is needed.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

None

8. Prepared by _____ Approved _____
(Director).

Date _____ _____

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION
1953 ~~1952~~ ANNUAL PROGRESS REPORT, NON-FEDERAL PROJECTS
(Four copies to be sent to Director's Office)

1. PROJECT: (Fund, number, and title): State - S95-Ai33 Utilization of Barley and Oat Grazing for Sheep Production.

2. Departments and Cooperating Agencies Animal Industry, Agronomy and North Carolina Department of Agriculture.

3. Personnel: Lemuel Goode, W. W. Woodhouse, J. W. Hendricks, G. K. Middleton, E. H. Hostetler and H. L. Lucas.

4. NATURE OF RESEARCH AND PRINCIPAL RESULTS OF THE YEAR (Confidential information should be so marked):

Investigations studying (a) the joint effect of three rates of grazing and varying length of grazing period on barley and oat yields, and (b) the value of barley-lespedeza and oat-lespedeza rotations in terms of sheep days grazed were continued.

The second years results generally follow the trend established during the first year and indicate that both barley and oats can be grazed until jointing starts without reducing grain yield. Grazing after jointing is observed reduces grain yield sharply. Rate of grazing did not seem to affect the amount of forage produced. Plots receiving the lighter rates of grazing during the fall could be

(Continued on Page 1a)

5. APPLICATION OF FINDINGS (expressed in terms of measurable public benefits if and when justified):

Two years results indicate that farmers in this state could materially reduce the amount of harvested feed required for beef cattle and sheep by grazing the small grain normally seeded

6. WORK PLANNED FOR NEXT YEAR:

Both the barley and oat plots were heavily diseased at the conclusion of the 1952 grazing season. The decision was made to fallow all plots for one year in an attempt to correct this condition. Plots will be reseeded in the fall of 1953 and the project continued.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

None

8. Prepared by _____ Approved _____
(Director)

Date _____ Date _____

4. NATURE OF RESEARCH Etc. (continued from Page 1)

grazed earlier and carried heavier grazing loads during the spring grazing season.

Heavily grazed plots had better stands of lespedeza than the lightly grazed plots.

August 6, 1952

Memorandum to: Dr. D.W. Colvard

From: Prof. E.H. Hostetler

I am enclosing a memorandum from L. Goode regarding our project S95-AI33 at Statesville. This difficulty in connection with this project seems so severe that all have agreed that we should discontinue this project for one year. In my opinion there is nothing better to do.

Very truly yours,

Earl Hostetler

E.H. Hostetler
Professor and Head
Animal Husbandry Section

jc

28 July 1952

MEMORANDUM TO PROFESSOR HOSTETLER:

Subject: Project S95-Ai33, Utilization of Barley and Oat Grazing for Sheep Production.

We have had considerable disease trouble in the small grain grazing plots at Statesville. The 1950 seeding of Arlington oats had to be reseeded to a new variety on October 2. The 1951 oat seeding was severely damaged in some plots and considerable disease was present in the barley plots. Reseeding oats and barley on the same land for three years has aggravated this problem.

A Committee consisting of Dr. Lucas, Dr. Middleton, Dr. Woodhouse, Dr. Rankin, Dr. Hebert and Lemuel Goode discussed this problem on July 25. The Committee was in unanimous agreement that the project should be discontinued for one year in an attempt to reduce the small grain disease present in the soil. All plots will be cultivated enough during the fall of 1952 to destroy volunteer oats and barley. Soybeans will be seeded in the spring of 1953 and the grazing project continued in the fall of 1953.

Lemuel Goode

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION
1952 ANNUAL PROGRESS REPORT, NON-FEDERAL PROJECTS
(Four copies to be sent to Director's Office)

1. PROJECT: (Fund number, and title): State - S95-Ai33 Utilization of Barley and Oat Grazing for Sheep Production.

2. Departments and Cooperating Agencies Animal Industry, Agronomy and North Carolina Department of Agriculture.

3. Personnel Lemuel Goode, W. W. Woodhouse, J. W. Hendricks, G. K. Middleton, E. H. Hostetler and H. L. Lucas

4. NATURE OF RESEARCH AND PRINCIPAL RESULTS OF THE YEAR (Confidential information should be so marked):

Investigations studying (a) the joint effect of three rates of grazing and varying length of grazing period on barley and oat yields, and (b) the value of barley-lespedeza and oat-lespedeza rotations in terms of sheep days grazed were continued.

One years results show that both barley and oats can be grazed to approximately March 1 without reducing grain yields. Slight jointing was observed in all plots on March 1, and jointing was pronounced by March 15. Grazing after March 1 reduced grain yields sharply.

Rate of grazing did not effect the amount of grazing available to March 1. Plots lightly grazed during the fall were ready to graze earlier in February and produced more forage during that period.

Lespedeza yield was effected by rate of grazing in that plots receiving heavier rates of stocking had a better stand and produced more forage.

5. APPLICATION OF FINDINGS (expressed in terms of measurable public benefits if and when justified):

Under the conditions of the experiment, barley plots, averaging 395 ewe days per acre to March 1, produced the equivalent of approximately 1600 pounds of hay. Oat plots, which had to be reseeded October 2, produced the equivalent of 580 pounds of hay.

6. WORK PLANNED FOR NEXT YEAR:

The project will be continued during 1951 and 1952.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

None

8. Prepared by Lemuel Goode Approved _____
(Director)

Date March 28, 1952 Date _____

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION
1951 ANNUAL PROGRESS REPORT, NON-FEDERAL PROJECTS
(Four copies to be sent to Director's office)

1. PROJECTS: (Fund, number, and title): State - S95-a133, Utilization of Barley and Oat Grazing for Sheep Production.

2. Departments and Cooperating Agencies: Animal Industry, Agronomy and N. C. Department of Agriculture.

3. Personnel: Lemuel Goode, W. W. Woodhouse, J. W. Hendricks, G. K. Middleton, E. H. Hostetler and H. L. Lucas.

4. NATURE OF RESEARCH AND PRINCIPAL RESULTS OF THE YEAR (Confidential information should be so marked):

Investigations studying (a) the joint effect of varying intensities of winter and spring grazing and varying lengths of grazing period on oat and barley yields in a lespedeza rotation, and (b) the value of barley lespedeza and oat lespedeza in terms of sheep days grazed and lamb and wool produced were initiated in the fall of 1949.

On August 26, six plots of approximately one acre each were seeded to Arlington oats and six similar plots were seeded to Colonial barley. Grazing rates were heavy, medium and light.

The system of grazing used during the fall of 1949 and spring of 1950, a constant rate and ratio of stocking, did not give the desired results. Medium and lightly grazed plots were not grazed uniformly. Thus grain yields harvested during the spring of 1950 are of little if any value.

Lespedeza yields from the barley plots were higher than from the oat plots. Also, heavily grazed plots, both barley and oats, produced more lespedeza than the medium and lightly grazed plots.

Ewe and lamb days grazed were higher for the heavily grazed plots in all cases. However, considerable forage remained on the medium and lightly grazed plots.

After completing the first year's work on this project, certain minor changes in procedure were indicated. While three rates of grazing will be maintained, the rate of stocking and length of grazing period will vary so that the desired level of grazing is obtained. Each plot will be grazed independently of the others.

5. APPLICATION OF FINDINGS (expressed in terms of measurable public benefits if and when justified):

No recommendations should be made until more information is available.

6. WORK PLANNED FOR NEXT YEAR: The project will be continued during 1950-51.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

None.

8. Prepared by Lemuel Goode Approved _____ (Director

Date April 9, 1951 Date _____

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION
1950 ANNUAL PROGRESS REPORT, NON-FEDERAL PROJECTS

1. PROJECT: (Fund, number, and title): State - 895-A133, Utilization of Barley and Oat Grazing for Sheep Production.

2. DEPARTMENTS AND COOPERATING AGENCIES: Animal Industry, Agronomy and N. C. Department of Agriculture.

3. PERSONNEL: Lemuel Goode, R. L. Lovvorn, J. W. Hendricks, C. K. Middleton, E. H. Hostetler and H. L. Lucas.

4. NATURE OF WORK AND PRINCIPAL RESULTS OF THE YEAR (confidential information should be so marked):

Investigations studying, a. the joint effect of varying intensities of winter and spring grazing and varying lengths of grazing period on oat and barley yields in a lespedeza rotation, and b. the value of barley-lespedeza and oat-lespedeza pasture in terms of sheep days grazed and lamb and wool produced were initiated in the fall of 1949.

On August 26, six plots of approximately one acre each were seeded to Colonial barley and six similar plots were seeded to Arlington oats. These plots are being grazed with sheep at the following rates: a. medium grazed with four ewes and their lambs at a constant rate, insofar as consistent with good management practices, b. heavy-grazed with six ewes and their lambs for the same periods as in a, and c. light grazed with two ewes and their lambs for the same periods as in a.

Due to excellent growing conditions during the fall, it was necessary to clip all plots before grazing. A difference in fertility level between plots made uniform grazing within a treatment difficult. Fall grazing started on Oct. 13 and continued until Dec. 16, except for five plots which were discontinued on Dec. 2. Spring grazing started on Feb. 15 and the sheep are on the plots as of May 16.

On October 1 a check plot was seeded and caged in each paddock. At various intervals 4' x 4' wire cages were placed on the grazed areas and grain yields will be computed.

5. BENEFITS realized by farmers or the public through application of findings, stated in dollars, bushels, or other values, where possible:

No recommendations should be made until more information is available.

6. WORK PLANNED FOR NEXT YEAR:

This project will be continued during 1950-51.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

None

8. APPROVED: _____ _____
Project Leader Associate Director

file

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION
PROJECT OUTLINE

Project No. 595-A-33
Date
Submitted .....
Approved .....
Revised .....

1. Title: Utilization of Barley and Oat Grazing for Sheep Production.

2. Objective(s)
   1. To study the joint effect of varying intensities of winter and spring grazing and varying lengths of grazing period on oat and barley yields in a lespedeza rotation.
   2. To determine the value of barley-lespedeza and oat-lespedeza pasture in terms of sheep days grazed and lamb and wool produced.

3. Reasons for undertaking Investigations*

The acreage seeded to small grain is increasing in North Carolina. If this acreage were grazed during the winter and early spring, it would reduce the amount of harvested roughage required to winter cattle, sheep and workstock. In many instances this would increase the livestock carrying capacity of the farm. While studies at the North Carolina and other stations indicate that small grain can be grazed under certain conditions without reducing the grain yield, additional information is needed on this subject.

The reduction of small grain yields due to grazing is generally attributed to injury sustained by the growing point of the plant. Information is needed to determine when the injury is sustained and the extent of damage as the plant matures.

Much of the available grazing data has been collected on the basis of mechanical clippings rather than actual grazing. Additional information is needed to determine the effect of prolonged trampling and the rate of stocking on grain yields. Likewise, information is needed relative to the point at which it becomes uneconomical from a standpoint of meat production to effect reduction in grain yield through grazing.

It is a common practice on North Carolina farms to seed lespedeza in small grain. Additional information is needed to determine the effect of length and rate of grazing on lespedeza yields.

*Including economic justification

4. Previous work and present status of investigations in the field of this project:

Several workers have investigated and contributed information on various phases of small grain grazing. Finnell (/) of the Oklahoma Station concluded the winter grazing of wheat sown for grain was desirable. However, late spring grazing by cattle reduced the yield. Georgeson et al. (3) in Kansas found moderate grazing in spring or fall had little effect on wheat yield, but that heavy grazing during the first part of April reduced the grain yield. Likewise Swanson (9) in Kansas found that well established wheat with vigorous, leafy top growth on a good seed bed can nearly always be pastured with benefit to grain yield, if pastured moderately. Severe seasonal pasturing and late spring pasturing reduced the yield of grain. Grazing should be discontinued just before the period when the plant shows a strong tendency to make erect growth in preparation for jointing.

Washko (10) of the Tennessee Station reported grazing to March 15th reduced grain yields. Stansel et al. (5) at Texas concluded that grazing small grain was beneficial and increased production but that grazing should be discontinued about March 1.

North Carolina workers (2, 4, 6, 7, 8) have demonstrated that small grain is well adapted to winter grazing and is also well adapted to a small grain-lespedeza rotation. Lovvorn (4) found clipping of barley through February reduced grain yields in North Carolina. Stitt (8) in a study where barley forage on small plots was removed by grazing with sheep for a few hours found a reduction of 41 per cent in grain yields when removed the last of March in Piedmont North Carolina.

5. Outline of Procedure:

1. Field - lying east of the sheep barn will be subdivided into 12 equal plots of approximately one acre each.

2. Six of the experimental areas will be seeded to Colonial barley between August 15 and September 1, at the rate of three bushels per acre. Five hundred pounds of 3-12-6 fertilizer per acre will be applied at the time of seeding. A top dressing of 100 pounds of nitrate of soda per acre, or its equivalent, will be applied about six weeks after seeding and again about the middle of February. Korean lespedeza will be drilled in the barley at the rate of 30 pounds per acre in February. No fertilizer will be applied to the lespedeza. The six remaining areas will be seeded to Arlington oats. Time and rate of seeding and fertilizer treatment will be the same as for the barley.

3. The paddocks will be grazed with sheep at the following rates:

A. Grazing rate No. 1 (medium) - To be grazed with 4 ewes and their lambs at a constant rate and, insofar as consistent with good management practices, grazed from about November 1st until completely grazed out in the spring.

B. Grazing rate No. 2 (heavy) - To be grazed for the same periods as under grazing rate No. 1, but stocked with 1½ times as many sheep (six ewes and their lambs).

C. Grazing rate No. 3 (light) - To be grazed for the same periods as grazing rate No. 1, but stocked with only half as many sheep (two ewes and their lambs).

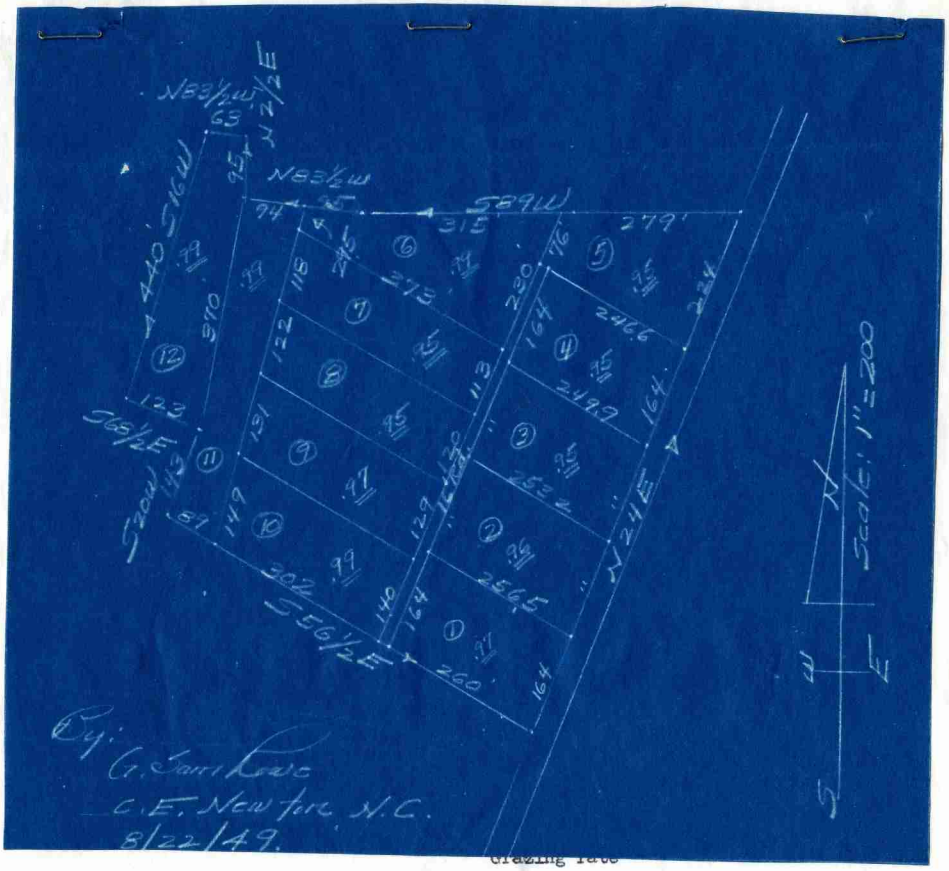
4. Replications see attached diagram.

5. The effect of intensity of grazing and length of grazing period on grain yields will be determined by placing 4' x 4' wire cages on the grazed areas on the following dates:

a. When sheep are placed on paddocks
b. December 1
c. February 1
d. February 15
e. March 1
f. March 15
g. April 1

Grain yields will be computed from the caged areas.

4. Replications and seeding schedule.



Grazing rate

Pasture	Var.	1st yr.	2nd yr.	3rd yr.	4th yr.
1	O	H	M	L	L
2	B	H	M	L	L
3	B	M	L	H	H
4	O	M	L	H	H
5	B	L	H	M	M
6	O	L	H	M	M
7	B	H	H	L	M
8	O	H	H	L	M
9	B	L	L	M	H
10	O	L	L	M	H
11	B	M	M	H	L
12	O	M	M	H	L

References

1. Finnell, H. H. Grazing of Winter Wheat. Oklahoma Panhandle Station Bulletin 4. 1929.

2. Foster, J. E., Pierce, J. C., Stitt, R. E., Hostetler, E. H., and Hendricks, J. W. N. C. Agr. Exp. Sta. Unpublished data.

3. Georgeson, C. C., Burtis, F. C. and Shilton, W. Experiments with Wheat at Kansas Station. Kansas Sta. Bul. 33. 1892.

4. Lovvorn, R. L., Small Grain Clipping Experiments. Annual Report 1943-45, Division of Forage Crops and Diseases. N. C. Agr. Exp. Sta.

5. Stansel, R. H., Dunkle, P. B., and Jones, D. L. Small Grain and Rye Grass for Winter Pasture. Texas Agr. Exp. Sta. Bul. 539. 1927.

6. Stitt, R. E., Effect of Various Methods of Pasture Management and Utilization of Grass and Pasture. Annual Report, 1927. Division of Forage Crops and Diseases, Piedmont Branch Station. N. C. Agr. Exp. Sta.

7. _____ Pasture Use and Management. Annual Report 1941. Piedmont Branch Station. N. C. Agr. Exp. Sta.

8. _____ Different Plants and Management Practices as Affecting Yields of Annual and Temporary Pastures. Annual Report. 1943. Piedmont Branch Station. N. C. Agr. Exp. Sta.

9. Swanson, A. F. Pasturing Winter Wheat in Kansas. Kansas Agr. Exp. Sta. Bul. 271. 1935

10. Washko, J. B. The Effect of Grazing Winter Small Grains. Journal of American Society of Agronomy. Vol. 39. Pages 659-666, 1947.

6. Measurements as to height of growing point and injury to growing point will be recorded on the same dates listed above. Random clippings will be made in each paddock to determine the dry matter present when the sheep are removed from the paddocks.

7. In addition, a check plot will be located at random in each paddock and seeded about October 1st. Rate of seeding for both barley and oats will be two bushels per acre. Fertilizer will be applied at the rate of 300 pounds of 3-12-6 per acre at the time of seeding. About the middle of February 200 pounds of nitrate of soda, or its equivalent, per acre will be applied to the check plot as a top dressing.

8. Information on such factors as temperature, rainfall, stand of grain and general weather conditions will be recorded.

9. The lespedeza will be grazed uniformly on all fields and turned under about August 10. Lespedeza yields will be computed from the caged areas.

10. Sheep will be ranged together and given identical treatment when not being used in the experiment. Sheep weights will be taken at regular 14 day intervals and when sheep are placed on the paddocks. Weights will also be taken at the close of each grazing period, after the sheep have been off the pasture for 12 hours. The number of sheep grazed and hours grazing per paddock will be recorded.

6. Probable Duration of Project: Four years.

7. Date of Initiation: Fall 1949.

8. Personnel:

Name	Department	Relation to Project
Lemuel Goode	Animal Industry Dept.	Leader
R. L. Lovvorn	Agronomy Department	Leader
J. W. Hendricks	N. C. Dept. of Agriculture	Co-Leader
G. K. Middleton	Agronomy Department	Adviser
E. H. Hostetler	Animal Industry Dept.	Adviser
H. L. Lucas	Exp. Statistics	Adviser

9. Coöperation:

a. Interdepartmental — Animal Industry (Animal Husbandry)
Agronomy Department

b. Other Agencies — N. C. Department of Agriculture

10. Financial Support:

a. Proposed Budget 9-1-49 to 8-31-50

ITEMS	ALLOCATION OF FUNDS					
	Bankhead-Jones	Purnell	Adams	State	Other	Total
1. Salaries						
2. Labor						
3. Travel				300.00		
4. Equipment & Supplies						
5. All Other						
Total				300.00		

b. Proposed Future Budgets:

Year	Salaries	Total Expenditures	Estimated Income
Annually for three years		300.00	None

11. General Remarks:

SIGNATURES OF APPROVAL

1. Approval of Project Leaders

Date Sept. 3, 1949 Samuel Goode

Title Asst. Prof. in Animal Industry

Date Sept. 3 1949 B. Bowman

Title Prof. of agronomy

Date .....

Title .....

2. Approval of Heads of Departments or Coöperating Agencies

Date 9-8-49 Earl H. Hostetler

Head, Animal Husbandry

Date 9/16/49 A. C. Cole

Head, Animal Industry

Date 9/22/49 W. E. Colwell

Head, Agron.

3. Approval of Committee on Experiment Station Projects

Date .....

Chairman of Committee

4. Approval of Director

Date Sept. 24, 1949 R. W. Cummings

Assoc Director, North Carolina Agricultural Experiment Station

5. Approval of U. S. D. A.

Date .....

Chief, Office of Experiment Stations