

**NORTH CAROLINA**

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 60**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH, H-16, TESTING INBRED LINES OF SWINE**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry**
3. PERSONNEL: **E. U. Dillard, A. J. Clawson, T. H. Blumer and E. R. Barrick**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked): **Thirty litters were farrowed in the spring at the Central Research Station. Inbred Tamworths, Durocs and 3-way crossbreds were equally represented. Gilt productivity and growth data were obtained on animals of the three breeding groups.**
5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): **There were not sufficient data available to allow any generalizations to be made.**
6. WORK PLANNED FOR NEXT YEAR: **The inbred Tamworths have been sold in preparation for closing out this project. A new project proposal has been submitted to replace the present project.**

H-207

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_ (Director).

Date \_\_\_\_\_ Date \_\_\_\_\_

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 59**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH H-16, TESTING INBRED LINES OF SWINE.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry**
3. PERSONNEL: **E. U. Dillard, A. J. Clawson, T. N. Blumer and E. R. Barrick**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

Fifty-five spring and 52 fall litters were farrowed at the Central Research Station in 1958. These litters were utilized in obtaining data for both breeding and nutrition projects. Forty Duroc and 3 breed rotation crossbred gilts were compared when self fed high fiber rations on concrete confinement. The crossbred gilts farrowed thriftier pigs and raised a higher percent to weaning age than did the purebred Duroc gilts. 180 pigs from these litters were fed out to market weight in four replicated lots. The average daily gain and feed required per pound of gain for the Durocs and 3 Way cross pigs were as follows: 1.56, 3.98 and 1.60, 4.06, respectively.

Twelve Tamworth x Duroc and Tamworth x Poland gilts were sent to the Research Station at Rocky Mount for the second year. These gilts have been bred to the same boars that are used on the 3 way cross gilts produced at that station for comparison.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

If crossbred gilts produced from the highly inbred line of Tamworths maintained at Central Station out perform 3 way cross gilts in this study, then the usefulness of this line will be greatly enhanced.

6. WORK PLANNED FOR NEXT YEAR:

This project is to be revised for a more comprehensive testing of the inbred Tamworth line maintained at Central Station.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

NONE

8. Prepared by A. J. Clawson Approved \_\_\_\_\_ (Director).  
Date February 18-1959 Date \_\_\_\_\_

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 59

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH H-26, STUDIES ON LOW TEMPERATURE (-79°C.) BOVINE SEMEN STORAGE.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry**
3. PERSONNEL: **J. E. Legates, N. Pati, R. M. Myers**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

A series of trials was conducted to determine whether glycerolized reconstituted dried buttermilk is a satisfactory diluent for storage of bovine semen at -79°C. The buttermilk diluent used was compared with conventional glycerolized egg yolk-citrate and milk diluters, using semen from nine Holstein bulls. Four replicates - a total of 72 ejaculates - were studied. Using a split-ejaculate diluent, equilibrated for 18 hours and frozen gradually to -79°C. It was held at this temperature for 10 days, thawed, stained with a differential stain and examined microscopically. Mean percentages of live sperm following this storage interval are: Egg Yolk-citrate 45.5%; Milk 45.1%; Buttermilk 50.9%

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): **Improved diluents should enhance conception rates achieved through the use of frozen semen; thus tend to eliminate the costly "repeat breeder" cow. This will result in a real financial saving to dairymen. It can thus be concluded that, on the basis of livability studies, reconstituted buttermilk is a satisfactory diluent for frozen bull semen. These findings should be checked by field trials to determine whether actual conception rates follow a similar pattern.**
6. WORK PLANNED FOR NEXT YEAR: **This diluent is to be applied to the low temperature storage of beef bulls, ram and boar semen, the dry ice used as a refrigerant (-79°C) may be replaced by liquid nitrogen (-320°C) to determine if buttermilk is still superior as a diluent.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  
**Ph.D. Thesis - N. Pati**  
**"Storage of Bovine Semen at low Temperature (-79°C) using Reconstituted Buttermilk as an Extender".**

8. Prepared by R. M. Myers Approved \_\_\_\_\_ (Director).  
Date 2/6/59 Date \_\_\_\_\_

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 60

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH, H-26, STUDIES ON LOW TEMPERATURE (-79°C.) BOVINE SEMEN STORAGE (St-H-26)**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry**
3. PERSONNEL: **R. H. Myers, L. C. Ulberg, J. E. Legates**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked): **The work described in the 1959 Annual Progress Report involving a comparison of glycerolized reconstituted buttermilk with egg yolk citrate-glycerol and heated milk-glycerol diluents for frozen bull semen - semen-containing was repeated. Improvements in procedure were included and the entire trial was conducted by a different individual. The results were even more pronounced in favor of buttermilk. It showed 58 percent sperm recovery following treatment as compared with 49 percent for egg yolk-citrate and 45 percent for heated milk. Second ejaculates responded to treatment better than first and all bulls showed a higher recovery response to buttermilk than to the other two diluents.**
5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): **The preparation of the buttermilk diluter is simple and requires no elaborate equipment. It can be used by the average dairyman in his own herd. It could provide artificial breeding organizations with an economical, easily prepared diluent capable of maintaining high breeding efficiencies when used following long term frozen storage.**
6. WORK PLANNED FOR NEXT YEAR: **A new project is being initiated involving semen studies and fertility trials with sheep and swine to provide a basis for an efficient artificial breeding program for these species.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  

H 210

**"Reconstituted Buttermilk as an Extender for Frozen Bovine Semen Storage". R. H. Myers, N. Pati and L. C. Ulberg. Presented at 1960 Southern Division Meeting, American Dairy Science Association, Birmingham, Ala., Feb. 1, 1960.**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director)

Date \_\_\_\_\_ Date \_\_\_\_\_

— North Carolina — Agricultural Experiment Station

FINAL REPORT, FEDERAL-GRANT PROJECTS

(Send 3 copies to State Experiment Stations Division, ARS, at time of closing)

1. PROJECT (Fund, number and title): **H-20, RR 9-3, Improvement of Dairy Cattle Through Selection.**
2. STATION DEPARTMENTS AND COOPERATING AGENCIES (e.g., USDA, TVA, etc.): **Department of Animal Industry, Department of Experimental Statistics, North Carolina Dairy Extension Service.**
3. MAJOR PERSONNEL: **J. E. Legates, D. R. Farthing, C. Clark Cockerham**
4. DATE BEGUN: **July 1, 1956** DATE COMPLETED: **6/30/59**  
(If discontinued without completion state reasons):
5. ESTIMATED TOTAL COST BY FUNDS (Federal-grant and others):  
**RR-9-3 \$31,000, Hatch \$14,000 State \$35,000**
6. THE PROBLEM (Briefly restate its nature, importance, and economic significance): **Although the South's dairy industry is growing, further increases in production are needed to provide minimum recommended per capita needs. Increased production per cow through breeding improvement is most desired both for individual dairymen and the entire South.**

**Selection aided by progeny testing and artificial insemination offers much promise for the continued improvement of dairy cattle. However, experiments utilizing appropriate controls to measure improvement are lacking. In addition many of the underlying breeding principles on which recommendations must be based still lack experimental verification.**

7. ABSTRACT MAJOR RESULTS AND CONCLUSIONS:

**Study of the conventional daughter average daughter-dam comparison and equal parent index revealed that they have little special merit as measures of transmitting ability for dairy sires. Measures using production information on animals which are contemporary to the daughters of the sire being evaluated provide for a much more effective correction for environmental differences which influence sire proofs.**

**Using this same principle of the contemporary comparison it was found that artificially-sired animal in North Carolina produced significantly more milk and fat than naturally sired animals in the same herd.**

8. **USEFULNESS OF FINDINGS** (Present or potential to other scientists - farmer acceptance - economic value to agriculture - other):
- The use of contemporaries (hard mates) in sire evaluation can effectively enhance the accuracy of sire selection. This is most important in artificial insemination where sires can be used for as much as 30,000 services per year.

Results to date indicate that it is not necessary to sustain major losses in average production while sampling young sires to provide future proved sires. Even with a breeding unit of only 725 cows, it appears likely that all potential herd sires can be progeny tested within the unit before they are used extensively. It should be possible to carry out such a progeny testing program with even greater facility in larger breeding units.

1. Legates, J. E., F. J. Verlinden, and J. F. Kendrick. Herd by Sire Interaction in Production Traits in Dairy Cattle. Jour. Dairy Science 38:1055-1063. 1956.
9. CITATION OF PUBLICATIONS (Issued and/or in manuscript form):
2. Farthing, B. R. and J. E. Legates. Genetic Covariation Between Milk Yield and Fat Percentage in Dairy Cattle. Jour. Dairy Science 40:639-646, 1957.
3. Legates, J. E. Heritability of Fat Yields in Herds with Different Production Levels. (Abstract) Jour. of Dairy Science 40:631- 1957.
4. Gaunt, S. N. and J. E. Legates. The Relative Merits of Five Measures of a Dairy Sires Transmitting Ability. Journ. of Dairy Science 41:830-839. 1958.
5. Farthing, B. R. and J. E. Legates. The Relation Between Weight and Production in Dairy Cattle. (Abstract) Jour. of Dairy Science 41:760. 1958.
6. Tucker, W. L. and B.R.Farthing. Genetic Improvement of Dairy Cattle Attributable to Sires used in Artificial Insemination in North Carolina. (Abstract) Jour. of Dairy Science 41:747. 1958.
7. Legates, J. E., B.R.Farthing and C. Clark Cockerham. Selection for Growth and Maternal Performance in Mice. Proc. X Int. Genetic Congress, 1958.
8. Cox, D. F., J. E. Legates and C. Clark Cockerham. Maternal Influence on Body Weight. Jour. of Animal Science. 18:519-527. 1959.

10. Prepared by J. E. Legates Approved \_\_\_\_\_ (Director)  
(Sign original only)

Date 6-11-59 Date \_\_\_\_\_

7. A program of progeny testing young bulls to provide future proved bulls has been in progress for nine years in 10 state-owned herds. For all herds combined the average annual increase in production has been 460 lbs. of milk and 17 lbs of fat. The 229 daughters of the first eleven young sires sampled averaged 154 lbs. of milk and 3 lbs of fat above their herd mates

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 59**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH H-26, (S-3) IMPROVEMENT OF DAIRY CATTLE THROUGH SELECTION.**
2. DEPARTMENTS AND COOPERATING AGENCIES: Department of Animal Industry, Department of Experimental Statistics, N. C. Institutional Breeding Program
3. PERSONNEL: J. E. Legates, B. R. Farthing, R. H. Myers, C. Clark Cockerham

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**a. Performance of State-owned Herds.**

Cows freshening in 1957 continued the increase in 305-day, 2x, M.E. production in these herds. The 604 cows completing records averaged 14,135M., 3.54% and 500F., which represents an increase of 415 lbs. of milk and 20 lb. of fat over the previous year. On the basis of the linear regression of production on years, the average annual increase in production has been 460 lb. milk and 17 lb. fat for the past nine years.

All milking females were classified by an unofficial committee during the year. Substantial improvements in practically all the components of type were evidenced in comparison with the previous committee classification in 1953. The average scores for overall mammary system and fore udder indicated major improvements in these breakdown items.

These additional young bulls were sampled during the year bringing the total to 24 since the program began. Two outstanding young sampled sires (see attached sheet)

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):  
Results to date indicate that it is not necessary to sustain major losses in average production while sampling young sires to provide future proved sires. Even with a breeding unit of only 725 cows, it appears likely that all potential herd sires can be progeny tested within the unit before they are used extensively. It should be possible to carry out such a progeny testing program with
6. WORK PLANNED FOR NEXT YEAR: even greater facility in larger breeding units. All current phases of project work are to be continued. Our project is to be revised during the year, and studies on the inheritance of milk solids-not-fat is to be initiated with the ten herds in the Institutional Breeding Program. A separate project is to be developed for the Evaluation of Selection Procedures for Quantitative traits Using Mice.
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  
Gaunt, S. N. and J. E. Legates. The Relative Merits of Five Measures of a Dairy Sires Transmitting Ability. Jour. Dairy Sci. 41:830-839. 1958.  
Farthing, B. R. and J. E. Legates. The Relation Between Weight and Production in Dairy Cattle. (Abst.). Jour. of Dairy Sci. 41:740, 1958. (See attached sheet)
8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_ (Director).

Date \_\_\_\_\_

Date \_\_\_\_\_



#### 4. Research Accomplishments of the Year

(continued)

were proved during the year. These two bulls have a composite proof including 46 A. I. daughters with 69 completed records which average 14,002 M, 3.57%, 328F. This production is 355 M, .06% and 20 F above their contemporary herd mates.

##### b. Relation Between Age, Weight and Production.

Age correction factors computed by the gross comparison method using 3597 records of 1216 cows in the Institutional Breeding Program were very similar to the standard D.H.I.A. factors. Factors developed from the within cow regression of milk yield on age were much higher than the D.H.I.A. factors due to the pronounced upward trend in production in these data.

The relative influence of age and live weight on production were studied from the within cow regression of production on age, age squared, weight and weight squared. Weights, based on heart girth measurements taken at the first test period after freshening, were available for 371 records of 165 cow with more than one production record and initial weights. These data indicated that the effect of weight is linear, while age effects are significantly curvilinear. The linear effect of weight accounted for more of the variance in production than the linear effect of age. However the linear and quadratic effects of age accounted for practically all the variance in production attributable to age and weight combined.

##### c. Selection - Control Herd.

The College Holstein herd is assigned to measure experimentally the improvement in production to be expected from using artificial insemination and selection. The selection group is a part of the Institutional Breeding Program, and the control cows are bred to bulls randomly selected from the control group. The data for the first two years are complete.

| Group | Selection |        |      |       |        | Control |        |       |     |        |
|-------|-----------|--------|------|-------|--------|---------|--------|-------|-----|--------|
|       | Year      | Recs.  | Milk | % Fat | FCM    | Recs.   | Milk   | % Fat | FCM |        |
| 56    | 18        | 13,729 | 3.63 | 501   | 13,007 | 12      | 14,954 | 3.61  | 507 | 13,227 |
| 57    | 18        | 14,970 | 3.58 | 536   | 14,028 | 18      | 14,941 | 3.63  | 531 | 13,781 |

All of the above data were obtained from cows or heifers originally in the groups when they were set up. They reflect the original equality of production potential of the two groups. During the first two years 12 cows were removed from the selection group which averaged 1292 lb. FCM below their herd mates. The 14 cows which have left the control group averaged 202 lb. FCM below their herd mates.

##### d. Evaluation of Selection Procedures for Quantitative Traits with Mice.

Selection for high and low 12-day weight of a standardized litter, which is being used to measure lactational and maternal performance of the females, along with high and low 6-week weight of individual mice has been carried on for 13 generations. An unselected control group is being maintained as an indicator of environmental fluctuations.

The 12-day weights in the high 12-day group has increased 0.625 gms./gen, while in the low line it has remained essentially constant, increasing only 0.015 gms./gen. The control line has increased in 12-day performance 0.521 gms./gen. After 13 generations of selection the high and low lines for 12-day weight have been separated by 0.7 grams, 21.8 per cent of the mean for 12-day weight.

Six-week weight has increased in the high line 0.379 gms./gen and decreased in the low line at the rate of -0.133 gms./gen. The control line has increased 0.205 gms./gen. The high and low 6-week lines have been separated by 7.5 grams, an amount equal to 60.32 per cent of the base population.

#### 7. Publications (continued)

Tucker, W. L. and B. R. Farthing. Genetic Improvement of Dairy Cattle Attributable to Sires Used in Artificial Insemination in North Carolina. (Abstr.) Jour. of Dairy Sci. 41: 747. 1958.

Legates, J. E., B. R. Farthing and C. Clark Cocherhan. Selection for Growth and Maternal Performance in Hires. X Int. Gen. Congress, 1958.

**NORTH CAROLINA**

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 1961**  
(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **H-32, THE USE OF RECORD OF PERFORMANCE SELECTION PROGRAM FOR IMPROVING BEEF CATTLE.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry, Agricultural Economics and Experimental Statistics.**
3. PERSONNEL: **J. H. Gregory, E. U. Billard and E. R. Barrick.**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**In 1960, all the data was punched on cards. The data used were all weights and grades taken on the calves, the age of dam, breed of sire and dams, sire (where known), sex of calf, date of birth, date of weight and grade and creep feeding code. There were approximately 5500 calves weighed and graded over a four-year period. All cards have been corrected and are ready for analysis.**

**The information being evaluated includes the growth pattern for both creep fed and non-creep fed calves; the effect of age of dam on weight of calf at different ages; the effect of age of dam on grade; change in grade of calf due to change in age and weight; age the calf should be weighed to give the best estimate of the cow's productivity; and effect of sex of calf on weight.**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**This work has been valuable in establishing procedures and correction factors for use in a state-wide performance testing program.**

6. WORK PLANNED FOR NEXT YEAR:

**The analysis will be completed on the data and the project will be revised.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None.**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director).

Date **March 24, 1961** Date \_\_\_\_\_

N C H-32 Anim Indus Improving Beef Cattle through Performance Records

1. STATE 2. PROJ. NO. 3. DEPT. 4. ABBREV. TITLE  
 7. TITLE, PROJECT OBJECTIVES AND DESCRIPTION OF WORK PROPOSED

5. REF.  
 6. X-REF.

THE USE OF RECORD OF PERFORMANCE SELECTION PROGRAM FOR IMPROVING BEEF CATTLE -- Obtain information for objective appraisal of breeding animals in production of market animals. Determine management practices that result in high market value for feeder calves. Assist cooperators in beef herd improvement through a systematic program of selection of breeding animals.

DESCRIPTION OF WORK

The program was initiated with cooperator herds from different sections of North Carolina. These herds calved during a three-month interval. Weights and grades were taken on all calves when the oldest calf reached 6 months of age, and were weighed and graded every 28 days until the youngest calf reached 6 months of age. In most instances there were four weights and grades taken on each calf. There were approximately 5500 calves weighed and grades over a four-year period from 1956 through 1959.

|                             |               |            |  |          |     |      |           |             |                 |                    |            |
|-----------------------------|---------------|------------|--|----------|-----|------|-----------|-------------|-----------------|--------------------|------------|
| 8. INDICATE TYPE OF PROJECT | MATCH         | RRF        | AMA  | NON-FED. | NEW | REV. | MARKETING | 9. DURATION | 10. COOPERATION | 11. APPROVAL DATES | 12. X-REF. |
| X                           |               |            |  |          |     |      |           | 61          |                 | 2-3-56             |            |
| 13. STATE                   | 14. PROJ. NO. | 15. DEPT.  | 16. ABBREV. TITLE                                  |          |     |      | 17. REF.  |             |                 |                    |            |
| N C                         | H-32          | Anim Indus | Records Improving Beef Cattle through Performance/ |          |     |      |           |             |                 |                    |            |

18. RECOMMENDED FOR APPROVAL

|       |           |      |
|-------|-----------|------|
| TITLE | SIGNATURE | DATE |
|       |           |      |
|       |           |      |
|       |           |      |
|       |           |      |

SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR PROJECTS PREVIOUSLY APPROVED BY SESD

19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

20. FEDERAL-GRANT PROJECTS ONLY--TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONS: Complete items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
 Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
 AGRICULTURAL RESEARCH SERVICE  
 STATE EXPERIMENT STATIONS DIVISION

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 1962**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **Hatch 32, THE USE OF RECORD OF PERFORMANCE SELECTION PROGRAM FOR IMPROVING BEEF CATTLE**

2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry, Agricultural Economics and Experimental Statistics**

3. PERSONNEL:

**J. H. Gregory, E. U. Billard and E. A. Barrick.**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**Much effort has been spent in programming the data in order to get all possible information from the analysis. It has been set up to determine if the additive or multiplicative method of adjustment, for weight and grade of calf due to age of dam, sex of calf, age of calf and month of birth of calf, is more efficient. Also, the magnitude of adjustment factors for these characteristics will be determined.**

**The optimum average age to weight and grade calves in order to furnish the most accurate information for use in culling the cow herd and for selecting replacement females will also be determined from this analysis. The analysis of this data is now in process and will be finished at an early date.**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**This work has provided the framework of the State Performance Testing Program and will furnish information that will make possible more refined techniques when the analysis is completed.**

6. WORK PLANNED FOR NEXT YEAR:

**After completion of the analysis, the findings will be published. The project is in the process of being revised.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None.**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_

(Director).

Date **March 2, 1962** Date \_\_\_\_\_

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 62**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **Hatch 33, DEVELOPMENT OF A BREED OF SHEEP ADAPTED TO EASTERN NORTH CAROLINA**
2. DEPARTMENTS AND COOPERATING AGENCIES:  
**Animal Industry.**
3. PERSONNEL:  
**Lemuel Goode, George L. Ellis, E. R. Barrick and E. U. Dillard.**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

Purebred Dorset and Hampshire ewes were checked daily for estrus starting May 5, 1961. The average dates and range of first estrus were July 18, May 5 to September 27; August 8, July 19 to September 5 for the Dorset and Hampshire ewes, respectively. Compared to previous years, the average date of first estrus was 2 - 3 weeks later than usual in both breeds. Intervals between heat periods also varied more than in previous years. Dorset ewes dropped a 106% lamb crop by February 26 compared to 85% for the Hampshire ewes. Seventy-five percent of the Dorset ewes bred in May conceived at first service whereas only 45% of the ewes bred during July and August conceived at first service.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):  
**The results show that the season of sexual activity in ewes varies markedly within and between breeds. The data suggests that environmental factors affect cycling activity and reproductive performance. When July and August breeding is practical with Dorset ewes, reproductive failure can be attributed primarily to a low conception rate rather than**  
(continued on attachment #1)
6. WORK PLANNED FOR NEXT YEAR:

**This project will be terminated in June, 1962.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None.**

8. Prepared by Lemuel Goode Approved \_\_\_\_\_

(Director).

Date **February 28, 1962**

Date \_\_\_\_\_

Attachment #1

failure to exhibit estrus. Selection within the Dorset breed for ewes that will breed during the cooler spring months is indicated if ways can be found to prevent the high death loss in early fall lambs experienced at this Station.

**NORTH CAROLINA**

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19<sup>61</sup>**  
(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **H-33, DEVELOPMENT OF A BREED OF SHEEP ADAPTED TO EASTERN NORTH CAROLINA.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry.**
3. PERSONNEL: **Lemuel Goode, George L. Ellis, E. R. Barrick and E. U. Dillard.**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

The overall breeding and lambing performance of purebred Polled Dorset sheep developed at North Carolina State College has equaled that of horned Dorset ewes and exceeded that of purebred Hampshires. Cycling and breeding records show that approximately 75% of the Dorset ewes exhibit regular estrous cycles during the spring and summer. However, breeding so as to lamb before November 15 has given extremely poor results. Approximately 30% of the early bred ewes that apparently settled returned to estrous after passing over 1 to 3 heat periods. The birth weight of lambs born before November 15 has averaged 1.5 lbs. less than those born during the winter. Many of these lambs were born dead or exhibited little vitality at birth. Over-all death loss has averaged 50%. The gestation period of early bred ewes has been 4 to 5 days shorter than that of ewes bred to lamb during the winter.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

The results show that Dorset ewes have the potential for early lamb production in Eastern North Carolina. However, the failure of ewes bred to lamb before November 15 to carry lambs to term and the high death loss in early fall lambs indicates that summer environment adversely affects embryonic development throughout the gestation period.

6. WORK PLANNED FOR NEXT YEAR:

The revision of this project has been delayed due to the absence of the project leader. It will be revised at the end of the lambing season.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

None.

8. Prepared by Lemuel Goode Approved \_\_\_\_\_

(Director).

Date March 29, 1961

Date \_\_\_\_\_



N C H-33 Anim Indus Breeding Sheep Adaptable to Eastern North

1. STATE 2. PROJ. NO. 3. DEPT. 4. ABBREV. TITLE  
 7. TITLE, PROJECT OBJECTIVES AND DESCRIPTION OF WORK PROPOSED

5. REF.  
 6. X-REF.

DEVELOPMENT OF A BREED OF SHEEP ADAPTED TO EASTERN NORTH CAROLINA --  
 Develop a light-faced, hornless breed of sheep that will produce, in  
 Eastern North Carolina, marketable lambs of desirable quality by or before  
 April 15, and have as much merit as possible in other important respects.  
DESCRIPTION OF WORK

Breeds of sheep were compared on the basis of such objective measurements  
 as lamb crop dropped, lamb crop weaned, 120-day lamb weight and grade and  
 early breeding potential. Following a mutation that occurred in the North  
 Carolina State College Dorset flock, intensive inbreeding and selection  
 pressure have been used to develop a strain of purebred Polled Dorsets that  
 have retained the desirable traits of the Dorset breed.

|                             |               |            |  |          |     |      |            |              |                 |                    |            |
|-----------------------------|---------------|------------|--|----------|-----|------|------------|--------------|-----------------|--------------------|------------|
| 8. INDICATE TYPE OF PROJECT | HATCH         | RRF        | AMA  | NON-FED. | NEW | REV. | MAR-KETING | 9. DURA-TION | 10. COOPERATION | 11. APPROVAL DATES | 12. X-REF. |
|                             | X             |            |  |          |     |      |            | 57           |                 | 7-11-44            |            |
| 13. STATE                   | 14. PROJ. NO. | 15. DEPT.  | 16. ABBREV. TITLE                          |          |     |      | 17. REF.   |              |                 |                    |            |
| N C                         | H-33          | Anim Indus | Breeding Sheep Adaptable to Eastern North/ |          |     |      | Carolina   |              |                 |                    |            |

18. RECOMMENDED FOR APPROVAL

TITLE

SIGNATURE

DATE

SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR  
 PROJECTS PREVIOUSLY APPROVED BY SESD

19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION

SIGNATURE

DATE

20. FEDERAL-GRANT PROJECTS ONLY-TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C.

SIGNATURE

DATE

INSTRUCTIONS: Complete items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
 Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
 AGRICULTURAL RESEARCH SERVICE  
 STATE EXPERIMENT STATIONS DIVISION

COVER-ABSTRACT-SIGNATURE PAGE FEDERAL-GRANT & NON-FEDERAL PROJECTS

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 59**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH H-33, (S-29) DEVELOPMENT OF A BREED OF SHEEP ADAPTED TO EASTERN NORTH CAROLINA.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry**
3. PERSONNEL: **Leasel Goode, George Ellis, E. R. Barrick and E. U. Dillard**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

At the Central Research Station, inter se matings have continued from original Dorset-Hampshire reciprocal crosses. Twenty ewes were bred to lamb during the 1958 lambing season. Ninety percent of the ewes lambed and weaned a 95% lamb crop, averaging 67 lbs. at 120 days. The average lambing date was Jan. 18.

Purebred Dorset and Hampshire ewes receiving similar treatment were compared to the crossbred ewes. Eighty-nine percent of the purebred Dorsets lambed and weaned a 99% lamb crop, averaging 67 lbs. at 120 days. Sixty-seven percent of the Hampshires lambed and weaned a 33% lamb crop, averaging 74 lbs. at 120 days.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

This project has demonstrated that it is possible to breed within a closed flock for several years without sacrificing total performance.

6. WORK PLANNED FOR NEXT YEAR:

This project will be closed out and a new project written on the physiology of reproduction in sheep.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

NONE

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director).

Date \_\_\_\_\_ Date \_\_\_\_\_

ANNUAL PROGRESS REPORT FOR STATE SUPPORTED PROJECTS  
OF THE  
NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION  
(Three copies to be submitted to Director's Office)

(RR-8-29)

1. PROJECT: (Fund, number, and title): **3-45 - SYSTEMS OF BREEDING FOR THE PRODUCTION OF MARKET LAMBS IN THE APPALACHIAN MOUNTAIN AREA OF NORTH CAROLINA.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry, Statistics and the North Carolina Department of Agriculture.**
3. PERSONNEL: **Lemuel Goode, George Ellis, E. R. Barrick, H. A. Stewart, C. C. Cockerham and D. F. Tugman.**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

- (a) **Western ewes (Hampshire x Rambouillet) bred to Hampshire rams.**  
 (b) **Purebred Hampshire ewes bred to Dorset rams.**  
 (c) **Native crossbred ewes (Shropshire x Corriedale x Southdown x Hampshire x Columbia) bred to Dorset rams.**

The native crossbred ewes excelled the other ewe groups in average fleece weights and percent lamb crop dropped and weaned. The present lamb crop dropped and weaned for the crossbred, western and Hampshire ewe groups respectively were, 173, 167; 1.56, 150; and 121, 107. The respective fleece weights were, 8.0, 7.6 and 6.0. The average 120 day lamb weights were, 72.2, 70.6 and 67.7 for the western, Hampshire, and crossbred ewes, respectively.

Each of the ewe groups - a, b, and c - were divided into early, Aug. and Sept., and late, Nov. and Dec. breeding units. The early bred ewes weaned a 130 percent lamb crop and the late bred ewes weaned a 154 percent lamb crop. The early lambs averaged 8.2 lbs. heavier at 120 days and graded approximately 2/3 of a grade higher than the late lambs.

5. USEFULNESS OF FINDINGS (Benefits to Agriculture and the general public and contributions to science):

**The results indicate that the use of crossbred ewes is highly beneficial in commercial lamb production in Western North Carolina and similar areas.**

6. WORK PLANNED FOR NEXT YEAR:

**The project will be continued as outlined in the original breeding plan.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None**

8. Prepared by

*George L. Ellis*

Approved \_\_\_\_\_

Director

Date

*Feb. 20, 1959*

Date \_\_\_\_\_

ANNUAL PROGRESS REPORT FOR STATE SUPPORTED PROJECTS  
OF THE  
NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION  
(Three copies to be submitted to Director's Office)  
(RR-S-29)

1. PROJECT: (Fund, number, and title): **S-200 AN EVALUATION OF CERTAIN FACTORS AFFECTING FERTILITY OF SHEEP IN THE TIDEWATER AREA OF NORTH CAROLINA.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry and the North Carolina Department of Agriculture.**
3. PERSONNEL: **E. U. Dillard, J. C. Osborne, George Ellis, Lemuel Goode and J. L. Rea, Jr.**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

Two similar ewe breeding groups, consisting of 10 purebred Hampshire and 13 Dorset x Hampshire crossbred ewes each, were bred to Hampshire rams during the 1957 breeding season. One ewe group was bred to a ram in an air conditioned barn, approximately 70°F. The other group was bred to a ram having access to shade outside the barn. All ewes were run together on pasture and had access to shade.

There was essentially no difference in the average lambing dates of the ewes bred to the air conditioned ram and the ewes bred to the ram outside; however, the ewes bred to the air conditioned ram dropped 14 percent more lambs and weaned 9 percent more. The crossbred ewes dropped a higher percent lamb crop but fewer lambs survived to weaning time. There was no difference in the average lambing dates of the purebred Hampshire and the crossbred ewes.

5. USEFULNESS OF FINDINGS (Benefits to Agriculture and the general public and contributions to science):

The results are in agreement with results obtained the past 2 years and indicate that environmental conditions in eastern North Carolina may affect summer fertility of rams.

6. WORK PLANNED FOR NEXT YEAR: In the summer of 1958 purebred Hampshire and Dorset Hampshire crossbred ewes were randomized into early and late breeding units, of 18 crossbred and 6 Hampshire ewes each. The early breeding season will be from July 6th to sept. 15th and the late breeding season from Oct. 15th to Dec. 26th. Two Polled Dorset rams will be used. Half of the ewes from each breeding unit will be bred to each ram. In addition to regular breeding and lambing data carcass data will be obtained.
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

None

8. Prepared by George L. Ellis

Approved \_\_\_\_\_

Director

Date Feb. 20, 1959

Date \_\_\_\_\_

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 60**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH, S-74, THE IMPROVEMENT OF BEEF CATTLE THROUGH BREEDING METHODS (S-10)**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry, N. C. Department of Agriculture**
3. PERSONNEL: **E. U. Billard, J. H. Gregory and E. R. Barrick**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

In the winter of 1958-59 twenty-one bulls and thirty-one heifer calves completed 168 day post-weaning rate of gain tests. Average daily gains for the bulls was 1.32 and for the heifers 1.28. Within group variation was greater in the bulls than in the heifers.

Pre-weaning and Post-weaning performance data were obtained on all progeny, and steers from both stations were fed and slaughtered. Carcass data including carcass grade, area of loin eye, coloring of fat, width of carcass, dressing per cent, length of round and carcass and shrinkage were taken. These data are being analyzed and correlations made of these different measurements.

The feedlot performance of a bull is a good indication as to what will be the performance of his progeny if managed under similar conditions.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): **Results from this project has been used in setting up the State Performance Testing Program and Post-weaning Performance Testing Program.**
6. WORK PLANNED FOR NEXT YEAR: **The Program is being reoriented to cover other aspects of beef cattle breeding. The revised project has been approved by the S-10 Technical Committee and it has been submitted to the SESD for approval.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR: **The Relationship of Performance of Bulls to the Performance of their Progeny. J. H. Gregory, M.S. thesis N. C. State College Library.**

8. Prepared by J. H. Gregory Approved \_\_\_\_\_  
Date 3-10-60 Date \_\_\_\_\_  
(Director).

**NORTH CAROLINA**

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 1961**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **147, REPRODUCTIVE INEFFICIENCY IN THE BOVINE.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry and Zoology**
3. PERSONNEL: **H. A. Poston, J. A. Santolucito and L. C. Ulberg**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**Collection of detailed data on three state-owned herds has been continued. Analysis of these data indicates that there is a marked depression in reproductive efficiency during summer months. The change in the reproductive pattern, due to differences in months, vary between herds. This suggests that part of the variation is due to something other than physiological factors. Heat detection is emerging as an important management problem.**

**Extracts of the bovine hypothalamus interferes with pregnancy when injected into rats. The stage of development of the embryo may be important in the effectiveness of the injections.**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**An understanding of possible physiological causes for low reproductive performance may permit their control. If causes are due to errors in management, an understanding of those causes will permit proper correction of errors.**

6. WORK PLANNED FOR NEXT YEAR:

**This study will be continued. There is still not available a suitable system of heat detection.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**Poston, H. A., L. C. Ulberg and J. A. Santolucito. The effect of hypothalamic lipids on the reproductive system. Journal of Animal Science. 19:1334. 1960 (Abstract)**

8. Prepared by L. C. Ulberg Approved \_\_\_\_\_ (Director).  
Date 2/18/62 Date \_\_\_\_\_

**N C H-147 Anim Indus Reproductive Inefficiency in the Bovine**

1. STATE 2. PROJ. NO. 3. DEPT. 4. ABBREV. TITLE  
 7. TITLE, PROJECT OBJECTIVES AND DESCRIPTION OF WORK PROPOSED

5. REF.  
 6. X-REF.

**REPRODUCTIVE INEFFICIENCY IN THE BOVINE** -- To determine the nature of sterility in animals which leave herds because of failure to reproduce. To produce experimentally conditions of lowered fertility comparable to those produced spontaneously. Propose and test treatments which may increase reproductive efficiency.

**DESCRIPTION OF WORK**

This study is an attempt to determine more precisely some of the major causes of low reproduction in the bovine by close observations of herds under normal farm conditions. Cows culled because of reproductive failure will be brought to a control point for further detailed observations. Once a major factor is determined as the cause, this factor will be studied in detail.

|                             |            |     |     |          |     |      |            |                    |                 |                               |            |
|-----------------------------|------------|-----|-----|----------|-----|------|------------|--------------------|-----------------|-------------------------------|------------|
| 8. INDICATE TYPE OF PROJECT | HATCH<br>X | RRF | AMA | NON-FED. | NEW | REV. | MAR-KETING | 9. DURA-TION<br>62 | 10. COOPERATION | 11. APPROVAL DATES<br>9-16-57 | 12. X-REF. |
|-----------------------------|------------|-----|-----|----------|-----|------|------------|--------------------|-----------------|-------------------------------|------------|

|                  |                        |                         |  |          |
|------------------|------------------------|-------------------------|--|----------|
| 13. STATE<br>N C | 14. PROJ. NO.<br>H-147 | 15. DEPT.<br>Anim Indus | 16. ABBREV. TITLE<br>Reproductive Inefficiency in the Bovine | 17. REF. |
|------------------|------------------------|-------------------------|--|----------|

18. RECOMMENDED FOR APPROVAL

| TITLE  | SIGNATURE | DATE |
|--|-----------|------|
| SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR<br>PROJECTS PREVIOUSLY APPROVED BY SESD |           |      |
|  |           |      |
|  |           |      |
|  |           |      |
|  |           |      |

19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

20. FEDERAL-GRANT PROJECTS ONLY--TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONS: Complete Items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under Item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
 Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
 AGRICULTURAL RESEARCH SERVICE  
 STATE EXPERIMENT STATIONS DIVISION

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19<sup>59</sup>

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH H-147, REPRODUCTIVE INEFFICIENCY IN THE BOVINE.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry and N. C. Institutional Breeding Program**
3. PERSONNEL: **H. A. Poston, J. C. Osborne, J. A. Santolucito and L. C. Ulberg**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):  
(See attached sheet)

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**Better understanding of factors contributing to low fertility should help alleviate erroneous culling of cows which fail to settle, particularly when those factors are errors in management.**

6. WORK PLANNED FOR NEXT YEAR: **This work will be continued with emphasis upon dysfunctions of the endocrine system.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None**

8. Prepared by L. C. Ulberg Approved \_\_\_\_\_  
Date \_\_\_\_\_ Date \_\_\_\_\_  
(Director)



4. Problems in managing the herd, which include determination of estrus; insemination technique and failure to determine the presence of an embryo are important factors which contribute to lowered reproductive performance. These mask the factors which cause deviations in physiology.

A total of 36 cows have been culled because of low fertility and received at the sterility barn. Of these 27 have been slaughtered. The results of detailed observations indicated some reasons for culling cows: 1) seven arrived pregnant; 2) six have ovarian cysts, therefore abnormal endocrine systems; 3) five had abnormal estrous cycles or for other reasons were not inseminated. Of nine cows inseminated after a normal length estrous cycle 5 resulted in pregnancies, two more pregnancies resulted from second service. Only two cows with no detectable abnormalities failed to settle after 2 services in the "sterility herd".

Indications of an abnormal endocrine system seems to be the most frequent factor as a cause of low fertility in this group of cows. Only one cow was consistently a positive reactor to Vibrio fetus. No other organisms were detected. Five cows with ovarian cysts were successfully treated with progesterons to cause normal estrous cycles. There is some indication that the lipid fraction of the hypothalamus from these cows may interfere with estrus in the rat.

Routine observations on matings in the College Dairy herds resulted in the following:

Results of Insemination during 1958 (34-41 days gestation)

|             | First Service |            | Second Service |            | Third Service |            |
|-------------|---------------|------------|----------------|------------|---------------|------------|
|             | No.           | % of total | No.            | % of total | No.           | % of total |
| Insem.      | 154           |            | 75             |            | 38            |            |
| Diag. Preg. | 82            | 53.2       | 34             | 45.3       | 16            | 42.1       |
| Diag. Open  | 19            | 12.3       | 5              | 14.7       | 2             | 5.3        |
| Preg. lost  | 3             | 1.9        | 2              | 5.9        | 2             | 5.3        |

For June, July and August Only

|             |    |      |   |      |   |      |
|-------------|----|------|---|------|---|------|
| Insem       | 17 |      | 9 |      | 5 |      |
| Diag. Preg. | 5  | 29.4 | 3 | 33.3 | 3 | 60.0 |
| Diag. Open  | 7  | 41.2 | 1 | 11.1 | 1 | 20.0 |
| Preg. lost  | 0  |      | 0 |      | 0 |      |

There is relatively little loss of embryos after 34-41 days into the gestation period. Some factor associated with season may be responsible for embryo loss during the first 34-41 days of the gestation period.

North Carolina AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 58

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): Hatch 147, REPRODUCTIVE INEFFICIENCY IN THE BOVINE.
2. DEPARTMENTS AND COOPERATING AGENCIES: Department of Animal Industry
3. PERSONNEL: L. C. Ulberg, J. C. Osborne
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

This project was recently approved. Facilities for handling "problem cows" have been made available. Arrangements have been made to accumulate a herd of such animals for study.

Palpations, per rectum, are being made in an attempt to determine causes for extended calving intervals in dairy cows. Most cows will exhibit estrus and be in breeding condition by 70 days post partum. Also pregnancies which go to 34 - 42 days post breeding seem to be past the most critical stage of gestation. The greatest loss of potential young occurs prior to this time.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

None

6. WORK PLANNED FOR NEXT YEAR:

Attempts will be made to determine causes for cows being removed from herds due to reproductive failure.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

None

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_

L. C. Ulberg

(Director).

Date

March 4, 1958

Date

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 60**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH, 147, REPRODUCTIVE INEFFICIENCY IN THE BOVINE**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry**
3. PERSONNEL: **H. A. Poston, R. M. Myers, J. A. Santolucito and L. C. Ulberg**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):
  - a) Detail studies on cows culled because of reproductive failure does not yield any specific major cause for such culling. This phase of the study has been de-emphasized during the year in order to give more attention to other factors involved.
  - b) Two herds, about 100 cows per herd, have been added to the system of weekly palpations. The interval from calving to successful insemination is increased by 1) post-partum anestrus 2) failure to return to estrus. Both of these factors could be influenced by the method of checking for estrus.
  - c) A review of ten years records of breeding performance for six herds in NCIBP a variation in calving interval due to season. Examination of 2451 individual records revealed that the month of freshening had an effect on the subsequent calving interval. A maximum average interval of 422 days was observed for cows freshening in May after which there occurred a monthly decline to a minimum of 397 days for cows freshening in October. The record for each herd showed similar patterns.
  - d) Extracts of hypothalamic tissue from low fertility cows continue to have a depressing effect on uterine weights of bioassay animals.
5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): **Systems of management which will shorten the calving interval, such as more precise determination of estrus, will certainly increase efficiency of production.**
6. WORK PLANNED FOR NEXT YEAR: **Work will be continued on systems of estrus detection and further studies on hypothalamic extract from cattle.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR: **Poston, H. A.; R. M. Myers and L. C. Ulberg. Seasonal fluctuations in reproductive efficiency of dairy cattle. Proc. Sou. Agr. Workers Conf. 1960. (Abstract).**
8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
Date \_\_\_\_\_ Date \_\_\_\_\_ (Director).

SES—Form 8  
(June 12, 1957)

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 60**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH, H-150, IMPROVEMENT OF SWINE BY SELECTION AND BREEDING PROCEDURES. 1. SELECTION FOR BACKFAT THICKNESS IN SWINE**
2. DEPARTMENTS AND COOPERATING AGENCIES: **N. C. Experiment Station, N. C. Department of Agriculture and Department of Experimental Statistics.**
3. PERSONNEL: **D. G. Spruill, E. U. Billard, C. C. Cockerham and J. L. Rea, Jr.**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked): **Twelve gilts from the selection group averaged farrowing 8.75 pigs per litter while eight gilts from the control group farrowed 6.62 pigs per litter. Backfat score (backfat probe corrected for weight) was slightly in favor of the selected group (.0079 for selected vs. .0082 for control).**

Twelve gilts and four boars were selected on backfat score from the selection herd and eight gilts and four boars were randomly selected from the control population to continue the groups.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): **This project has not been in progress long enough for valid conclusions to be reached. There is, however, some evidence indicating that selection against backfat can be effective.**
6. WORK PLANNED FOR NEXT YEAR: **The project will be continued as outlined.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  
**None**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
Date \_\_\_\_\_ Date \_\_\_\_\_ (Director).

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 59**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH H-150, IMPROVEMENT OF SWINE BY SELECTION AND BREEDING PROCEDURES I. SELECTION FOR BACKFAT THICKNESS IN SWINE.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **N. C. Experiment Station, N. C. Department of Agriculture and Department of Experimental Statistics**
3. PERSONNEL: **E. U. Dillard, A. J. Clawson, E. R. Barrick, C. C. Cockerham and J. L. Rea, jr.**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

Twenty spring and 17 fall litters were farrowed from Red line gilts maintained in a closed herd at the Tidewater Research Station. Gilts and boars were selected for the second year on the basis of backfat thickness and from a randomly selected population. The selection differential averaged 0.4 inches of backfat. One hundred forty fall pigs were slaughtered for carcass comparisons.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

This project has not been in progress long enough to allow an analysis of the data.

6. WORK PLANNED FOR NEXT YEAR:

Continuation of selection based on backfat thickness and a randomly selected control group.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

8. Prepared by A. J. Clawson Approved \_\_\_\_\_

(Director).

Date February 19 1959 Date \_\_\_\_\_

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 1961

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **H-150, IMPROVEMENT OF SWINE BY SELECTION AND BREEDING PROCEDURES. 1. SELECTION FOR BACKFAT THICKNESS IN SWINE.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **N. C. Department of Agriculture.**
3. PERSONNEL: **E. U. Dillard, G. W. Robison, J. E. Logates**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**In the spring of 1960 seven litters in the control population and 12 litters in the population under selection for low backfat were farrowed. Some pigs of all litters except one in the control population survived for measurement and selection at approximately 5 months of age. Sixteen boars and 20 gilts were measured in the control population and 29 boars and 30 gilts in the population under selection. As in the previous years there was a difference in the means of the two populations in backfat thickness indicating that selection has been effective in reducing backfat thickness. Boars and gilts for the 1961 generation were selected according to plan.**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**Evidence continues to indicate that selection for lower backfat thickness is effective. There is no indication that rate of gain was affected. Farmers have shown much interest in these results.**

6. WORK PLANNED FOR NEXT YEAR:

**This project will be continued as planned for 1961 at which time a critical review will determine whether or not it shall be continued for further generations.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None**

8. Prepared by E. U. Dillard Approved \_\_\_\_\_ (Director).

Date 3-23-61 Date \_\_\_\_\_

N C H-150 Anim Indus Improvement of Swine by Selection and Breeding

1. STATE 2. PROJ. NO. 3. DEPT. 4. ABBREV. TITLE  
 7. TITLE, PROJECT OBJECTIVES AND DESCRIPTION OF WORK PROPOSED

5. REF.  
 6. X-REF.

**IMPROVEMENT OF SWINE BY SELECTION AND BREEDING PROCEDURES. I. SELECTION FOR BACKFAT THICKNESS IN SWINE** -- To measure the effectiveness of selection for backfat thickness in a closed population. To estimate the relative importance of heredity and environment in the variability of backfat thickness and other characteristics of swine. To study the response of other characteristics to selection for backfat thickness.

DESCRIPTION OF WORK

Selection will be practiced for lowered backfat thickness in swine within a closed population. Selections will be made upon the basis of backfat thickness weight ratio as determined by probing the live animals at approximately five months of age. The population under selection will consist of twelve sows and four boars with gilts being selected one from each litter and the boars each from a separate litter.

A random control group will be maintained of the same breed group. The random population will consist of eight females and four males with each litter contributing a gilt to the future population and the boars will be separated one each from four litters.

|                             |               |            |  |          |     |      |            |             |                 |                    |            |
|-----------------------------|---------------|------------|--|----------|-----|------|------------|-------------|-----------------|--------------------|------------|
| 8. INDICATE TYPE OF PROJECT | HATCH         | RRF        | AMA  | NON-FED. | NEW | REV. | MAR-KETING | 9. DURATION | 10. COOPERATION | 11. APPROVAL DATES | 12. X-REF. |
| X                           |               |            |  |          |     |      |            | 62          |                 | 10-3-57            |            |
| 13. STATE                   | 14. PROJ. NO. | 15. DEPT.  | 16. ABBREV. TITLE                              |          |     |      |            |             | 17. REF.        |                    |            |
| N C                         | H-150         | Anim Indus | Improvement of Swine by Selection and Breeding |          |     |      |            |             |                 |                    |            |

18. RECOMMENDED FOR APPROVAL

| TITLE   | SIGNATURE | DATE |
|---|-----------|------|
| SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR PROJECTS PREVIOUSLY APPROVED BY SESD |           |      |

19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

20. FEDERAL-GRANT PROJECTS ONLY--TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C.

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONS: Complete items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
 Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
 AGRICULTURAL RESEARCH SERVICE  
 STATE EXPERIMENT STATIONS DIVISION

COVER-ABSTRACT-SIGNATURE PAGE FEDERAL-GRANT & NON-FEDERAL PROJECTS

SES—Form 8  
(June 12, 1957)

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 60**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH, 165, EVALUATION OF CHANGES IN QUANTITATIVE TRAITS UNDER SELECTION IN MICE (ST-H-165) (U.S.F. Grant 8986)**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Dept. of Animal Industry**
3. PERSONNEL: **C. W. Young, R. H. Miller, J. E. Legates**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked): **The selection experiment has continued and data are now available on the first 18 generations of selected mice. Data for the first 15 generations of selection are being analyzed and a first draft of the results has been prepared.**

**Cross-nursing studies were continued during the year to obtain information on cross-nursed mice. These data have been transferred to I.B.M. cards for analyses.**

**A diallel mating experiment is in progress, and marker stocks homozygous for color have been developed for use in proposed artificial insemination studies.**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):  
**None at this time, pending final appraisal of data now being analyzed.**
6. WORK PLANNED FOR NEXT YEAR:  
**Selection lines are to be continued. The diallel experiment to estimate non-additive genetic components to be completed. Work on adopting techniques for artificial insemination is to be initiated.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  
**Cox, D. F., J. E. Legates and C. C. Cockerham. Maternal Influence on Body Weight. Jour. Anim. Sci. 18:519-527. 1959.**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
Date \_\_\_\_\_ Date \_\_\_\_\_  
(Director).



NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 61**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **165, EVALUATION OF CHANGES IN QUANTITATIVE TRAITS UNDER SELECTION IN MICE.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry, National Science Foundation**
3. PERSONNEL: **J. E. Legates, R. H. Miller, B. J. Moore, O. W. Robison, J. W. Smith**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**Four additional generations of selection were completed during the year, but no definite changes were evident in the lines selected for high six-week weight, high twelve-day weight or low twelve-day weight. There was a slight but continuing decline in the line selected for low six-week weight. Reverse selection has also been initiated in each of the four selection lines.**

**Cross nursing studies have been continued to assess the intra-relationship between growth performance and maternal performance. Growth prior to weaning does not appear to be closely associated with postnatal maternal performance. Growth during the post weaning period (three to six weeks) is apparently positively related genetically to maternal performance. However, a negative genetic association was consistently indicated between later growth (six to eight weights) and maternal performance.**

**Two diallel mating experiments have been carried out to obtain an estimate of the non-additive genetic variance that would be influencing the traits which are under selection. The special feature of the diallel matings (non's)**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**The selection results thus far have generally substantiated selection theory and given support to probable effectiveness of selection in our larger mammals for several generations.**

6. WORK PLANNED FOR NEXT YEAR:

**Work on artificial insemination will be continued and special matings are planned using mixed semen from two males with coat color genes as markers. Intrauterine competition between the different genotypes and non-additive genetic variance should be assessed with a reasonable success once the technique is perfected. All selection lines will also be continued.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**Young, C. W. and J. E. Legates. Genetic and Lactational Influences on Growth and Maternal Traits (Abstract) Jour. of Animal Science 19:1230-1231.**

8. Prepared by J. E. Legates Approved \_\_\_\_\_ (Director).

Date 1-11-61 Date \_\_\_\_\_

4. (con't)

is an attempt to estimate the sire by dam interaction component of variance free of possible series interaction effects. Data on approximately three thousand individual mice now have been compiled and are being analyzed.

Work has been initiated with artificial insemination. In this exploratory work successful inseminations have been obtained and the perfection of technique is progressing.

**N C H-165 Anim Indus Evaluation of Changes in Quantitative Traits Under Selection in Mice**

1. STATE 2. PROJ. NO. 3. DEPT. 4. ABBREV. TITLE  
7. TITLE, PROJECT OBJECTIVES AND DESCRIPTION OF WORK PROPOSED

5. REF.  
6. X-REF.

**EVALUATION OF CHANGES IN QUANTITATIVE TRAITS UNDER SELECTION IN MICE--**

To ascertain the usefulness of additively genetic, non-additively genetic, maternal, and environmental variances for characterising the response of 12-day litter weight and 6-week weight to selection. To assess the genotypic and environmental interrelationships between lactation performance, based on 12-day litter weight, and individual 6-week weight.

**DESCRIPTION OF WORK**

Four long inbred lines of mice were crossed to produce a four-way cross population that could be reconstituted as selection progressed. The individuals produced from this four-way cross of inbred mice were inter-mated to provide a variable foundation stock for initiation of selection. The traits being studied in these lines are the 12-day weight of a litter of six mice which is being used to measure lactational and maternal performance of the females, and the six weeks weight of the mice representing a measure of growth response. A randomly selected line is also being maintained as a control.

Cross nursing experiments are carried out in which each dam in a group of three dams littering on the same day, nurses two of her own offspring and two offspring from each of the two remaining dams. The possibilities of transplanting fertilized ova from several matings into one pseudo-pregnant female, and of inseminating a female with semen from several males are being investigated as techniques to aid in the evaluation of maternal environment.

|                             |               |                 |  |            |
|-----------------------------|---------------|-----------------|--|------------|
| 8. INDICATE TYPE OF PROJECT | 9. DURATION   | 10. COOPERATION | 11. APPROVAL DATES   | 12. X-REF. |
| I                           | 64            |                 | 7-1-59   |            |
| 13. STATE                   | 14. PROJ. NO. | 15. DEPT.       | 16. ABBREV. TITLE  | 17. REF.   |
| N C                         | H-165         | Anim Indus      | Under Selection in Mice<br>Evaluation of Changes in Quantitative Traits/ |            |

18. RECOMMENDED FOR APPROVAL

| TITLE   | SIGNATURE | DATE |
|---|-----------|------|
| SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR PROJECTS PREVIOUSLY APPROVED BY SESD |           |      |

19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION

|           |      |
|-----------|------|
| SIGNATURE | DATE |
|           |      |

20. FEDERAL-GRANT PROJECTS ONLY--TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C.

|           |      |
|-----------|------|
| SIGNATURE | DATE |
|           |      |

INSTRUCTIONS: Complete Items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under Item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
STATE EXPERIMENT STATIONS DIVISION

COVER-ABSTRACT-SIGNATURE PAGE FEDERAL-GRANT & NON-FEDERAL PROJECTS

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 60**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH, 167, IMPROVEMENT OF DAIRY CATTLE THROUGH SELECTION (S-3) (ST-N-167) (Disc. Gifts Holstein-Friesian) (Disc. Gifts Amer. Breeders Service)**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Department of Animal Industry, N.C. Institutional Breeding Program, The Holstein Friesian Association of America**
3. PERSONNEL: **J. E. Legates, E. H. Myers**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**a. Performance of State-owned Herds**

Production for cows freshening in 1958 increased over those freshening in 1957. The 630 completed records averaged 14,600 M., 3.6% and 530F. on a 305-day, 2 x, M.E. basis.

A major feature of the work with the state-owned herds is an evaluation of the feasibility of sampling young bulls to provide all of the future proved bulls to be used in the program. Twenty-six young bulls have been selected for sampling and proofs on the first 11 of these young bulls are now available. The 229 daughters of all of these 11 young bulls averaged +155 lbs. M., -.02% and +4 lb. F. as compared to their herd mates. The herd mates were the other animals, mostly sired by naturally proved sires, freshening in the same year and season as the daughters of the young bulls.

Three of the young bulls were returned to regular service in the breeding program. The 68 daughters of these bulls average +1221 M., -.01%

(see attached sheet)

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):  
**Nothing to add to statement presented in last year's report.**
  
6. WORK PLANNED FOR NEXT YEAR: **All phases of project work are to be continued. The addition of an analysis for protein is planned in connection with the work on solids-not-fat. A summary of the first ten years of work with the state-owned herds in North Carolina is in progress.**
  
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  
**Tucker, W. L., J. E. Legates and E. H. Farthing. A. I. Sires Help Production. Research and Farming, N. C. Agric. Expt. Sta. 18:12. 1959.**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director).

Date \_\_\_\_\_ Date \_\_\_\_\_

4. (Continued)

and 28 F. as compared to their herd mates. Subsequently, two of these three bulls have been sold to artificial breeding associations, and their use in the breeding program continued through frozen semen.

b. Solids-Not-Fat

During the year work with solids-not-fat was initiated with the cattle in the state-owned herds. The Watson lactometer procedure has been used to determine the solids-not-fat. The 3400 monthly samples, all from Holsteins, averaged 8.77% solids-not-fat and 3.70% fat.

c. Selection-Control Herd

Three years of data have been obtained since this phase of work was undertaken. Twelve bulls have been used in the control herd during the past four years and seven heifers sired by the control bulls have now freshened. Additional data will be required before a reasonable statement on the progress of this study can be made.

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 1961**  
(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **167 (S-3), IMPROVEMENT OF DAIRY CATTLE THROUGH SELECTION.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Department of Animal Industry, N. C. Institutional Breeding Program, The Holstein-Friesian Assn. of America**
3. PERSONNEL: **J. E. Legates, R. M. Myers, J. R. Aldridge and J. W. Smith.**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked): **During the year 634 lactations of cows in state-owned Holstein herds which freshened in 1959 were completed with an average 305-day, 2X, M. E. production of 14567M, 3.69% and 537F. Fat percentage was .06% and fat yield was 7 lb. above the previous year; while the milk yield was 34 lb. less than for 1958.**

**A total of 4,384 lactation records from the state-owned herds were studied to assess possible effects of high production during the first 90 days of lactation on the number of days the cow was open during that 305-day lactation. The relationship was studied separately for 1,125 first and 3,259 second or later lactations. In both groups of data 90-day production accounted for less than 0.5 percent of variance in days open. Hence, on the basis of the measures studied there was no evidence for an important influence of production on fertility.**

**The number of days open and the number of days dry were also studied to determine the advisability of accounting for variance resulting from their influences on 305-day milk production in compiling sire proofs. The number**

5. USEFULNESS OF FINDINGS (Benefit to the culture and the general public and contributions to science): **Results of the sire sampling program with the state-owned herds has stimulated much interest in the initiation of such programs in major A.L. studs throughout the United States. Services to three sires proved in the project are now available for general use through a commercial stud.**

6. WORK PLANNED FOR NEXT YEAR: **All phases of project activity are to be continued. Following preliminary work on the technique, protein analysis on monthly milk samples will be obtained in addition to the fat and solids-not fat content.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**Tucker, W. L., J. E. Legates and B. R. Farthing. Genetic Improvement in Production Attributable to Sires Used in Artificial Insemination in North Carolina. J. Dairy Sci. 43:982-987. 1960.**

(con't)

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director).

Date \_\_\_\_\_ Date \_\_\_\_\_

4. (con't)

of days open during the lactation significantly influenced production, and 7 and 4 percent of the variance in 305-day milk yields was accounted for in first and second or later lactations respectively. However, the number of days dry preceding the lactation had little influence on either days open or 305-day production. It accounted for less than 0.5 and 0.1 percent of the variance in these variables respectively.

The genetic correlations between days dry, days open and 305-day milk production were low and non-significant. In these data correcting production for days dry and days open should not disturb the genetic variation in production. On the basis of these results no adjustment of production for dry period is suggested, but appropriately accounting for the influence of days open should aid in the detection of genetic differences in production among individual cows and progeny groups.

In the study of solids-not-fat 507 lactations of 305-days or less have been compiled. All of these are for Holsteins and the average solids-not-fat content on a lactation basis was 8.72 percent. A summary of individual monthly values for solids-not-fat percentages in relation to days in milk showed a trend closely paralleling that for fat percent. The initial monthly value was high showing a sharp decline the second month and rising again by the seventh month in lactation.

5. (con't)

Work with solids-not-fat, while in its preliminary states, has stimulated interest in this program and provided a basis for answers to questions arising in our state.

7. (con't)

Legates, J. E. Genetic and Environmental Factors Affecting the Solids-not fat Composition of Milk. J. Dairy Sci. 43:1527-1532. 1960

N C M-167 Anim Indus Improvement of Dairy Cattle Through Selection

1. STATE 2. PROJ. NO. 3. DEPT. 4. ABBREV. TITLE  
 7. TITLE, PROJECT OBJECTIVES AND DESCRIPTION OF WORK PROPOSED 5. REF.  
 6. X-REF.

**IMPROVEMENT OF DAIRY CATTLE THROUGH SELECTION** -- To assess the improvement in production that can be realized from selection in a dairy herd using artificial insemination with an unselected group maintained for comparison. Evaluate the effectiveness of a program of sampling young bulls to provide selected proved sires for the development of highly productive Holsteins adapted to North Carolina conditions. Investigate the influence of environmental factors on the solids-not-fat and total solids content of milk, to determine the repeatability and heritability of these milk constituents, and to evaluate the genetic and phenotypic relationships between these milk constituents and milk yield.

DESCRIPTION OF WORK

A Holstein herd of 40 lactating females has been equally divided into a selection group and an unselected control group. Animals in both groups are managed as a unit. Sires from the North Carolina Institutional Breeding Program (NCIBP), representative of sires generally available to a dairyman, are used to breed the selection group. Sires to breed the control groups are randomly selected from within the herd using three sires per year to reduce inbreeding.

An appraisal of the effectiveness of a program of sampling young bulls and the research on milk constituents is being conducted with state-owned Holstein herds having 600 lactating females. These animals are bred to sires in the NCIBP stud, and about 25 percent of the animals are bred to young bulls. A special supervisor obtains the information on milk constituents during monthly visits to these herds.

|                             |       |     |     |          |     |      |           |             |                 |                    |            |
|-----------------------------|-------|-----|-----|----------|-----|------|-----------|-------------|-----------------|--------------------|------------|
| 8. INDICATE TYPE OF PROJECT | HATCH | REF | ANA | NON-FED. | NEW | REV. | MARKETING | 3. DURATION | 10. COOPERATION | 11. APPROVAL DATES | 12. X-REF. |
|                             | X     | S-3 |     |          |     |      |           | 69          |                 | 7-1-59             |            |

13. STATE 14. PROJ. NO. 15. DEPT. 16. ABBREV. TITLE 17. REF.  
 N C M-167 Anim Indus Improvement of Dairy Cattle Through Selection

18. RECOMMENDED FOR APPROVAL

| TITLE   | SIGNATURE | DATE |
|---|-----------|------|
| SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR PROJECTS PREVIOUSLY APPROVED BY SESD |           |      |

19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION

|           |      |
|-----------|------|
| SIGNATURE | DATE |
|-----------|------|

20. FEDERAL-GRANT PROJECTS ONLY--TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C.

|           |      |
|-----------|------|
| SIGNATURE | DATE |
|-----------|------|

INSTRUCTIONS: Complete Items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under Item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
 Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
 AGRICULTURAL RESEARCH SERVICE  
 STATE EXPERIMENT STATIONS DIVISION



NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 60**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH, H-188, EFFECT OF AMBIENT TEMPERATURES UPON EARLY EMBRYO LOSS IN SHEEP (8-29) (ST-H-188) (Misc. Gift FRS Ulberg)**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry Department, N.C. Agri. Exp. Sta. and The Division of General Medical Sciences, U.S. Public Health Service as Grant No. RG-5458(C1).**
3. PERSONNEL: **C. W. Alliston, G. L. Ellis and L. C. Ulberg**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):  
**This project was initiated during the year to replace previous existing projects. The following data were collected:**  
  
**A. A total of 68 purebred Dorset or Hampshire ewes were used during July and August 1959, in an attempt to determine the effect of changes in ambient temperatures at the time of mating. At the time of estrus a ewe was allotted to one of three groups: (a) Chambers maintained at 70°F.; (b) Chamber maintained at 90°F. or (c) Variable outside temperature but in the shade. A ewe assigned to the chamber groups remained there for 18 days or until return to estrus, whichever occurred first. A series of rectal temperatures and respiration rates were recorded for each ewe on the third day post mating. The average rectal temperatures were 101.6; 104.4 and 103.6 degrees F. for group a; b and c respectively. Respiration rates were 28; 125 or 83 respirations per minute for group a; b or c respectively. A mating was considered successful providing there was no return to estrus by 65 days post mating. Two ewes in each chamber group died because of respiratory infection. (See attached sheet)**
5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): **These data suggest that at least part of the problem of low reproductive performance of sheep during periods of high temperature may be due to failure somewhere prior to such embryo development. It should logically follow that anything which will keep sheep cooler during the breeding season may improve reproduction during hot weather.**
6. WORK PLANNED FOR NEXT YEAR: **The project will be continued with emphasis on attempts to determine more precisely the point in the reproductive process where high temperatures are detrimental.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  
**a) Alliston, C. W. and L. C. Ulberg. The influence of Ambient Temperature on Early Pregnancy Loss as Determined by Embryo Transfer. Journal Animal Science, 18: 1550. 1959 (Abstract).**  
**b) Film: Thirteen minute 16 mm color "Embryo Transfer in Sheep"**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director).

Date \_\_\_\_\_ Date \_\_\_\_\_

## 4. (Continued)

| Treatment Group | No. of Ewes | <u>Summary</u>                             |   |
|-----------------|-------------|--|---|
|                 |             | Successful Matings from 1st & 2nd Services | Ewes with Long Return Cycles (25-61 days) |
| 70°F.           | 23          | 17   | 1   |
| 90°F.           | 24          | 5  | 13  |
| Outside         | 21          | 14   | 0   |

- B. Embryo transfer was used to determine more precisely the affect of temperature. Ambient temperatures had no apparent effect upon ovulation rate. High temperatures did appear to interfere with fertilization, development of ova and survival of transferred embryos. More embryos survived the transfer when recovered from oviducts of females kept at 70°F. They survived equally well when placed in uteri of females kept at 70°F. or 90°F. There is no indication of a harmful effect when hormones were used to synchronize reproductive cycles or to increase ovulation rate.

| Ambient Temperature of Donor | <u>Summary</u>       |                  |                          |                            |
|------------------------------|----------------------|------------------|--------------------------|----------------------------|
|                              | Ovulations / females | Ova / Ovulations | Embryo Transferred / Ova | Embryo Survival / Transfer |
| 70°F.                        | 58/39                | 45/55            | 38/45                    | 20/38                      |
| 90°F.                        | 55/35                | 37/52            | 23/37                    | 2/23                       |

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 1961  
(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **H-188 (S-29), EFFECT OF AMBIENT TEMPERATURES UPON EARLY EMBRYO LOSS IN SHEEP.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry Department and The Division of General Medical Sciences, U. S. Public Health Service as Grant**
3. PERSONNEL: **C. W. Alliston, C. O. Woody, C. L. Ellis, Samuel Cooke and L. C. Ulberg.** 26-3458(C2)
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

There were significantly less transferred embryos surviving in uteri of females maintained in an ambient temperature of 70°F. when the embryo originated in females maintained at 90°F. as compared with embryos which originated in females maintained at 70°F. This indicated that the damage to the embryo had occurred prior to the time it entered the uterus. There remained the possibility of a partial uterine effect. Two years results are not consistent, in that one year the uteri of ewes maintained at 90°F. supported embryo growth while the next year they did not.

The following experiment was conducted during the year to determine more precisely when an animal could be subjected to high temperatures without interfering with the potential pregnancy. The interval from 12 days post-estrus to 3 days after the end of the subsequent estrus was divided into three periods. The animals were artificially inseminated, 12- 24 hours after the beginning of the second estrus, with semen from rams kept at 65°F. Flacing ewes in high environmental temperature for one period had no harmful effect. A technique has been developed for transfer of unclaved eggs.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

Although embryos appear to be normal, microscopically, at the time they enter the uterus there has been irreversible damage due to high ambient temperatures. Not all physiological mechanisms which bring about embryonic death are acting through the uterine environment but some are acting through other mechanisms (cont)

6. WORK PLANNED FOR NEXT YEAR

Embryo transfers will be continued, with the transfers being made both before and after fertilization but before cleavage. Ewes will be placed in the control chambers at very precise times during the period of early embryonic development.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

Alliston, C. W. The influence of ambient temperature on early pregnancy loss as determined by embryo transfer. Ph.D. thesis. North Carolina State College Library. 1960.

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director).  
Date \_\_\_\_\_ Date \_\_\_\_\_

5. (con't)

which are antecedent to the entrance of the embryo into the uterus, but yet permits death to occur in the uterus.

7. (con't)

Alliston, C. W. and L. C. Wiberg. Early pregnancy loss in sheep at ambient temperatures of 70°F. and 90°F. J. An. Sci. 19:1316. 1960. (Abstract)

Alliston, C. W. and L. C. Wiberg. Summer sterility. Res. and Farming. 28:5. 1960.

N C H-188 Ania Indus Effect of Ambient Temperature Upon Early Embryo  
Loss in Sheep

1. STATE 2. PROJ. NO. 3. DEPT. 4. ABBREV. TITLE  
7. TITLE, PROJECT OBJECTIVES AND DESCRIPTION OF WORK PROPOSED

5. REF.  
6. X-REF.

**EFFECT OF AMBIENT TEMPERATURE UPON EARLY EMBRYO LOSS IN SHEEP --** To determine physiological effects of ambient temperature and humidity upon the loss of potential young. To study relationship between intra-uterine environment and early embryonic development as affected by external conditions. To determine the effects of inter-uterine environmental conditions upon the nourishment of the early embryo.

DESCRIPTION OF WORK

Embryos are to be transferred from the oviducts of ewes maintained at one environment temperature to the uteri of ewes maintained at another environment to establish the point in development where damage occurs. Once this point is established, possible physiological mechanisms will be studied.

|                             |               |            |   |         |     |      |            |             |                 |                    |            |
|-----------------------------|---------------|------------|---|---------|-----|------|------------|-------------|-----------------|--------------------|------------|
| 8. INDICATE TYPE OF PROJECT | HATCH         | RRF        | AMA   | NON-FED | NEW | REV. | MAR-KETING | 9. DURATION | 10. COOPERATION | 11. APPROVAL DATES | 12. X-REF. |
|                             | X             |            | S-29  |         |     |      |            | 62          | NIH             | 7-20-59            |            |
| 13. STATE                   | 14. PROJ. NO. | 15. DEPT.  | 16. ABBREV. TITLE   |         |     |      | 17. REF.   |             |                 |                    |            |
| N C                         | H-188         | Ania Indus | Effect of Ambient Temperature Upon Early Embryo/<br>Loss in Sheep |         |     |      |            |             |                 |                    |            |

18. RECOMMENDED FOR APPROVAL

TITLE

SIGNATURE

DATE

SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR  
PROJECTS PREVIOUSLY APPROVED BY SESD

19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION

SIGNATURE

DATE

20. FEDERAL-GRANT PROJECTS ONLY-TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C.

SIGNATURE

DATE

INSTRUCTIONS: Complete items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
STATE EXPERIMENT STATIONS DIVISION

COVER-ABSTRACT-SIGNATURE PAGE FEDERAL-GRANT & NON-FEDERAL PROJECTS

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 1961

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **198, (S-10) GENETIC AND ENVIRONMENTAL INTERACTIONS FOR PERFORMANCE AND CARCASS TRAITS IN BEEF CATTLE.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **N. C. Department of Agriculture, N. C. State Hospital Board of Control**
3. PERSONNEL: **E. U. Dillard, J. H. Gregory, J. E. Legates, O. W. Robison**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**1960 was the first year of operation of this project which replaced Project S-74 (RR-S-10). Frozen semen from three purebred Hereford bulls was used to inseminate the Hereford cows at Raleigh, Laurel Springs, Plymouth and Butner. A total of 241 cows were inseminated. Percentage of conceptions on the basis of palpations were: Butner 88; Laurel Springs 71, Plymouth 60, Raleigh 46. Only at Butner was there a technician employed by the farm unit.**

**In the three herds at Plymouth, Raleigh and Laurel Springs 1960 calves were graded and weighed at approximately 120 days of age and at weaning. Post weaning performance-on-feed tests were initiated at each of these locations. To introduce new blood into the herds a set of half sib calves (6 bulls and 4 heifers) were purchased in Virginia at weaning and included in the feed tests at Raleigh.**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**This project, only initiated in 1960, is a long time project and answers to the objectives will be several years in the future. The answers whether negative or positive could markedly influence selection procedures in beef cattle.**

6. WORK PLANNED FOR NEXT YEAR:

**Approximately 250 head of cows will be inseminated in 1961 and the first slaughter data on the bull progenies and fattened under different environments will be obtained. For 1961 a trained technician will be available at each location to do the inseminating.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_

(Director).

Date \_\_\_\_\_ Date \_\_\_\_\_

1. STATE 2. PROJ. NO. 3. DEPT. 4. ABBREV. TITLE 5. REF. 6. X-REF.

7. TITLE, PROJECT OBJECTIVES AND DESCRIPTION OF WORK PROPOSED  
**GENETIC AND ENVIRONMENTAL INTERACTIONS FOR PERFORMANCE AND CARCASS TRAITS IN BEEF CATTLE** -- To evaluate the importance of sire-by-location interaction for performance traits. To evaluate sire by location and ration interaction for gain and carcass characteristics of steer progeny. To develop and evaluate selection criteria for the improvement of productive efficiency and market quality.

DESCRIPTION OF WORK

Making use of four herds in three rather distinct geographical areas of the state and by using artificial insemination data will be collected on pre- and post weaning performance of beef animals to measure possible interactions between genotype and environment. Progeny of the bulls at each location will be weighed and graded at approximately four months of age and at weaning. Heifer calves will be put on a 140 day post weaning gain tests. Sample steer progeny of each sire will be fed out in feed lot and on pasture without grain feeding. Carcass data will be obtained on these steers. Culling of cows within herds will be based upon productivity and progeny performance. Culling of replacement animals will be based upon their own performance plus that of their sire and dam.

|                             |       |      |     |          |     |      |           |             |                 |                    |            |
|-----------------------------|-------|------|-----|----------|-----|------|-----------|-------------|-----------------|--------------------|------------|
| 8. INDICATE TYPE OF PROJECT | HATCH | RRF  | AMA | NON-FED. | NEW | REV. | MARKETING | 9. DURATION | 10. COOPERATION | 11. APPROVAL DATES | 12. X-REF. |
|                             | X     | S-10 |     |          |     |      |           | 70          |                 | 4-12-60            |            |

|           |               |            |  |          |
|-----------|---------------|------------|--|----------|
| 13. STATE | 14. PROJ. NO. | 15. DEPT.  | 16. ABBREV. TITLE  | 17. REF. |
| N C       | 198           | Anim Indus | Performance and Carcass Traits in Beef Genetic and Environmental Interactions for/ |          |

|                              |           |      |
|------------------------------|-----------|------|
| 18. RECOMMENDED FOR APPROVAL |           |      |
| TITLE                        | SIGNATURE | DATE |
|                              |           |      |
|                              |           |      |
|                              |           |      |
|                              |           |      |
|                              |           |      |
|                              |           |      |

SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR PROJECTS PREVIOUSLY APPROVED BY SESD

19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION  
 SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

20. FEDERAL-GRANT PROJECTS ONLY--TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C.  
 SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

INSTRUCTIONS: Complete items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
 Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
 AGRICULTURAL RESEARCH SERVICE  
 STATE EXPERIMENT STATIONS DIVISION

**NORTH CAROLINA**

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 61**  
(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **207, EVALUATION OF TWO METHODS OF SELECTING FOR PERFORMANCE IN SWINE.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Department of Animal Industry and North Carolina State Hospital Board of Control.**
3. PERSONNEL: **O. W. Robison and J. E. Legates**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**One hundred and twenty animals (ten females and two males from each of ten herds) were purchased to establish the purebred herds. The animals from each herd were allotted at random to the appropriate foundation units. Initial matings were made in the purebred herds in October, 1960. Following these matings, the Duroc boars were introduced into the crossbred population. Thus, the first round of testing boars for their combining ability with the crossbred population is now underway.**

**Data, as indicated in the project outline, are being collected on the present crossbred population. These data will be used as a reference point as to the present status of the crossbred population. Presently, information has been collected on approximately 500 pigs.**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): **This project has just been initiated, therefore, there are no results to report.**

6. WORK PLANNED FOR NEXT YEAR: **Continue as indicated in the project outline.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_ (Director).  
Date 9/2/61 Date \_\_\_\_\_



N.C. 207 Anim Indus Evaluation of Two Methods of Selecting for Performance in Swine

1. STATE 2. PROJ. NO. 3. DEPT.  
4. ADDRESS, T. L. C.

5. REF.  
6. X-REF.

**EVALUATION OF TWO METHODS OF SELECTING FOR PERFORMANCE IN SWINE** --Study the relative efficiency of selection based on intra-breed performance with selection based on crossbred performance in improving litter size, weight-for-age and carcass merit in a two breed rotation. Evaluate the magnitude of sire-herd, sire-season and selection method-herd interactions.

DESCRIPTION OF WORK

Two herds each of purebred Duroc and Yorkshire swine are being used to compare two methods of selecting for performance in swine. One herd of Durocs and one herd of Yorkshires are being selected on the basis of individual performance whereas males from the remaining Duroc and Yorkshire herds are used for production of both purebred and crossbred progenies and selection among purebred sire families is based on performance of their crossbred half-sibs. Performance is evaluated on the basis of litter size, weight-for-age and carcass merit. The two systems are to be continuously compared on the basis of the performance of the crossbred (two breed rotation) offspring of boars produced through the two systems of selection.

|                             |       |      |     |          |     |      |           |             |                 |                   |            |
|-----------------------------|-------|------|-----|----------|-----|------|-----------|-------------|-----------------|-------------------|------------|
| 8. INDICATE TYPE OF PROJECT | HATCH | REF. | AMA | NON-FED. | NEW | REV. | MARKETING | 9. DURATION | 10. COOPERATION | 11. APPROVAL DATE | 12. X-REF. |
| X                           |       |      |     |          |     |      |           | 66          |                 | 4-21-60           |            |

13. STATE N.C. 14. PROJ. NO. 207 15. DEPT. Anim Indus 16. ABBREV. TITLE Evaluation of Two Methods of Selecting for/ Performance in Swine 17. REF.

18. RECOMMENDED FOR APPROVAL  
TITLE SIGNATURE DATE

SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR PROJECTS PREVIOUSLY APPROVED BY SESD

19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION  
SIGNATURE DATE

20. FEDERAL GRANT PROJECTS ONLY - TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C.  
SIGNATURE DATE

INSTRUCTIONS: Complete items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
STATE EXPERIMENT STATIONS DIVISION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 61  
(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **210, IMPROVEMENT OF FERTILITY FROM THE USE OF ARTIFICIAL INSEMINATION IN SWINE AND SHEEP.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Interdepartmental - Dorothea Dix Hospital Farm**
3. PERSONNEL: **R. M. Myers, L. C. Ulberg, J. E. Legates, G. W. Robison**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**I. Sheep**

(a) Natural service was compared with artificial insemination in the college flock. Nineteen ewes were bred naturally. Six lambed to first service (31%), one aborted a single fetus and one died without returning to service. Eight lambs were dropped. Sixteen ewes were bred artificially. Nine lambed to first service (56%), producing 11 lambs. All ewes were bred approximately 12 hours after the detection of estrus.

(b) Twenty-four ewes which had not exhibited previous signs of estrus were injected with hormones and 23 were inseminated artificially. Eleven (46%) lambed. Fifteen lambs were dropped - a 65% lamb crop.

(c) Fifty-nine ewes maintained in controlled temperature chambers under four different treatments were inseminated artificially with semen from rams kept in an air-conditioned pen. Thirty-six (61%) lambed to first service. Fifty-six lambs were dropped.

(con't)

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**Synchronization of estrus coupled with satisfactory fertility levels from artificial insemination in sheep will make it possible to breed more ewes to better rams and will allow the lamb crop to arrive at a pre-determined time. If semen storage procedures designed to retain fertility over long periods**

(con't)

6. WORK PLANNED FOR NEXT YEAR:

**The work with sheep will be continued with the college and Tidewater flocks. Field trials involving synchronization of estrus and artificial insemination are planned through the cooperation of flocks in Grange Co. An attempt will be made to store ram semen at -320°F. without impairing its fertilizing**

(con't)

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**R. M. Myers, H. Pati and L. C. Ulberg. Reconstituted Buttermilk as a Diluent for Frozen Bull Semen Storage.**

**This paper has been approved by the Director and has been submitted to the Journal of Dairy Science for publication.**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director).

Date 3/29/61 Date \_\_\_\_\_

4. (con't)

(d) Thirty-two ewes, 23 of which had returned to natural service, were inseminated artificially. Only 5 of these (16%) lambed to the first artificial service.

(e) At the Tidewater Research Station, 58 ewes were injected with hormones in an attempt to synchronize estrus. Forty-eight were bred artificially. Eight (17%) lambed. Ten lambs were dropped.

II. Swine

| Treatment       | No. Bred | No. Conceived | Avg. No. Ovulations | Avg. No. Embryos |
|-----------------|----------|---------------|---------------------|------------------|
| Nat'l service   | 4        | 2             | 20                  | 13               |
| AI-Fresh Semen  | 4        | 2             | 16.5                | 12               |
| AI-Stored Semen | 2        | 1             | 12                  | 3                |

A satisfactory collection procedure and insemination techniques have been developed in swine. A heated milk diluent gave longer sperm life under laboratory storage conditions than did one composed of egg yolk and sodium citrate. Motility of boar spermatozoa has been retained following freezing to -320°F but was not maintained for even a short storage interval. Detection of heat in the sow is a time-consuming task and results are not wholly accurate.

5. (cont)

can be developed, semen collected in the cooler seasons of the year can be used during the summer, thus avoiding the effects of seasonal sterility in the ram. If not, air-conditioning may provide similar results.

Once it has been determined that the techniques of artificial insemination using undiluted semen in swine produce results that are comparable to natural service, steps can be taken to develop diluents which will increase the volume as well as the storage life of boar semen, thus permitting more adequate use of superior sires.

6. (cont)

capacity. In swine, more fertility information will be obtained through a comparison of services using undiluted and diluted semen. The technique of artificial insemination will be applied to a breeding swine herd maintained on the Fincrest Farm. Diluents and handling procedures leading to long-term storage will be explored.

N.C. 210 Anim Indus Improvement of Fertility from Use of Artificial Insemination

1. STATE 2. PROJ. NO. 3. DEPT. 4. ABBREV. TITLE  
7. TITLE, PROJECT OBJECTIVES AND DESCRIPTION OF WORK PROPOSED  
IMPROVEMENT OF FERTILITY FROM THE USE OF ARTIFICIAL INSEMINATION IN SWINE AND SHEEP -- Attain a more satisfactory level of fertility from the use of artificial insemination in swine and sheep through studies of the contributory effects of: semen collection techniques, semen dilution media and preservation methods, and insemination techniques.

5. REF.  
6. X-REF.

DESCRIPTION OF WORK

Collection techniques for the ram and the boar have been developed which produce a satisfactory ejaculate of viable semen from each. This undiluted semen has been used for artificial insemination in both species and results have been good when compared with natural service. Other studies will involve a comparison of undiluted with diluted semen and attempts will be made to preserve it at low temperatures for long periods of time. This work will include field trials under farm conditions.

|                              |               |            |   |           |     |      |            |             |                 |                    |            |
|------------------------------|---------------|------------|---|-----------|-----|------|------------|-------------|-----------------|--------------------|------------|
| 8. INDICATE TYPE OF PROJECT  | HATCH         | RRF        | AMA   | NON-FED.  | NEW | REV. | MAR-KETING | 9. DURATION | 10. COOPERATION | 11. APPROVAL DATES | 12. X-REF. |
|                              | X             |            |   |           |     |      |            | 65          |                 | 6-17-60            |            |
| 13. STATE                    | 14. PROJ. NO. | 15. DEPT.  | 16. ABBREV. TITLE   |           |     |      |            | 17. REF.    |                 |                    |            |
| N.C.                         | 210           | Anim Indus | Insemination Improvement of Fertility from Use of Artificial/ |           |     |      |            |             |                 |                    |            |
| 18. RECOMMENDED FOR APPROVAL |               |            |   |           |     |      |            |             |                 |                    |            |
| TITLE                        |               |            |   | SIGNATURE |     |      |            | DATE        |                 |                    |            |

SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR  
PROJECTS PREVIOUSLY APPROVED BY SEED

|   |  |  |  |  |  |  |  |      |  |  |  |
|---|--|--|--|--|--|--|--|------|--|--|--|
| 19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION   |  |  |  |  |  |  |  |      |  |  |  |
| SIGNATURE   |  |  |  |  |  |  |  | DATE |  |  |  |
| 20. FEDERAL-GRANT PROJECTS ONLY-TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C. |  |  |  |  |  |  |  |      |  |  |  |
| SIGNATURE   |  |  |  |  |  |  |  | DATE |  |  |  |

INSTRUCTIONS: Complete Items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under Item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
STATE EXPERIMENT STATIONS DIVISION

COVER-ABSTRACT-SIGNATURE PAGE FEDERAL-GRANT & NON-FEDERAL PROJECTS

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 60**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **STATE, S-215, THE RELATIONSHIP OF A CONTROLLED ENDOCRINE SYSTEM TO REPRODUCTIVE EFFICIENCY**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Dept. of Animal Industry**
3. PERSONNEL: **C. W. Alliston, George Ellis, L. C. Ulberg**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked): **The work during the last year has been limited to sheep given 14 daily injections of 10 mg. progesterone followed by one injection of 750 IU pregnant mare serum (PMS) administered 48 hours after the last progesterone:**
  - a) **Synchronization of estrus in ewes with active ovaries: Time of onset of estrus was determined in 108 individuals. All but 2 animals were in estrus within 24 hours of the predicted time. The other two were in estrus early. Ovulations ranged from 1-4 ova. There was no indication that normality of ova were altered.**
  - b) **Animals approaching the end of the anestrus period: Forty-eight ewes were divided into two groups: 1) control and 2) treated. Nineteen of the treated ewes were in estrus and bred at the predicted time of which 15 lambed and had 23 lambs. Sixteen of the control ewes were bred over a 16-day period of which 13 ewes settled and produced 14 lambs.**
5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): **This system of ovarian control will allow:**
  - a) **increased rate of twinning; 2) terminate the anestrus period and 3) have a high percentage of the ewes to lamb very near a pre-determined date.**
6. WORK PLANNED FOR NEXT YEAR: **This system will be studied further.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  
**None**
8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
Date \_\_\_\_\_ Date \_\_\_\_\_  
(Director).

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 1961  
(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **212, THE EFFECT OF LEVEL OF TOTAL NUTRIENT AND PROTEIN INTAKE ON REPRODUCTIVE PERFORMANCE OF GILTS AND LIVABILITY OF THEIR OFFSPRING.**
  2. DEPARTMENT AND COOPERATING AGENCIES: **Animal Industry and Experimental Statistics.**
  3. PERSONNEL: **A. J. Clawson, E. R. Barrick, G. Matrone, M. B. Wise, W. W. G. Smart, Jr.**
  4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked): **Ninety six gilts (48 fall and 48 spring litters) have been used to study the energy and protein needs of gestation. The gilts were divided by littermate groups and bred to four ration treatments with two replications. The experimental design was a 2x2 factorial in which energy and protein levels were studied. The energy levels were 3 and 6 lbs. of feed per day with either 0.3 or 1.2 lb. of protein. The work is not completed with the spring litters. Data obtained with the fall litters showed that gilts fed at the 3 and 6 lb. level gained an average of 80 and 160 lbs. each during gestation. They farrowed 10.3 and 9.5 pigs and weaned 8.7 and 7.7 pigs, respectively. There was no significant difference in litter weight or in average weight per pig farrowed associated with either energy or protein level fed. Gilts fed 0.3 and 1.2 lb. of protein per day farrowed 9.7 and 10.1 pigs and weaned 7.8 and 8.5 pigs, respectively.**
  5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):  
**At present the National Research Council recommendation is 6 lbs. of feed per day and 0.9 lbs. of protein for bred gilts. If the results of this research can be substantiated, a considerable saving to swine producers can be realized.**
  6. WORK PLANNED FOR NEXT YEAR: **The work will be repeated with the first litter gilts which will be carried for second litters to obtain information on the carry-over effect of feeding the low energy and low protein diets.**
  7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  
**M. S. Theads - David Griffin Spruill. 1960. The use of Dehydrated and Pelleted Forage Meals and Pasture in Gestation Diets of Gilts.  
Spruill, D. G., A. J. Clawson and E. R. Barrick. 1961. The use of Dehydrated and Pelleted Forage Meals in Gestation Diets of Gilts. A. I. Report #66. A. H. Series #55.**
  8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director)
- Date **March 27, 1961** Date \_\_\_\_\_

N.C. 212 Anim Indus The Effect of Level of Total Nutrient and Protein Intake on Reproduction of Gilts, etc.

1. STATE 2. PROJ. NO. 3. DEPT. 4. ABBREV. TITLE  
7. TITLE, PROJECT OBJECTIVES AND DESCRIPTION OF WORK PROPOSED

THE EFFECT OF LEVEL OF TOTAL NUTRIENT AND PROTEIN INTAKE ON REPRODUCTIVE PERFORMANCE OF GILTS AND LIVABILITY OF THEIR OFFSPRING — Determine the effect of varying protein and total nutrient intake during gestation; on growth and reproductive performance of gilts; on livability and performance of the offspring.

5. REF.  
6. X-REF.

DESCRIPTION OF WORK

A 2 x 2 factorially designed experiment was conducted to study the energy and protein needs of gestating gilts. The gilts were started on test at the time of breeding and were fed either 3 or 6 lbs. of total feed daily. Gilts receiving each feeding level received either 0.3 or 1.2 pounds of protein daily. Weight gain during gestation, total pigs farrowed, live pigs farrowed, birth weight, weaning weight and number of pigs weaned were used as measurement criteria.

|                             |               |            |   |          |     |      |            |             |                 |                    |            |
|-----------------------------|---------------|------------|---|----------|-----|------|------------|-------------|-----------------|--------------------|------------|
| 8. INDICATE TYPE OF PROJECT | HATCH         | RRF        | AMA   | NON-FED. | NEW | REV. | MAR-KETING | 9. DURATION | 10. COOPERATION | 11. APPROVAL DATES | 12. X-REF. |
|                             | X             |            |   |          |     |      |            | 63          |                 | 7-6-60             |            |
| 13. STATE                   | 14. PROJ. NO. | 15. DEPT.  | 16. RECOMMENDED FOR APPROVAL  |          |     |      |            |             |                 |                    | 17. REF.   |
| N.C.                        | 212           | Anim Indus | Protein Intake on Reproduction of Gilts, etc.<br>The Effect of Level of Total Nutrient and/ |          |     |      |            |             |                 |                    |            |

SECTIONS 18, 19, AND 20 NOT APPLICABLE FOR  
PROJECTS PREVIOUSLY APPROVED BY SESD

|   |      |
|---|------|
| 19. APPROVAL OF DIRECTOR, AGRICULTURAL EXPERIMENT STATION   |      |
| SIGNATURE   | DATE |
| 20. FEDERAL-GRANT PROJECTS ONLY—TO BE APPROVED BY STATE EXPERIMENT STATIONS DIVISION, WASHINGTON, D. C. |      |
| SIGNATURE   | DATE |

INSTRUCTIONS: Complete items 1, 2, 3, 7, 8, 9, 10, 18, and 19. Under item 7, show title in CAPS, itemize objectives and leave space between the objectives and description of work proposed. Forward original of this form with required number of project outlines to State Experiment Stations Division, Washington, D. C. (See reverse side for Essentials of an Experiment Station Project Outline.)

SES Form 20  
Dec 1960

U. S. DEPARTMENT OF AGRICULTURE  
AGRICULTURAL RESEARCH SERVICE  
STATE EXPERIMENT STATIONS DIVISION

COVER—ABSTRACT—SIGNATURE PAGE FEDERAL-GRANT & NON-FEDERAL PROJECTS

North Carolina Agricultural Experiment Station

## FINAL REPORT, FEDERAL-GRANT PROJECTS

(Send 3 copies to State Experiment Stations Division, ARS, at time of closing)

&amp; RR-S-10

1. PROJECT (Fund, number and title): **S-46/ The Development of Beef Cattle Especially Adapted to the Coastal Plain Region of North Carolina.**
2. STATION DEPARTMENTS AND COOPERATING AGENCIES (e.g., USDA, TVA, etc.): **Agricultural Research Service (APH) and Animal Industry.**
3. MAJOR PERSONNEL: **E. U. Dillard, J. H. Gregory and E. R. Barrick**
4. DATE BEGUN: **1946** DATE COMPLETED: **JUNE 1959**  
(If discontinued without completion state reasons): **Forest grazing work was discontinued and the lease for the range from West Virginia Pulp and Paper Co. was terminated.**
5. ESTIMATED TOTAL COST BY FUNDS (Federal-grant and others): **\$10,000.**
6. THE PROBLEM (Briefly restate its nature, importance, and economic significance):  
**The performance of the British breeds of beef cattle in the hot and wet areas of Eastern North Carolina, with high insect infestation, is very low. A breed was needed that could withstand the heat and insects of this area and also produce acceptable carcass characteristics.**
7. ABSTRACT MAJOR RESULTS AND CONCLUSIONS:
  - (1) **Calves with some Brahman or Africander breeding exhibited superior performance to those of strictly English breeding.**
  - (2) **The product of crossing  $F_1$  (Brahman x Hereford or Africander x Hereford x Angus) was not as high in performance as the  $F_1$ 's. The  $F_2$ 's were very low in vigor.**
  - (3) **A three breed rotational cross may prove of value in maintaining vigor and performance.**



8. USEFULNESS OF FINDINGS (Present or potential - to other scientists - farmer acceptance - economic value to agriculture - other ):

**The use of cattle with some Brahman or Africander breeding will produce more beef in the Coastal Plain region of North Carolina.**

**More favorable conditions are needed for growth of replacement animals than are afforded under the range conditions.**

9. CITATION OF PUBLICATIONS (Issued and/or in manuscript form):

10. Prepared by J. H. Gregory Approved \_\_\_\_\_ (Director)  
(Sign original only)

Date Feb. 20, 1959 Date \_\_\_\_\_

~~NORTH CAROLINA~~ AGRICULTURAL EXPERIMENT STATION  
~~ANNUAL PROGRESS REPORT~~ <sup>NOV</sup> FEDERAL-GRANT PROJECTS, 19 ~~61~~  
(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **S-45. SYSTEMS OF BREEDING FOR THE PRODUCTION OF MARKET LAMBS IN THE APPALACHIAN MOUNTAIN AREA OF NORTH CAROLINA.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry, Statistics and the North Carolina Department of Agriculture.**

3. PERSONNEL: **Lemuel Goode, George L. Ellis, E. R. Barrick, H. A. Stewart,**

4. RESEARCH ASSISTANTS OF THE YEAR (Confidential information should be so marked):

**The 1960 lamb crop was obtained from the following ewe groups:**

- (a) Western ewes (Hampshire x Rambouillet) bred to Hampshire rams.  
(b) Native crossbred ewes (originating in 1946 from a foundation of grade Hampshire ewes bred to mutton type rams in rotation (Shropshire, Corriedale, Southdown, Hampshire, Columbia, Suffolk, Dorset) bred to Corriedale rams.  
(c) Crossbred ewes (maintained as a purebred Hampshire unit from 1946 to 1955, and since 1955 bred to mutton type rams in rotation (Suffolk, Dorset) bred to Corriedale rams.

The native crossbred ewes, group B, dropped and weaned more lambs than either of the other ewe groups. The 120 day lamb weights and grades were similar in all ewe units. Western ewes produced heavier fleeces than ewes in the other groups.

Each ewe group (a, b, c.) was sub-divided into early (August, September) and late (November, December) breeding units. There was no difference between the early and late bred units in over-all ewe productivity. However, this is the first time that late breeding has failed to show an advantage over early breeding since the project was initiated.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**Results to date show that crossbreeding is highly advantageous in commercial lamb production. The performance of native crossbred ewes has been at least equal to that of Western ewes provided the native ewes were sired by rams from the larger, more prolific mutton breeds. The lower breeding efficiency of early bred ewes indicates that summer environment adversely affects reproduction in sheep even at high elevations in N. C. Western**

**This project will be continued through the 1961 lambing season as described in the project outline.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None.**

8. Prepared by Lemuel Goode Approved \_\_\_\_\_ (Director).

Date March 28, 1961 Date \_\_\_\_\_

1945-46 THE DEVELOPMENT OF BEEF CATTLE  
ESPECIALLY ADAPTED TO THE COASTAL PLAIN REGION OF NORTH CAROLINA  
Animal Industry and  
Agricultural Research Service (APR)

H. W. Billard, J. H. Gregory, E. E. Barrick

Brahman-Herford, Africander-Angus-Herford, grade Herford and Home Carolina Groups were again compared under the unfavorable environmental conditions at the Frying Pan Experimental Range. A small group of Home Carolina's were moved to the Range about the first of May. All calves were sold as veal. Some of the calves were sold light and did not demand top veal prices. Again the Brahman-Herford calves resulting from mating an  $F_2$  bull with  $F_1$  and  $F_2$  cows did not perform as well as other groups.

There were not enough Home Carolina calves at the Range to give any comparison with the other groups.

The calves with some Brahman or Africander breeding exhibited superior performance to those of strictly English breeding under the unfavorable range conditions of eastern North Carolina. Due to the lack of vigor in the  $F_2$  crosses, a three breed cross may be of value.

The Brahman-Herford, Africander-Angus-Herford and grade Herford groups were sold and this project discontinued. The Home Carolina group was moved to a private farm and will be tested under farm conditions in the Tidewater section of North Carolina.

Home

(Continued)

ANNUAL REPORT

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION PROJECTS

2. PROJECT (name, date, and title): **8-46 THE DEVELOPMENT OF BEEF CATTLE ESPECIALLY ADAPTED TO THE COASTAL PLAIN REGION OF NORTH CAROLINA**  
 Animal Industry and  
 3. DEPARTMENT AND COOPERATING AGENCY: **Agricultural Research Service (ARS)**

4. PERSONNEL: **B. V. Dillard, J. R. Gregory, E. R. Barrick**

5. SUMMARY OF THE IMPORTANCE OF THE YEAR'S WORK (all important information should be so marked):

**Brahman-Herford, Africander-Angus-Herford, grade Herford and Bone Carolina groups were again compared under the unfavorable environmental conditions at the Frying Pan Experimental Range. A small group of Bone Carolina's were moved to the Range about the first of May. All calves were sold as veal. Some of the calves were sold light and did not demand top veal prices. Again the Brahmans-Herford calves resulting from mating an  $F_2$  bull with  $F_1$  and  $F_2$  cows did not perform as well as other groups.**

**There were not enough Bone Carolina calves at the Range to give any comparison with the other groups.**

6. USEFULNESS OF FINDINGS (Beneficial to agriculture and the general public and contributions to science):

**The calves with some Brahman or Africander breeding exhibited superior performance to those of strictly English breeding under the unfavorable range conditions of eastern North Carolina. Due to the lack of vigor in the  $F_2$  crosses, a three breed cross may be of value.**

7. CONCLUSIONS FOR NEXT YEAR:

**The Brahman-Herford, Africander-Angus-Herford and grade Herford groups were sold and this project discontinued. The Bone Carolina group was moved to a private farm and will be tested under farm conditions in the Tidewater section of North Carolina.**

8. PUBLIC DEBTS INCURRED OR MONIES RECEIVED DURING THE YEAR:  
**None**

9. Prepared by \_\_\_\_\_ APPROVED \_\_\_\_\_  
 (Director)

Date: \_\_\_\_\_

2-43 - SYSTEMS OF BREEDING FOR THE PRODUCTION OF  
MARKET LAMBS IN THE APPALACHIAN MOUNTAIN AREA OF NORTH CAROLINA  
Animal Industry, Statistics and the North  
Carolina Department of Agriculture

3. BREEDERS: Lounel Coode, E. H. Barrick, R. A. Stewart, C. G. Cockerham and  
O. F. Fagans  
(The names of the breeders should be so printed).

The 1937 lamb crop was obtained from three ewe groups, 16 ewes per group, bred as follows:

- Southern ewes (Hampshire x Rambouillet) bred to Hampshire rams.
- Purebred Hampshire ewes bred to Dorset rams.
- Native crossbred ewes (Shropshire x Corriedale x Southdown x Hampshire x Columbia) bred to Dorset rams.

The Southern ewes weaned a 162 percent lamb crop averaging 81.3 lbs. per lamb at 120 days. The average fleece weight per ewe was 8.1 lbs. The Native crossbred ewes weaned a 158 percent lamb crop with an average 120 day lamb weight of 78.1 lbs. and an average fleece weight per ewe of 8.9 lbs. Only 61 percent of the Hampshire ewes lambing as compared to 100 percent for the other ewe groups. The Hampshire ewes weaned a 54 percent lamb crop averaging 74.4 lbs. at 120 days. The average fleece weight per ewe was 6.1 lbs.

Each of the ewe groups, a, b and c, were evenly divided into early, Aug. and Sept., and late, Nov. and Dec., breeding units. The early bred ewes weaned a 112 percent lamb crop and the late bred ewes weaned a 146 percent lamb crop. The early lambs averaged 5.2 lbs. heavier at 120 days and graded approximately 1/3 of a grade higher than the late lambs.

CONCLUSIONS: The results of this investigation indicate that the use of crossbred ewes is highly beneficial in commercial lamb production and that, in western North Carolina and similar areas, late breeding (Nov. and Dec.) is more desirable than early breeding (Aug. and Sept.)

The results indicate that the use of crossbred ewes is highly beneficial in commercial lamb production and that, in western North Carolina and similar areas, late breeding (Nov. and Dec.) is more desirable than early breeding (Aug. and Sept.)

6. SUMMARY: The project will be continued as outlined in the original breeding plan.

7. PUBLICATION: ISSUE OF REPORT TO BE DETERMINED AT THE END OF THE YEAR:  
None

8. APPROVED: \_\_\_\_\_ approved \_\_\_\_\_  
(Director)

Date: \_\_\_\_\_

4-43 - SYSTEMS OF BREEDING FOR THE PRODUCTION  
MARKET LAMBS IN THE APPALACHIAN MOUNTAIN AREA OF NORTH CAROLINA  
Animal Industry, Statistics and the North  
Carolina Department of Agriculture

Lamuel Coode, H. H. Barrick, R. A. Stewart, C. C. Cockerhan and  
J. F. Tamm

The 1937 lamb crop was obtained from three ewe groups, 15 ewes per group, bred as follows:

- (a) Eastern ewes (Hampshire x Rambouillet) bred to Hampshire Rams.
- (b) Purebred Hampshire ewes bred to Dorset Rams.
- (c) Native crossbred ewes (Shropshire x Corriedale x Southdown x Hampshire x Columbia) bred to Dorset Rams.

The Western ewe weaned a 162 percent lamb crop averaging 81.3 lbs. per lamb at 120 days. The average fleece weight per ewe was 8.1 lbs. The Native crossbred ewe weaned a 136 percent lamb crop with an average 120 day lamb weight of 78.1 lbs. and an average fleece weight per ewe of 8.9 lbs. Only 82 percent of the Hampshire ewes lambed as compared to 100 percent for the other ewe groups. The Hampshire ewes weaned a 54 percent lamb crop averaging 74.4 lbs. at 120 days. The average fleece weight per ewe was 6.1 lbs.

Each of the ewe groups, a, b and c, were evenly divided into early, Aug. and Sept., and late, Nov. and Dec., breeding units. The early bred ewes weaned a 112 percent lamb crop and the late bred ewes weaned a 146 percent lamb crop. The early lambs averaged 5.1 lbs. heavier at 120 days and graded approximately 1/3 of a grade higher than the late lambs.

The results indicate that the use of crossbred ewes is highly beneficial in commercial lamb production and that, in western North Carolina and similar areas, late breeding (Nov. and Dec.) is more desirable than early breeding (Aug. and Sept.)

The project will be continued as outlined in the original breeding plan.

None

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19 59**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **HATCH S-74, (S-10), THE IMPROVEMENT OF BEEF CATTLE THROUGH BREEDING METHODS.**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry, U. S. Department of Agriculture Research Series (APH)**
3. PERSONNEL: **J. H. Gregory, E. U. Dillard, M. B. Wise, E. R. Barrick and R. H. White**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

In the winter of 1957-58, sixteen bulls and twenty-four heifer calves completed 168 day post-weaning rate of gain tests. Average daily gain for the bulls was 1.52 and for the heifers 1.34. They were fed a higher roughage ration than in previous years. Within group variation was high in bulls but low in heifers.

Five bulls from the 1957-58 test were progeny tested in grade herds at two research stations in the state. Pre-weaning and post-weaning performance data were obtained on all progeny and steers from both stations were fed and slaughtered. Carcass data including carcass grade, area of loin eye, coloring of fat, width of carcass, dressing percent and length of round and carcass were taken.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

To determine the youngest age to predict the usefulness of a sire and to study the inheritance and correlations of certain economic characteristics.

6. WORK PLANNED FOR NEXT YEAR:

The project is being revised for next year, using the same bulls for the station herds and the purebred foundation herd. Artificial insemination will be practiced by using frozen semen for the outlying stations. Sire x location interaction will be studied and carcass data will be obtained from half sibs of the bulls being used.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

The Influence of Sex of Calf and Age of Dam on Six-month Weights of Beef Calves. Patterson, James W. M.S. Thesis, N. C. State College Library.  
Genetic and Environmental Relationships between Prenatal and Postnatal Growth in Beef Cattle. White, R. H. M.S. Thesis. N. C. State College Library.

8. Prepared by J. H. Gregory Approved \_\_\_\_\_ (Director).  
Date Feb 20 19 59 Date \_\_\_\_\_

NORTH CAROLINA

AGRICULTURAL EXPERIMENT STATION

**ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 1958**

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **STATE 147 (RR-S-29), EVALUATION OF CERTAIN FACTORS AFFECTING FERTILITY OF SHEEP IN THE TIDEWATER AREA OF NORTH CAROLINA.**

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

3. PERSONNEL: **E. U. Billard, J. C. Osborne, G. Matrone, L. Goode and J. L. Rea, Jr.**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

Two similar ewe breeding groups, consisting of equal numbers of purebred Hampshire and Dorset x Hampshire crossbred ewes, were bred to Hampshire rams during the 1956 breeding season. One ewe group was bred to a ram kept in an air conditioned barn, approximately 70° F., and the remaining group was bred to a ram having access to shade outside the barn. All ewes were run together on pasture and had access to shade.

A higher proportion of the ewes bred to the ram kept in an air conditioned barn settled first service and thus lambed earlier, av. lambing dates Dec. 16 and Jan. 11, than the ewes bred to the ram kept outside the barn. Other differences between ewe groups and differences between ewe breed were not significant.

During the 1957 breeding season the ram treatment was reversed so that the ram kept outside the barn during the 1956 breeding season was kept in the air conditioned barn. Once again lowering the environmental temperature of the ram has apparently resulted in more ewes settling early in the breeding season.

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

The results indicate that ram breed and environmental conditions affect summer fertility of rams.

6. WORK PLANNED FOR NEXT YEAR:

The project will be continued as in 1957 except that Dorset x Hampshire crossbred rams will be used.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**None**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director).

Date \_\_\_\_\_ Date \_\_\_\_\_



ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19\_\_\_\_  
(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **S-165, RESISTANCE TO MASTITIS IN DAIRY CATTLE**

2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry**

3. PERSONNEL: **J. G. Lecce, J. E. Legates, F. D. Sargent**

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**Information on clinical mastitis for 1041 lactations obtained since the beginning of the investigations were analyzed. Each of the four quarters of the udder appeared to be equally susceptible to an initial attack of mastitis. However, given a case of mastitis in a quarter the probability of the next case in that quarter is slightly higher than the probability of occurrence in another quarter. Mastitis incidence did not increase significantly just prior to drying off. However, the data did confirm the fact that there was a relatively high incidence of mastitis just subsequent to freshening; and further suggested that seasonal influences were not of major importance. Lactation mastitis scores were based on the fraction of the months in the lactation that clinical mastitis symptoms were observed. The heritability of this score using the daughter-dam regression was 0.22 - 0.16, and the corresponding repeatability value was 0.33 - 0.04.**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**Nothing in addition to what has been cited in previous reports.**

6. WORK PLANNED FOR NEXT YEAR:

**Information to be summarized and published. Anticipate termination of present project.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**Young, C. W., J. E. Legates and J. G. Lecce. Genetic and Phenotypic Relationships between Clinical Mastitis, Laboratory Criteria and Udder Height. Jour. Dairy Science. 43:54-62.**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director).

Date \_\_\_\_\_ Date \_\_\_\_\_

7. (Con't)

Sargent, Frank Dorrance. A Study of Certain Environmental and Genetic Aspects of Clinical Mastitis. M.S. Thesis. North Carolina State College Library.

North Carolina

AGRICULTURAL EXPERIMENT STATION

ANNUAL PROGRESS REPORT, FEDERAL-GRANT PROJECTS, 19\_\_\_\_

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **STATE S-165, RESISTANCE TO MASTITIS IN DAIRY CATTLE**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Dept. of Animal Industry**
3. PERSONNEL: **Frank Sargent, J. G. Leece, J. E. Legates, C. W. Young**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked): **Preliminary estimates of genetic and phenotypic relationships between clinical mastitis, laboratory criteria and udder height were computed for 416 lactations of 285 cows. Clinical mastitis information has now been obtained on 1040 lactations and more detailed genetic analysis of these data are now in progress. Information on lactation production, milking rates and udder height as related to the incidence of clinical mastitis have also been obtained and are now being studied. Results of these analysis are not yet available.**
5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science): **These results thus far definitely point up the importance of genetic influences on mastitis resistance or susceptibility. Our findings have substantiated the relationship between udder pendulousness and the incidence of clinical mastitis.**
6. WORK PLANNED FOR NEXT YEAR: **Completion of the analysis and reporting of the data collected during the past five years is anticipated. The work is to be reoriented following the completion of the analyses.**
7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  
**Young, C. W., J. E. Legates and J. G. Leece, "Mastitis Built in Resistance. Research and Farming 18 (1) 12. 1959.**  
**Leece, J. G. and J. E. Legates, Changes in the Paper Electrophoretic Whey-Protein Pattern of Cow with Acute Mastitis, Jour. Dairy Sci. 42:698-704. 1959.**
8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
(Director).  
Date \_\_\_\_\_ Date \_\_\_\_\_

5191

ANNUAL PROCESS REPORT

NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION STATE PROJECTS

1. PROJECT: (Fund, number, and title): **8-191 - A STUDY OF PERFORMANCE CHARACTERISTICS OF BEEF CATTLE AS RELATED TO THE PRESENCE OR ABSENCE OF THE GENES FOR RECESSIVE DWARFISM**
  2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry Department and North Carolina Department of Agriculture**
- PERSONNEL: **J. H. Gregory, E. U. Dillard, M. B. Wise, E. R. Barrick and W. H. Bailey**

RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**In the spring of 1957, eighteen known dwarf carrier cows were purchased and placed at the Upper Coastal Plain Research Station at Rocky Mount, North Carolina. One cow was found to be infected with leptospirosis and had to be removed from the herd. Only one bull was tested in the spring of 1957 due to the detection of leptospirosis in one cow. The remainder of the herd tested clean for leptospirosis on three tests at thirty day intervals.**

**There have been three calves dropped, that were sired by the bull being tested, one of which is a snorter dwarf.**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science.):  
**Establishing that the bull used was a known carrier for dwarfism. This will prevent the using of the bull in the foundation herd and also from using progeny of the bull in the other station herds.**

6. WORKED PLANNED FOR NEXT YEAR:  
**Two bulls will be tested in the spring of 1958 and body measurements will be taken on the calves that are presently being dropped. Insulin injections will be made and blood samples will be taken at .5, 1, 2, 4, and 6 hours after the injection for a white blood cell count.**  
**Any other leads that may result from this test will be investigated.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:  
**None**

8. Prepared by \_\_\_\_\_ Approved \_\_\_\_\_  
 (Director)

Date \_\_\_\_\_

ANNUAL PROGRESS REPORT FOR STATE SUPPORTED PROJECTS  
OF THE  
NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION  
(Three copies to be submitted to Director's Office)

1. PROJECT: (Fund, number, and title): **S-191 - A STUDY OF PERFORMANCE CHARACTERISTICS OF BRED CATTLE AS RELATED TO THE PRESENCE OR ABSENCE OF RECESSIVE DWARFISM**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry and N. C. Department of Agriculture**
3. PERSONNEL: **J. H. Gregory, M. B. Wise, E. U. Dillard, E. R. Barrick and W. H. Baile;**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

In 1958 one bull was tested for recessive dwarfism genes. Fifteen cows were bred and dropped 15 calves. One calf was dead at birth and appeared normal. Of the 14 calves born alive, 12 appeared normal, 1 was a suspected dwarf but without all characteristic features, and 1 was a typical snorter dwarf. Weights and grades of offspring were taken at birth and at 28 day intervals thereafter. During the breeding season of 1958 two bulls were bred to 16 cows (one cow died from hardware disease). Calves from these matings will be dropped soon.

5. USEFULNESS OF FINDINGS (Benefits to Agriculture and the general public and contributions to science):

Prevented the use of what is now known to be a dwarfism carrier bull in a purebred herd.

6. WORK PLANNED FOR NEXT YEAR:

Blood studies to measure the effects of insulin on white blood cell count are now being initiated. Other prospective herd sires will be tested and progeny tests will be completed.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

NONE

8. Prepared by M. B. Wise

Approved \_\_\_\_\_  
Director

Date Feb 20, 1959

Date \_\_\_\_\_

**ANNUAL PROGRESS REPORT, FEDERAL GRANT PROJECTS, 19** \_\_\_\_\_

(Three copies to be given to the SES examiner)

1. PROJECT (Fund, number, and title): **S-215. THE RELATIONSHIP OF A CONTROLLED ENDOCRINE SYSTEM TO REPRODUCTIVE EFFICIENCY**
2. DEPARTMENTS AND COOPERATING AGENCIES: **Animal Industry Department, N. C. Dept. of Agriculture**
3. PERSONNEL: **J. F. Dickey, L. C. Ulberg**
4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):

**The standard treatment of progesterone and PMS was further tested in sheep. The time of onset of estrus is extremely predictable. Artificial insemination was used on some females. The ovaries of immature ewe lambs will respond to the same treatment. Of five embryos produced by immature ewes one development to term when placed in the uterus of a mature ewe.**

5. USEFULNESS OF FINDINGS (Benefits to agriculture and the general public and contributions to science):

**Pre-determined breeding dates, and consequently lambing dates, are available when ovarian control, without harmful effects on fertility, are available.**

6. WORK PLANNED FOR NEXT YEAR:

**The system will be tested on the farm on a limited scale during the year.**

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

**L. C. Ulberg and C. E. Lindley. Use of progesterone and estrogen in the control of reproductive activities in beef cattle. J. An. Sci. 19:1132-1142. 1960.**

8. Prepared by *L. C. Ulberg* Approved \_\_\_\_\_ (Director).

Date *March 28, 1964* Date \_\_\_\_\_

Project Action Notification Form

DEPARTMENT: Animal Industry

PROJECT NO: State S-215

PROJECT TITLE: The Relationship of a Controlled Endocrine System  
to Reproductive Efficiency

ACTION TAKEN: Approved June 24, 1959

DATE: June 24, 1959

COMMENTS: Project S-200 is to be closed out and funds budgeted  
to S-200 are to be transferred to project S-215

CC: George Hyatt  
S. H. Kimball  
H. A. Stewart

THE RELATIONSHIP OF A CONTROLLED ENDOCRINE SYSTEM TO REPRODUCTIVE  
EFFICIENCY.



Department of Animal Industry  
NORTH CAROLINA STATE COLLEGE

MEMORANDUM

To Prof. Hyatt

George Ellis is to prepare close-out forms for 5-200-RRS-29 - He should be in Friday.

Dr. Barrick will sign the two attached projects for Prof. Goode if he does not return. He is expected Thursday PM or Friday.

Date \_\_\_\_\_

Signed: J. E. Regester

ATTACHED PAPERS

- \_\_\_\_\_ Please note and return.
- \_\_\_\_\_ Return with recommendations.
- \_\_\_\_\_ For your records.
- \_\_\_\_\_ Speak to me concerning.
- \_\_\_\_\_ Please handle.
- \_\_\_\_\_ Please answer.
- \_\_\_\_\_ Needs your signature.
- \_\_\_\_\_ For your approval.
- \_\_\_\_\_ Please give me all data.
- \_\_\_\_\_ Note and pass to next person.
- \_\_\_\_\_ Please reply, sending me a copy.

North Carolina

Agricultural Experiment Station

FINAL REPORT, FEDERAL-GRANT PROJECTS

(Send 3 copies to State Experiment Stations Division, ARS, at time of closing)

1. PROJECT (Fund, number and title): **S-200 -State - An Evaluation of Certain Factors Affecting Fertility of Sheep in the Tidewater Area of North Carolina.**

2. STATION DEPARTMENTS AND COOPERATING AGENCIES  
(e.g., USDA, TVA, etc.):

**Animal Industry Department and North Carolina Department of Agriculture.**

3. MAJOR PERSONNEL: **E. U. Dillard, J. C. Osborne, H. A. Stewart, Lenzel Goods, J. L. Rea, Jr.**

4. DATE BEGUN: **7/1/53** DATE COMPLETED: **7/1/59**  
(If discontinued without completion state reasons):

5. ESTIMATED TOTAL COST BY FUNDS (Federal-grant and others):  
**Regional Research (RR-S-29) - \$3,000; State (S-147, S-200) - \$9,800.**

6. THE PROBLEM (Briefly restate its nature, importance, and economic significance): **Because of the hot, humid weather and prevalence of internal parasites during the summer months in the Tidewater Area of North Carolina, it is important that the lambs be born early in order that they may be ready for market by April and May. Difficulties have been encountered in obtaining early lambs from purebred flocks. The objectives of this study was (1) to compare different breeds or strains of sheep as regards to (a) seasonal variations in oestrus cycle, (b) seasonal variations in date lambs are born and (c) percentage lamb crop; (2) to compare performance of sheep kept in barn during the day with that of sheep allowed to remain on pasture; (3) the effect of lowered environmental temperature on ram performance.**

7. ABSTRACT MAJOR RESULTS AND CONCLUSIONS:

**Comparisons made between purebred Hampshire and Berset Hampshire Crossbred ewes indicate no marked difference in reproductive performance due to breed of ewe. However, differences in the reproductive capacity of rams during the months of July and August were apparent. Ewes bred to Berset Hampshire crossbred rams lambbed earlier than ewes bred to purebred Hampshire rams. Rams maintained in an air conditioned room settled more ewes early in the breeding season than rams not artificially cooled.**

**The conception rate of ewes kept in a barn where the daytime temperature was (1 - 70) lower than outside was not increased. Laparotomies performed on a sample group of ewes each year indicated that in all instances ovulation had taken place when ewes were observed in oestrus.**

(Over)



ANNUAL PROGRESS REPORT FOR STATE SUPPORTED PROJECTS  
OF THE  
NORTH CAROLINA AGRICULTURAL EXPERIMENT STATION  
(Three copies to be submitted to Director's Office)

1. PROJECT: (Fund, number, and title):

2. DEPARTMENTS AND COOPERATING AGENCIES:

3. PERSONNEL:

4. RESEARCH ACCOMPLISHMENTS OF THE YEAR (Confidential information should be so marked):  
**S-165 Resistance to Mastitis in Dairy Cattle**  
**Institutional Breeding Program** Department of Animal Industry, N. C.

b J.C.Leece, J.E.Legates, F.D.Sargent, C.W.Young, Juanita Hoffman

By examining the protein patterns of whey, via paper electrophoresis, it has been determined that blood serum albumin in easily detectable amounts appears in milk from cows ill with mastitis. This change in whey protein pattern has been related to the inflammation phenomenon in general. It is felt that detection of blood serum protein, especially albumin in whey is an accurate indicator of inflammation and, hence, mastitis.

Collection of data on clinical mastitis, milking rates, and udder height have continued during the year. All data have been resummarized for further analysis.

5. USEFULNESS OF FINDINGS (Benefits to Agriculture and the general public and contributions to science):

The detection of serum albumin by electrophoretic study of whey proteins promises to be an invaluable aid to the diagnosis of mastitis, especially for laboratory work.

6. WORK PLANNED FOR NEXT YEAR:

Data available are to be studied to provide a more effective expression of clinical mastitis to permit further study of the relationships between mastitis, udder height and milking rates.

7. PUBLICATIONS ISSUED OR MANUSCRIPTS PREPARED DURING THE YEAR:

J.C.Leece and J.E.Legates. Changes in the Electrophoretic Whey Pattern of Cows with Acute Mastitis. Accepted for publication Journal of Dairy Science.  
C.W.Young, J.E.Legates and J.C.Leece. Genetic Variation in Clinical Mastitis. J. of Dairy Science 41:739

8. Prepared by \_\_\_\_\_

Approved \_\_\_\_\_

Director

Date \_\_\_\_\_

Date \_\_\_\_\_