

NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE

ANNUAL REPORT

Agricultural Production, Management, and Natural Resource Use
Title of Project

BIOLOGICAL AND AGRICULTURAL ENGINEERING
Section

1965
Annual Year

Name and Title of Worker	Percentage of Time Devoted to Entire Project by Each Worker
<u>H. M. Ellis In Charge</u> Project Leader	100 %
<u>J. C. Ferguson, Specialist</u>	100 %
<u>John W. Glover, Specialist</u>	100 %
<u>R. M. Ritchie, Jr., Specialist</u>	100 %
<u>Ronald E. Sneed, Specialist</u>	80 %
<u>Ernest M. Stallings, Specialist</u>	100 %
<u>W. C. Warrick, Specialist</u>	100 %
<u>Rupert W. Watkins, Specialist</u>	100 %
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Signed *H. M. Ellis*
Project Leader

Date Submitted February 11, 1966

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(The section on Rural Civil Defense was included in the Annual Report of the Agricultural Extension Service Administration. It was not included in the two copies of the Annual Report of Biological and Agricultural Engineering which were sent to Mr. George Smith.)

FOREWORD

The major objective of the Extension Agricultural Engineering Department's program might be stated as educating and motivating people to make the best practical use of labor, power, and equipment in carrying out the over-all program of the Agricultural Extension Service. Agricultural engineering cuts entirely across the field of agriculture. For this reason it is impractical to try to present the program of the department as a single report. The educational program is necessarily broken down into different areas, and areas are divided into phases, with an Extension Agricultural Engineering specialist responsible for each phase. In general, our projects are designed to eliminate unnecessary use of energy with special emphasis on eliminating unnecessary hand labor. Our individual specialists keep this objective in mind in directing program phases toward applied research type teaching-demonstrations. This report does not undertake to set down the entire work program of the past year. It does set down those phases planned for major emphasis during the year.

III. Program Accomplishments - Farm Mechanization and Rural Electrification

- A. 1. Continued scarcity of farm labor and the competitive situation now existing between the farm and industry make it absolutely necessary that farmers consider every means and device for reducing labor requirements. In most cases this will involve additional power, more modern machinery, better designed service buildings, larger acreage, and - equally important - better management. Keen interest prevails among all commercial farmers in further mechanizing field operations as well as barnyard chores.
- A. 2. Extension work in farm mechanization deals mainly with three major crops: tobacco, cotton, and peanuts. However, corn and other grain crops receive their share of attention, along with several horticultural crops such as strawberries, blueberries, grapes, apples, peaches, etc. While many of our commercial farms are becoming larger as land and capital become available, there are still many small family farms that are operated on a part-time basis with one or more members of the family being employed in industry. This situation is good in that the family is not wholly dependent on farm production yet is afforded the advantages of rural living.
- a. Cotton. With a record average yield of a bale per acre in 1964, interest was stimulated in the production of cotton in North Carolina, and an intense effort was directed toward this crop in 1965. From early to mid-season, prospects looked extremely good; but with the advent of an extended rainy period, the total crop was reduced approximately 50% from 1964 yields. Yet in many areas and on individual farms good yields and in some cases as much as two bales or more per acre were realized, resulting mainly from the determination of some farmers to carry through a

recommended insect control program regardless of weather conditions, proving that even under most adverse conditions cotton yields can be maintained. The cotton production specialists conducted many production meetings during the year, and the agricultural engineering specialist in machinery participated in ten joint meetings.

Fourteen personally conducted mechanical harvesting meetings or field demonstrations were held prior to the 1965 harvest season.

Surveys of mechanical harvesting have been made for the past several years, and in 1965 approximately 1,375 mechanical harvesters operated in the state, harvesting approximately 70% of the crop.

Several individual farm visits were made with agents for the purpose of observing and advising in maintenance and more efficient use of mechanical cotton harvesters.

The use of weed control chemicals and other improved cultural practices helped to reduce grassy classed cotton to approximately 6%, even though extremely wet weather prevailed throughout late summer.

Several completely new modern high capacity gin plants were built during the year, and many others did extensive renovation to existing facilities. Visits were made to most of the new gins during the ginning season.

With larger percentages of the crop being harvested mechanically each year, the ginning operation may still become a bottleneck during peak harvesting periods, and is of great concern to both ginners and farmers when such conditions occur.

b. Tobacco. An extension agricultural engineering specialist cooperated with plant pathology specialists in a special demonstration project called "Research on Wheels". This project was designed to demonstrate the results of various disease treatments on growers' farms. Application techniques were designed along with application equipment to properly apply the material.

Assistance was also given to research entomologists in designing special chemical applicator equipment for new insecticides.

c. Peanuts. Mechanical peanut harvesting has progressed very rapidly, with approximately 90% of the crop being combine harvested in 1965. The extension effort is devoted to proper harvesting techniques to maintain quality and prevent mold growth. Information articles were prepared and published in two trade publications that go to all peanut producers. The entire program at the annual research station field day, which was attended by over 1,000 growers, was devoted to proper mechanical harvesting.

d. Corn and Other Grain Crops. As a result of an extremely wet summer, corn yields reached an all time high in North Carolina; and while only a relatively small percentage of the acreage was sod planted, this unique method has aroused considerable interest among growers of corn for both grain and silage. To accomplish sod planting successfully, it is necessary that conventional planting machinery be modified to some degree and weed control materials be applied at the time of planting that will produce dormancy of the sod for sufficient duration to produce a corn crop. No mechanical cultivation whatsoever is used; and where the practice has been correctly executed, along with sufficient rainfall, yields of both grain and silage have been most gratifying.

Work on equipment design has been done both with other specialists and with individual farmers in an effort to determine the most practical machinery combinations. Approximately 14 specialist days were devoted to field work on sod planting.

A large proportion of the corn in North Carolina is now harvested and field shelled with a grain combine equipped with a corn header. These machines have the capability of harvesting corn with a high moisture content. With early season varieties many growers are attempting to harvest and sell high moisture corn before the seasonal price drops. As a result, the county elevators and terminal elevators have become overloaded with wet corn and have raised the moisture discount schedule. A series of instructional meetings was conducted in cooperation with extension marketing specialists to explain the situation and explain alternatives in harvesting methods.

- e. Horticultural Crops. Engineering assistance was rendered the horticultural specialists in meetings and field demonstrations involving peaches, sweet potatoes, strawberries, and blueberries. A mechanical blueberry harvesting aid was introduced to blueberry growers with enthusiastic reception; and while this device has thus far not been used in North Carolina, the method has been accepted in both Michigan and New Jersey. While blueberry production practices in North Carolina may not lend themselves entirely to this method, several growers will either prove or disprove the method and device during the next harvest season.

Two sprayer schools and construction workshops were conducted for trellis tomato growers in the mountain production area.

- f. Sprayer Meetings. Fifteen general information sprayer meetings were conducted during the year in which sprayer equipment was discussed in detail, supplying necessary information that farmers so inclined might buy component parts and assemble their own spray rigs. Special emphasis is given to pump selection and care, along with correct nozzle sizes, spacing, pressure, etc.
- g. Tractor and Other Farm Machinery Schools. Thirty-five tractor and other farm machinery schools were conducted during the year, most schools being arranged and jointly conducted with county agents and vo-ag teachers. This is evidence that machinery maintenance has improved; however, there are still very definite needs in this field. With an ever-increasing number and variety of machines owned by the average farmer, continued instruction in more efficient use and maintenance is essential. Adequate storage and on-farm shop facilities are still major needs, and a reality to relatively few farmers.

Tractor and farm machinery care and adjustment were presented during a short course in modern farming sponsored by the bankers and held annually on the campus during January.

- h. 4-H. 4-H work in agricultural engineering includes the tractor project, the automotive project, the electric project, and the safety project.
- (1) A new second year project manual and record were prepared and published for the electric project.
 - (2) A series of four two-day leader and agent training schools were conducted for the electric project.
 - (3) The annual 4-H Electric Congress set a new record with over 200 4-H members attending. This event is financed by the

electric power companies and is an award for 4-H members doing an outstanding job in the electric project. Educational information is also presented during the Electric Congress.

- (4) Six district demonstration contests were conducted in electric subjects as part of the electric project, and a state level contest was conducted for the district winners.
- (5) A series of four one-day leader training schools was conducted for automotive project leaders.
- (6) A series of classes on automotive project subjects was conducted for 1,400 4-H members attending 4-H Club Week.
- (7) A skill driving contest was designed and conducted during 4-H Club Week.
- (8) North Carolina developed a national winner in the automotive project.
- (9) Six district tractor driving contests and a state contest were conducted as part of the tractor project. The state winner competed in the eastern regional contest in Richmond, Virginia. Assistance and instruction on the tractor contest were given to several counties with new agents.
- (10) A special tractor driving contest was conducted at the State Fair for 4-H members.

i. T.V. and Radio. The two specialists involved in mechanization presented ten T.V. shows on timely subjects, live, during the year. All of the shows now presented on ASPECT are taped and rebroadcast over a total of eleven stations throughout North Carolina. Radio programs totaled twelve in number, most of which were taped and used on numerous stations throughout the state.

j. Printed Information Media. During the year eight mimeographed information leaflets were prepared which received general distribution. Several timely news stories were written for daily newspapers as well as periodicals and producer oriented magazines.

B. Assistance was given to two local farm machinery manufacturers to help develop machines to meet local needs. Improvements were made on farm sprayers, soil fumigators, and peanut trsilers.

Assistance was given to a large wood-treating plant to reduce cylinder down time. The problems were isolated as being vaporization of the creosote in the pumps. For proper treating, the creosote must be handled hot, which raises its vapor pressure almost to atmospheric pressure. After the problem was identified, a new piping and pumping system was designed by the extension engineer, and installed by the treating plant, resulting in a 20% production increase.

J. C. Ferguson and John W. Glover are the specialists responsible for work in farm mechanization and rural electrification.

III. Program Accomplishments - Crop Processing

A. Tobacco

1. Bulk Curing

- a. The objective of the educational effort in tobacco bulk curing was to acquaint farmers with the fundamentals of the curing process and the proper use of equipment in controlling process variables.
- b. Educational efforts were directed primarily to agricultural agents, equipment dealers, and sales people who by virtue of occupation and position, influence the plans and thinking of farmers. These agricultural leaders were subject to curing fundamentals and proper equipment usage through training schools, workshops held in cooperation with electric power suppliers, and agent-farmer meetings.
- c. Agents, dealers, and salesmen showed a genuine interest in and appreciation for curing fundamentals and were largely responsible for the improved curing practices used by farmers in 1965. Several farmers reported bulk curing results superior to results attained in conventional curing.

B. Mechanical Hay Drying

1. The objective was to demonstrate the advantages of mechanical hay drying in supplying high quality alfalfa for dairy farms in a hay-deficit North Carolina.
2. Results from demonstration farm tests during the past two years were assembled and published in information circular form, showing costs involved and savings accruing from mechanical drying.
3. Published results were used in educational meetings with agents and were used by extension chairmen in determining the

feasibility of mechanical hay drying in their respective counties.

C. Corn Storage and Drying

1. The objective was to educate agricultural agents, equipment dealers, sales people, and farmers in the fundamentals of corn drying and storage.
2. This department, in cooperation with other departments on campus, held special training schools for agents and other agricultural workers expounding the fundamentals of drying shelled corn and the advantages inherent thereto. Workshops were conducted for power suppliers disseminating drying and storage fundamentals. A special corn drying and storage class was conducted for ASCS office managers and committee members at the ASCS State Conference.
3. Early harvest advantages inherent to drying and price gains from storage returned handsome dividends to farmers in North Carolina in 1965. Many new storage facilities were established; and rising corn prices since harvest have paid for, in some instances, more than half the storage investment costs in less than six months.

D. Peanut Curing

An extensive extension effort was made towards maintaining peanut quality with better curing methods. The quality work included preventing mold growth which could lead to later condemnation.

As a result, many growers and custom curer operators upgraded their curing equipment to provide a greater air flow. The peanut industry was pleased with the product, and no North Carolina peanuts were condemned because of mold producing toxins.

Three technical papers were prepared on curing and published in controlled circulation trade publications going to growers, and a

mimeo was also distributed.

Assistance was given to a local manufacturer in designing a new system to provide more air flow by reducing friction losses in a previous model.

John W. Clover and Rupert W. Watkins are responsible for the program in crop processing.

III. Program Accomplishments - Irrigation

A. 1. The objectives of the program in irrigation were:

- a. To conduct an applied irrigation experiment on corn, cotton, and peanuts.
- b. To assist county extension agents in carrying out an educational program in their counties on the value of irrigation and on good irrigation practices.
- c. To work closely with suppliers, manufacturers, distributors, and dealers of irrigation equipment in informing them of farmer needs for irrigation and in the promotion of better system design.
- d. To prepare educational materials on irrigation and to promote the use of more and better irrigation through all-practice demonstrations, radio and television programs, and newspaper and magazine articles.
- e. To work with other state agencies on irrigation problems.

- 2 and 3. a. 1965 was the third year of the irrigation research project on corn, cotton, and peanuts. The project was originally planned to study the response of these crops to irrigation. Other objectives have been added during the experiment. These include:
- (1) Critical period or periods of moisture use.
 - (2) Amount of irrigation required for maximum net returns.
 - (3) Moisture requirements of these crops.

In addition, fertilization rates and plant population levels have been integrated into this study.

Although the results have been varied because of rainfall distribution, it has been established that each of these crops will respond to irrigation during periods of deficit rainfall. The periods of most critical moisture requirement have been fairly

definitely established, as have the moisture requirements of the crops.

The varying fertilization and plant population levels have indicated some trends, but no definite conclusions can be made at present.

A progress report for 1963-64 was prepared in January 1965 and presented at the annual meeting of the Soil Science Society of North Carolina. The title of the paper was "Irrigation - Nitrogen - Landplaster Interaction Studies with Corn, Cotton, and Peanuts".

Plans are to continue the research study in 1966 with Ronald E. Sneed as project leader.

- b. Each year irrigation equipment distributors cooperate with the irrigation specialists by supplying confidential sales information that enables the specialist in compiling total sales of irrigation equipment and additional acreage figures. The 1965 sales totaled approximately \$522,650, adding 1,173 acres to the irrigated acreage of the state. This brings the total irrigated agricultural acreage in North Carolina to approximately 95,797 acres. Turf irrigation sales were compiled for the first time in 1965 and totaled \$501,985. No attempt was made to estimate the total irrigated turf acreage.
- c. The North Carolina Irrigation Society composed of the leaders of irrigation in North Carolina, which the irrigation specialist played a major role in organizing and in helping to carry out its program, is assuming an active role in irrigation education in North Carolina. A very excellent one-day meeting with attendance of 50 and which was planned by the irrigation specialist

was held in November 1965 with some of the top leaders in irrigation across the nation as speakers. The Society is also conducting irrigation educational meetings for vocational agriculture teachers, county extension agents, and industrial education centers.

The irrigation specialist met with the Board of Directors of the Society six times in 1965 to plan and direct the Society's educational efforts.

The irrigation specialists were on the program of several of the major distributors' annual dealer meetings.

- d. Assistance was given in the preparation of five magazine articles in 1965. Two news articles were prepared for daily newspapers, and one radio and one television program were prepared.
- e. Two mimeographed leaflets on irrigation were prepared for distribution to county extension agents.
- f. A power company and a bank were assisted in planning irrigation systems for pilot irrigation demonstrations.
- g. The irrigation specialists served on four of the all-practice demonstration committees, and irrigation was promoted as one of the practices.
- h. The following papers were prepared for presentation:
 - (1) "Irrigation Design" presented by H. M. Ellis on the program of Farm and Home Week of the University of Delaware at Newark, Delaware.
 - (2) "A Forward Look at an Ancient Practice" presented by H. M. Ellis at the fall meeting of the Sprinkler Irrigation Association in Phoenix, Arizona.

- (3) "Instrumental Demonstrations" presented by Ronald E. Sneed at the Southern Regional Workshop for Extension Agricultural Engineers in Dallas, Texas.
- (4) "Irrigation in the Rain Belt" presented by H. M. Ellis at the annual meeting of the National Reclamation Association in Kansas City, Missouri.
- (5) "Sprinkler Irrigation's Role as a Crop Production Tool in the Southeast" presented by Ronald E. Sneed at the Rainy Sprinkler Sales Seminar in Peoria, Illinois.

Ronald E. Sneed is responsible for leadership in irrigation, assisted by H. M. Ellis.

III. Program Accomplishments - Farm Service Buildings

Areas selected for major emphasis during the year were development and preparation of plans for poultry and swine buildings, with minor emphasis on dairy housing systems and sweet potato storage.

A. 1. Poultry Buildings

Field studies of environmental conditions in poultry buildings were continued. During the winter months hygrothermograph instruments were used to get typical one-week temperature and humidity records in a variety of poultry laying houses and broiler houses. Curves plotted from these records show clearly the degree of temperature control possible under winter conditions with various types of houses, insulation, and bird densities. Results of these efforts will be used in meetings and teaching materials to get across points on environmental control to growers. The same instruments were used to get a nine-week record during the summer period of an insulated, fan ventilated, windowless broiler house compared to an insulated house with curtains for ventilation control on the same farm. No noticeable differences were found in the average temperature or performance in these houses during the summer. The test is being repeated for a cold weather period in 1965-66.

Three new poultry house plans were developed during the year. One of these was a medium-width, high-density cage layer house with $\frac{1}{2}$ " insulation in the roof and a gravity ventilating system. This pattern was chosen as a compromise between the narrow "California type" cage house and the fully insulated, windowless high density houses. It should offer a reasonable degree of temperature control in the winter, with open sides for ample natural ventilation during summer. Two insulated broiler house plans were developed, one for fan

ventilation, and the other for natural or gravity ventilation.

2. Swine Buildings

The "Swine Development Center" on the experiment station farm at Rocky Mount was completed in March 1965. The building of greatest interest in this complex is the "farrow-to-finish" unit which is being compared to a conventional farrowing house and feeding floor. Even though this unit is still in the evaluation stage, it has created wide interest. A small scale plan of the building was prepared as a handout at the dedication meeting for the facility (see attached sheet), and nearly 2,000 copies of this sheet have been distributed, even though the building has not been actively promoted by experiment station or extension personnel. This indicates the keen interest swine producers have in new ideas in buildings and equipment. A number of producers have already built units patterned after this one. The Animal Science Department has made a preliminary evaluation of the building, and it is anticipated that after one full year's use a more complete evaluation can be made, after which the plan will be revised as seems warranted, and added to the plan service.

Besides the farrow-to-finish principle, an area of keen interest to swine producers has been the use of slotted floors to save labor in cleaning pens. Various types of units have been built, and observation indicates that none of them are completely self-cleaning except the all-slat pens. Some of the part-slat arrangements are working very satisfactorily, and indications are that some form of partially slotted pen arrangement rather than fully slotted will emerge as the most popular pattern.

Plans were developed during the year for a low-cost building intended as a farrowing or farrow-to-finish unit, and for a partially

slotted feeding floor. Both of these plans were selected for use in the Southern Region Plan Exchange.

3. Dairy Housing Systems

Dairymen have been asking for information on improving their facilities, especially in the areas of free stall housing and manure disposal. A new plan folder, "Free Stall Housing for Dairy Cattle in North Carolina," and two new plans for free stall resting barns were developed during the year. Talks and mimeographed material on manure handling and disposal were prepared.

4. Sweet Potato Storage

Work toward developing sweet potato storage facilities was continued in cooperation with horticulture and agricultural engineering research workers. From work with one commercial house, a new system of operating commercial storage houses has developed. This system evolved from the use of palletized handling.

With conventional handling methods, where potatoes are stored in baskets or boxes stacked by hand individually, it has been considered necessary to divide houses into a number of small rooms to get uniform curing for potatoes harvested at different times. With palletized handling, it was found practical to move the potatoes after curing to another room for storage. Thus one curing room of moderate size can be operated continuously at curing temperatures during the harvest season, and the remainder of the house can be in one large room held at storage temperature. After harvesting and curing are completed, the curing room temperature can be lowered and it can be used for storage. This system permits the use of good curing and storage practices in commercial houses without the expense of partition and separate heat control for a number of small rooms.

5. Other Activities

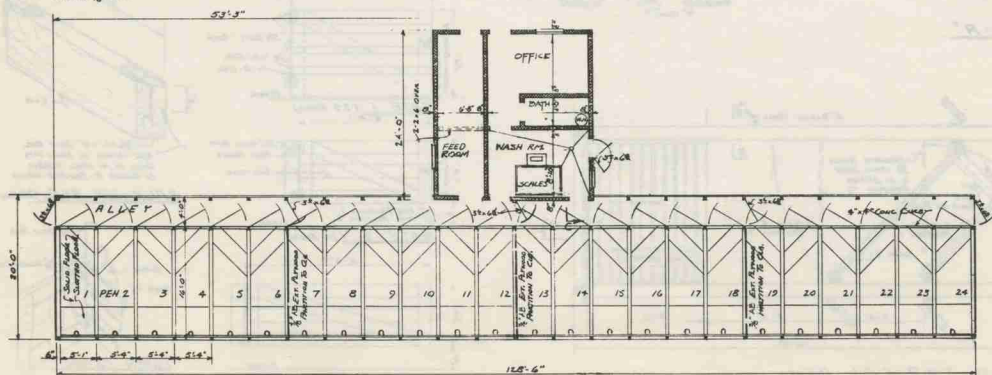
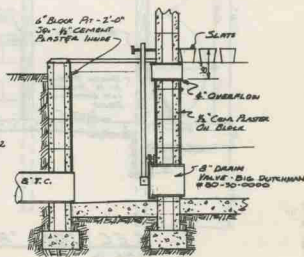
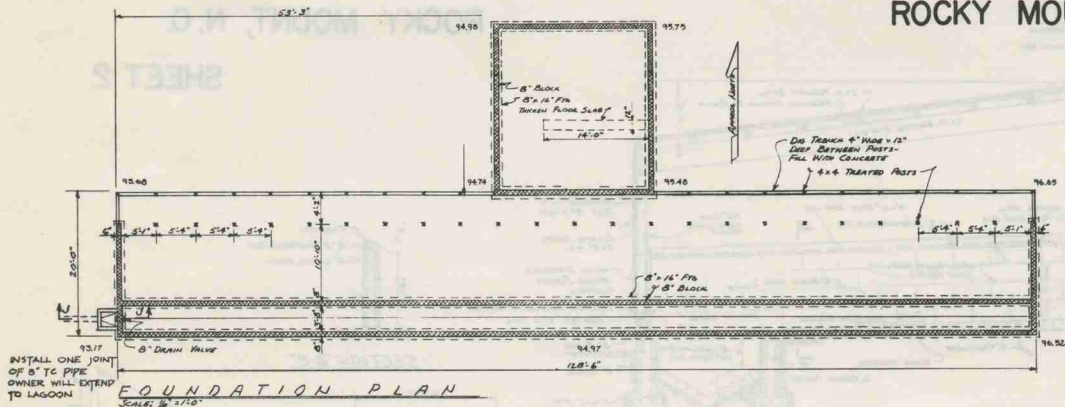
A major project during the year has been the preparation of a new farm service buildings plan catalogue for use by county extension workers and other agricultural workers. Each plan is illustrated by an 8½ x 11 sheet, generally either a USDA miscellaneous publication or a small scale reproduction of the working drawings. The cover for these sheets will be a 3-ring loose leaf binder so that the book may be kept up to date by adding or removing plans. This book should be ready for distribution early in 1966.

Approximately 30% of the specialist's time was spent in a general program including agent training schools and county or state meetings, not mentioned above, individual farm visits, preparation and distribution of information on farm buildings, radio, and television. This would also include limited assistance in preliminary planning of public agricultural buildings, such as agricultural office buildings, fair buildings, livestock arenas, community buildings, etc.

R. M. Ritchie, Jr., is the specialist responsible for farm service buildings work.

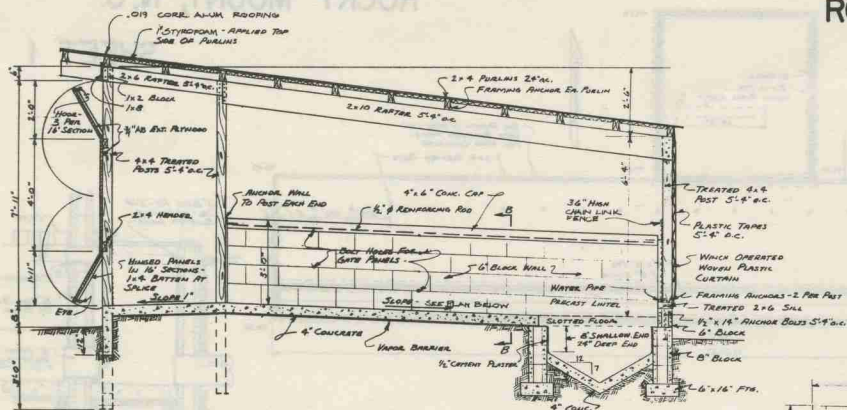
FARROW TO FINISH SWINE UNIT SWINE DEVELOPMENT STATION ROCKY MOUNT, N. C.

SHEET I

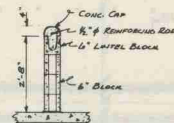


FARROW TO FINISH SWINE UNIT SWINE DEVELOPMENT STATION ROCKY MOUNT, N. C.

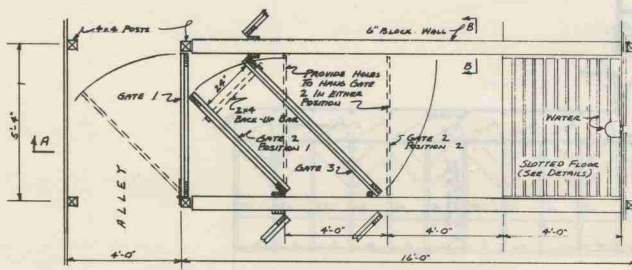
SHEET 2



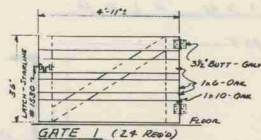
SECTION "A-A"
SCALE: 1/2" = 1'-0"



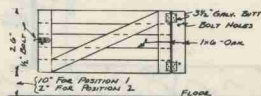
SECTION "B-B"



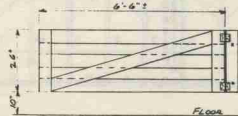
FLOOR PLAN-TYPICAL PEN
SCALE: 1/2" = 1'-0"



GATE 1 (24 REEDS)



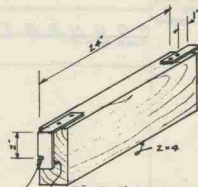
GATE 2 (24 REEDS)



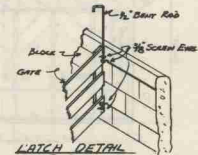
GATE 3 (24 REEDS)

GATE DETAILS

SCALE: 1/2" = 1'-0"
(SHOW LEFT & RIGHT HAND SIDES TO FIT PLAN)



BACK-UP BAR (24 REEDS)



LATCH DETAIL GATE 3

PLAN SERVICE

The following plans were distributed from this department in 1965:

Residences	5,548
Dairy buildings	1,083
Beef buildings	1,447
Swine buildings	3,813
Poultry buildings	920
Equipment	3,417
Other buildings	1,803
Miscellaneous, special blueprints, etc.	<u>1,312</u>
Total	19,343

New plans added to the service in 1965 were as follows:

House plans (USDA)

No. 7151
 No. 7163
 No. 7167
 No. 7171
 No. 7172
 No. 7175
 No. 7176
 No. 7179
 No. 7180

Dairy buildings (North Carolina)

No. 362 - Free stall housing for dairy cattle in North Carolina
 No. 363 - Free stall resting barn, 32' wide
 No. 364 - Free stall resting barn, single line stalls

Poultry buildings (North Carolina)

No. 828 - High density cage layer house
 No. 829 - Broiler house - insulated, fan ventilated
 No. 830 - Broiler house - insulated, natural ventilated

Swine buildings

N. C. No. 520 - Farrowing house, or farrow-to-finish unit
 USDA No. 5986 - Part-slat feeding floor

A great deal of work was done by drafting room personnel (one full-time worker plus part-time student help) in preparing charts, posters, lecture materials, etc., for this and other departments. A summary of this work follows:

Banners	7
Slides and graphs	265
Posters	212
Lettering strips	587
T.V. cards	31
Maps	18
Cover designs	14
Charts	62
Displays	25
Certificates	134

III. Program Accomplishments - Rural Housing

A. North Carolina was 60% rural and rural non-farm in 1960, and the evidence of substandard housing is almost twice as great in the country as in the cities. This gives basis for extension programs to improve housing in North Carolina. Such programs must necessarily be conducted by county extension agents. Training extension agents in programming, technical housing information, and providing teaching aids, plans, etc., for them are the major role of the specialist in housing.

I. Activities Accomplished.

- a. An in-depth training school consisting of one day each week for four weeks (four days) was conducted by specialists in agricultural engineering and housing and house furnishing. Agents in three districts and from five counties in another district were trained. From one to four agents per county participated, with a total enrollment of about 170. Classes ranged from 25 to 35 agents each. Resource people from Carolina Oil Fuel Institute, American Plywood Association, Farmers Home Administration, and power companies assisted with the training. An extension economist also collaborated. Three visits by the class to a house under construction (plans drawn by the specialist) were made in one district.

Twelve agents were taught a three-weeks' credit course in housing during the summer of 1965.

- b. The free house plan service was announced on several ASPECT programs. Eight other channels carry the ASPECT program in addition to the Channel 4 educational station.

- c. Emphasis was placed on educating the poorly housed or low-income families on better housing standards. A result demonstration house for this group was completed in Chatham County and was shown at an open house.
- d. A new house plan was developed and plans completed for a demonstration house to be built in Wayne County in the \$15,000 to \$20,000 class. Plans were drawn for a remodel demonstration house in Tyrrell County.
- e. In answer to requests, 5,548 free house plans were distributed in 1965.
- f. A new house plan book containing 59 plans, entitled "House Plans for North Carolina Families" was compiled and mailed to each county extension chairman and home economics agent and to Farmers Home Administration supervisors. Some counties were sent additional copies for agents working on housing and for builders and building supply houses. The book is made up of single sheets or miscellaneous publications on each plan. Miscellaneous publications developed and printed by this department for the plan book and for hand-outs by agents totaled 20. Each miscellaneous publication has a foundation planting guide prepared by the Horticulture Extension Department.
- g. A set of thirty slides with script entitled "Outdoor Living in Rural America" was made available to extension agents on request. A booklet entitled "Concrete Around the Home" was sent to each county extension chairman and home economics agent.

- h. A class in housing trends was conducted by the specialist for 300 women at Homemakers Week.
- i. A questionnaire was developed by the specialist for use in housing surveys. The specialist with extension agents trained enumerators to make a housing survey of one total community in Wayne County. Montgomery County has also begun a survey on housing, using the questionnaire as a guide.
- j. The specialist assisted in planning a regional housing conference on educational aids. He conducted a conference of 40 regional people in Atlanta on planning a series of lessons consisting of slides and script to be used across the region by those persons teaching housing. A federal specialist reports three lessons completed as of January 1966. The North Carolina specialist prepared a lesson on "Motivating for Better Housing". This has been used by several home economics agents.
- k. The Wayne County Housing Advisory Council promoted a home show which was attended by more than 10,000 persons.
- l. Three ASPECT T.V. shows and two radio tapes were produced by the specialist on housing.
- m. Fifty-six days were spent by the specialist in working with agents in the counties on housing problems.
- n. Gaston County was assisted in planning and conducting an education program for 38 people for eight nights.
- o. The specialist arranged for speakers and was chairman of a panel program at the 1965 National Meeting of the American Society of Agricultural Engineers. This program was entitled, "The Economy House".

Woodley C. Warrick, a full-time specialist in housing, is responsible for this phase of the program.

III. Program Accomplishments - Water Systems and Rural Sanitation

A. 1. The objectives of the program in water systems and rural sanitation were:

- a. To continue work with the low-income segment of our population in the promotion of water systems and bathrooms.
- b. To educate county extension agents and the general public on the need for treatment of water against mineral and sewage contamination.
- c. To prepare additional materials on water quality control.

2 and 3. a. Several counties were assisted with programs on water systems for low-income families. Slides, educational materials, and demonstrational materials were made available to several other counties for county meetings. The housing specialist assisted in the program through his efforts with adequate housing for low-income groups.

- b. Slides and educational materials were made available to several counties for programs on water quality control.
- c. The extension specialist was instrumental in getting the North Carolina State Board of Health to test water for mineral contamination for a nominal fee. A number of individual requests were answered on water quality control.
- d. Material was made available to Carolina Power & Light Co. for the promotion of home and farm water systems.

Ronald E. Sneed is responsible for leadership in the area of water systems and rural sanitation, with assistance from W. C. Warrick and H. M. Ellis.

III. Program Accomplishments - Safety

A. Objectives

To reduce the amount of suffering and the loss of life and property through accidents by giving leadership to an Extension Service safety program and by assisting in coordinating all rural slanted safety programs as executive secretary of the North Carolina Rural Safety Council.

B. Program Accomplishments

1. Radio program

- a. Organized ten teams of wildlife protectors and county extension chairmen to give radio interviews on some phase of safety such as: gun safety, boating safety, hiking safety, trailering boats, highway safety, etc. Interviews were taped, duplicated, and sent to 100 cooperating stations. Estimated broadcasts (assuming 50% were used) numbered 1,980.
- b. Prepared four three minute safety programs which were handled in the same way: 440 broadcasts.
- c. Thirteen safety spot announcements to same stations: 4,290 spot broadcasts.

2. T.V. Shows

- a. Safe use of household chemicals and agricultural poisons.
With director of Duke Poison Control Center.
- b. Farm pond safety show.
- c. Governor's proclamation of National Farm Safety Week in North Carolina.
- d. Home fire safety show.
- e. Two pesticide safety shows.

- f. Each daily ASPECT program is closed with a safety slogan.
- g. It is estimated by the T.V. editor that 150 safety spots were used during the year.

NOTE: All these programs are re-broadcast by ten cooperating stations.

- 3. Three news articles on safety to weekly and daily papers.
- 4. Presented paper at Southern Safety Conference, Tampa, Florida.
- 5. Sent requests to all county extension chairmen with twenty copies of religious emphasis suggestions, asking that they distribute suggestions to their rural ministers and ask for their help in seeking observance of National Farm Safety Week.
- 6. Met with Home Demonstration Council and assisted in preparation of Home Demonstration state safety program.
 - a. Conducted two district leader training schools for county safety chairmen.

H. M. Ellis is in charge of the safety phase of the Extension Agricultural Engineering program.

SPECIAL PROJECTFARM MATERIALS HANDLING EXPOSITION

The Extension Agricultural Engineering Department in cooperation with power use personnel directors of Carolina Power & Light Co., Duke Power Co., Virginia Electric & Power Co., and the North Carolina Electric Membership Cooperatives planned a very large farm materials handling exposition to be conducted in January 1966.

This University-sponsored exposition required a great deal of time in planning the various phases - from deciding on location to type of program and contacting manufacturers from all sections of the nation.

At the end of the year all indications pointed to this being the largest exposition of its kind undertaken in the Southeast. The exposition will be reported in the Annual Report for 1966.

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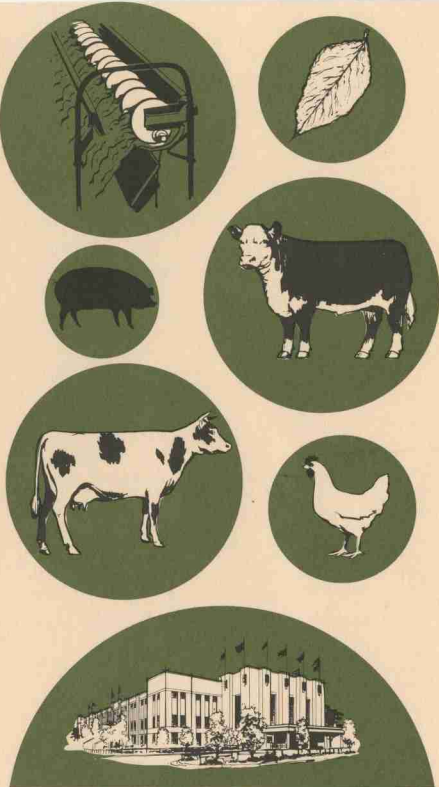
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N. C. State University at Raleigh

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President, Carolina Farm Equipment
Dealers Association

Manufacturer's Liaison Committee

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Director, Agricultural Development
Virginia Electric & Power Company
Richmond, Virginia

A. Chappell
Carolina Farm & Power Equipment
Dealers Association
P. O. Box 225
Wilson, North Carolina



North Carolina Farm Materials Handling Exposition

January 19-20
Reynolds Coliseum

Sponsored by N. C. State University at
Raleigh and the Electric Power Suppliers of
North Carolina in Cooperation with Other
Agricultural Agencies and Groups

DON'T LUG IT! LET IT RIDE!



Dan K. Moore

DAN K. MOORE
Governor of
North Carolina

In these days of rapid changes, we must be prepared to adjust our thinking and our ways of doing things to keep pace. In agriculture, for example, as the relative cost of labor increases we must mechanize our operations as quickly as feasible.

As the Governor of North Carolina, I wish to extend to you an invitation and the opportunity to take part in the Materials Handling Exposition to be held in the William Neal Reynolds Coliseum on the campus of North Carolina State University at Raleigh.

This promises to be one of the best expositions of its kind and fits well the plans of our agriculture of the future. I believe you will find this exposition to be helpful in your study of and planning for your operations in the years ahead.

James A. Graham

JAMES A. GRAHAM
Master of
Agriculture



It is with great pleasure that I anticipate the Materials Handling Exposition on the campus of North Carolina State University. This will be a significant event for the agriculture and agri-business interests of North Carolina and, I am sure, for all of you who participate.

North Carolina's agricultural development is now at a stage where the materials handling industry and our farmers can move forward together rapidly to their mutual benefit.

Therefore, I not only welcome you to North Carolina, but also assure you that the North Carolina Department of Agriculture is ready and eager to cooperate with you and, through its regulatory and service programs, to help you meet the challenge offered by this State's vast agricultural opportunities.



H. Brooks James

H. BROOKS JAMES
Dean of Agriculture
and Life Sciences

The North Carolina State University, School of Agriculture and Life Sciences, invites you to attend and participate in the Materials Handling Exposition to be held on our campus. We are interested in the economic development of our state and in improving the level of living of all of her people. Agriculture is in a period of rapid change in North Carolina. Each of our 100 counties has a specific program designed to increase farm income.

Materials Handling can play an important part in our growth and development. Now is an especially appropriate time to emphasize the contribution it can make. I hope you will join with us and make this fine Exposition one of the best ever held in this area.

Purpose

The North Carolina Farm Materials Handling Exposition is being held

- To stimulate a greater interest in profitable farm-stead mechanization.
- To give farmers and agri-businessmen opportunity to see the latest labor-saving equipment and systems.

Here are some of the pieces of equipment or systems that will be displayed:

Automatic Fencers	Feeders
Barn Cleaners	Feed Mills
Blowers	Feed Mixers
Building Materials	Hoists
Bulk Tobacco Barns	Lifts
Controls	Lighting
Conveyors	Loaders
Cutters	Milking Machines
Crop Dryers	Poultry Equipment
Electric Switches	Pumps
Ensilage Unloaders	Sprayers
Fans	Water Supply Equipment
Farm Materials Handling	

The Exposition will be opened Wednesday, January 19, at 10 a.m. by Governor Dan K. Moore. It will remain open until 9 p.m. Wednesday and be open Thursday, January 20, from 9 a.m. until 9 p.m.

Admission is free. And there is plenty of free parking.

COMMITTEES

FARM MATERIALS HANDLING EXPOSITION

Steering Committee

Executive Director
J. S. Dutton, Jr.
P. O. Box 366
Raleigh, N. C.

H. B. James
Dean, School of Agriculture & Life Sciences
N. C. State University at Raleigh

James A. Graham
Commissioner of Agriculture
N. C. Department of Agriculture

B. C. Mangum
President, N. C. Farm Bureau Federation
Raleigh, N. C.

Mrs. Harry B. Caldwell
Master, N. C. State Grange
Greensboro, N. C.

Chairman, Attendance Committee
Joe N. Howard
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Greensboro, N. C.

Chairman, Exhibitor's Committee
J. M. Ammons
Director, Agricultural Development
Carolina Power & Light Company
Raleigh, N. C.

Chairman, Arrangements and Facilities Committee
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Director of Special Services
Tarheel Electric Membership Corporation
Raleigh, N. C.

Chairman, Publicity and Public Relations Committee
Howard M. Ellis
In Charge Extension Agricultural Engineering
N. C. State University at Raleigh

Chairman, Manufacturer's Liaison Committee
James H. McBrayer, Jr.
Director, Agricultural Development
Virginia Electric & Power Company
Richmond, Virginia

Chairman, Hospitality Committee
T. G. Miller, Jr.
Agricultural Engineer, N. C. Rural
Electrification Authority
Raleigh, N. C.

Continued on back

THE BIGGEST FARM EVENT OF THE YEAR — MORE THAN 75 EXHIBITS

III. Program Accomplishments - Rural Civil Defense

- A. 1. The overall objective of rural civil defense work is to inform and motivate people to take sufficient action to insure survival of themselves, their livestock, and their capacity to produce safe food in nuclear and natural disaster situations.

1965 Planned Program

- a. Train and encourage county extension agents to plan and carry out an effective county rural civil defense education and information program.
- b. Expand the pilot 4-H activities and programs to additional counties as rapidly as possible.
- c. Present a series of programs for leaders from all organizations, communities and professions, in several interested counties.
- d. Expand rural civil defense training with and through home demonstration clubs, leaders, and county councils.
- e. Encourage other organized groups to take active part in the rural civil defense education and information program.
- f. Gather pertinent research information and prepare slides and script, for use of county extension workers, concerning the effect of nuclear disasters on livestock and planning and preparing for such disasters so as to minimize animal losses and provide for continued production of safe feed and food.

A. 2. & 3. With the belief that rural civil defense educational work can be done most effectively with and by county extension agents through organizations with which they normally work, programs have been carefully planned, organized and conducted accordingly toward four objectives:

- 1. Survival of people
- 2. Survival of livestock
- 3. Protection of supplies
- 4. Production of safe food

This involves training of agents before or along with the general public. To provide agent training and to instigate county programs, half day staff conferences have been held in 21 counties this year and in 80 during the past two years. These conferences included training in subject matter information and extension versus other agency responsibilities. Educational methods, procedures and techniques used in working with North Carolina demonstration counties in 4-H, home demonstration, organized community, and all leader training work on rural civil defense was explained as well as visuals available and their use. USDA defense board functions, responsibilities, and needed actions were carefully covered. Finally suggested procedures for incorporating rural civil defense into the ongoing programs of all agents was outlined. Each agent was given a packet of materials and bulletins including 9 North Carolina developed nuclear disaster mimeographed items and 11 natural disaster fact sheets. Slides and charts were used to present the above information in the staff conferences.

Following these conferences concentrated work with 4-H clubs, home demonstration clubs, organized communities and overall leader groups has been pursued. Work has also been done with agricultural workers' councils, defense boards, civic clubs and farm organizations.

The 4-H rural civil defense work has been done through four organized activities, a rural civil defense project, demonstration contest, organized county workshops and a state 4-H rural civil defense county program contest. These are interrelated and complementary, yet are separate contests. Concentrated work with 21 counties has been carried out in these activities and many other counties have taken active part.

The first activity is a county, district and state rural civil defense demonstration contest. To participate in this a club member or a team of two must prepare and present a 15 minute method demonstration or illustrated

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lecture on any subject pertaining to rural civil defense. The procedure is for winners in the county contest held in May to compete in district contests during June, and the 6 district winners to compete in the state contest held during state 4-H club week in July.

In 1965, 49 of the 100 counties participated in the district rural civil defense demonstration contest with 64 team and individual winners receiving 50 blue and 14 red ribbons. The 6 district winners competed in the state contest with the winning team later giving their demonstration before 750 delegates to the N. C. Farm Bureau Federation annual meeting. Both the first and second place state winners have appeared before area and district meetings. As was planned, many of the participants in these contests gave the same demonstration before civic clubs, home demonstration clubs, 4-H clubs, farm organizations and community groups as well as before large audiences at the district and state contests. The quality of performances in this activity was considered outstanding by all judges and is a very effective method of teaching rural civil defense.

A 17-page 4-H Rural Civil Defense for Survival Project Record Book has been carefully developed, printed and used with excellent results. It includes sections on learning, teaching others, family survival plans and actions, livestock survival plans and actions and safe food production after fallout. Participation in the project has been about equal to that in the demonstration contest with excellent records being entered in district and state competition.

The county 4-H rural civil defense workshop groups have been organized in all 21 demonstration counties. They have active officers and meet regularly with worthwhile programs. They serve to bring about greatly increased knowledge of club members, agents, leaders, parents and the general public as well as increased participation in the project and demonstration contests.

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Some of the work accomplished includes news articles, radio and t.v. programs, skits, exhibits, tours, field exercises, talks, shelter stays, model shelter building contests and increased family and community planning and preparedness.

Judging of the 4-H rural civil defense overall program contest was based on an 8-page written report of all rural civil defense work and accomplishments of the 4-H club members and extension agents in each county. Two counties, Lincoln and Currituck tied for state winner and both received state award plaques.

A county winner medal has recently been added to the 4-H rural civil defense awards program. The awards are as follows:

1. Demonstration Contest

District	-	\$19 Scholarship to State 4-H Club Week
State	-	\$50 Cash

2. Project Contest

County	-	Rural Civil Defense Medal
District	-	\$19 Cash
State	-	\$50 Cash

3. County 4-H Over-all Program Contest

Two Most Outstanding N. C. Counties - Plaques

The 4-H approach in rural civil defense education has proven very effective in North Carolina with outstanding quality and quantity of participation and accomplishment. It will continue to play a significant role.

Thirteen counties have been worked with ~~with~~ this year through home demonstration clubs. Special training programs have been given to home demonstration leaders and county councils in each case. These same subject matter programs were then presented by the leaders or agents in their respective home demonstration club. Charts, slides, mimeographed family and livestock survival planning sheets, bulletins, rural civil defense

quizzes and other materials have been used in these training meetings and in subsequent local club meetings. It is felt that this work is very effective and it has been well received in the counties and clubs.

Three counties have been worked with this year in holding rural civil defense training schools for leaders of all organizations and groups in a county. These schools consisted of three 2-hour meetings and the procedures used seem to have real merit.

The procedures, results and future plans of the Anson County staff serves as a good example.

1. After a 3-hour county extension staff conference, it was decided to conduct an all leader training series of meetings.
2. It was decided to give the program for those leaders and organizations that could take and use rural civil defense information most effectively and who had most influence with the general public.
3. Supervisors of the various organizations selected were contacted personally for the purpose of selling the idea to them. They were, in turn, asked to be responsible to bring their groups to each session.
4. Two letters were mailed to the leader group. They first outlined the purpose of the meeting along with the dates and subjects that would be covered at each. A second reminder letter was sent 15 days prior to each meeting and in many cases telephone reminders were made.
5. The local newspapers and radio stations were used effectively.
6. Groups involved were:
 - a. Chamber of Commerce
 - b. Adult 4-H leaders
 - c. Home demonstration club presidents
 - d. Home economics and agricultural teachers
 - e. Superintendent and principals of all city and county schools

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- f. Anson County commissioners
 - g. All civic clubs in the county
 - h. Anson County hospital
 - i. Local health and welfare department
 - j. Red Cross and county rescue squad
 - k. Ministers and doctors
 - l. Agricultural agencies
 - m. City and rural fire departments
 - n. Local electric companies
 - o. County civil defense director
7. The three training meetings were held three weeks apart and the attendance was 135 at the first, 205 at the second, and 100 at the third even though another county wide meeting was held on the night of the third.
8. The programs presented by the rural civil defense specialist covered a nuclear attack situation; destruction and dangers involved; how people can survive; family preparedness planning; shelters, equipment and supplies needed; providing last minute shielding; livestock planning and survival; protection of supplies of feed, food and water; decontamination; production of safe plant and animal food supplies after fallout; and agency responsibilities.
9. Audience participation was obtained through use of written quizzes and family and farm planning exercises.

The following is a quote from a letter written by Mr. Potter, Anson County Extension Chairman:

"We were well pleased with the series of meetings conducted on rural civil defense and believe that many of the people of Anson County have a better knowledge as a result of them. We feel that every effort that was made was well worth the time.

"The attendance was much better than we anticipated. The people who attended the meetings were those who are in a position to utilize

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this information among the groups that they are in contact with daily. At the present time we have three schools that have taught a unit of lessons to all classes on rural civil defense. We have also had requests from other groups to present programs on this topic. I do not know the exact number of kits of bulletins and materials given out, but I would estimate 30 complete kits. As far as the number of bulletins distributed is concerned, we would estimate 4,000.

"Our plans are to follow up these meetings starting early in 1966. We are planning and hope to be able to go into each school in the county and present a program to high school and grammar grade students. We will also be using news articles and radio programs on rural civil defense at intervals throughout the year. Our 4-H clubs have taken a real active interest and the workshop group has been meeting monthly on this program under the leadership of Mr. Walker and Miss Foeshe.

"We are deeply appreciative to you for the excellent way you presented the all-leader training programs. The material that you presented at the meetings was most helpful and effective. We have had a number of favorable comments from the people about the meetings."

During the spring of 1965, it was decided that the rural civil defense specialist would spend considerable time during the period July 1, 1965, to January 1, 1966, conducting a special study on livestock survival. This has involved a full week's stay at the University of Tennessee, Atomic Energy Commission Agriculture Laboratory at Oak Ridge, Tennessee, and a week in Washington, D. C. All available literature and research reports were gathered and carefully studied and slides are being prepared covering the following:

1. The need for livestock survival planning - a basic part of livestock management.

2. Livestock situation during and after a nuclear attack.
 - a. Dangers and how created
 - b. How radiation works
 - c. Present level of protection
 - d. Last minute actions vs. pre-attack preparations

3. General radiation effects.
 - a. LD 50/30
 - b. Symptoms
 - c. 4 systems affected and how - circulatory, digestive, respiratory, nervous.
 - d. Causes of death

4. Detailed external radiation effects
 - a. Effects on cells and organs and their repair
 - b. Effects on lungs
 - c. Effects on blood and temperature
 - d. Effects on intestines
 - e. Effects on unborn embryos and defects after birth.

5. Internal Effects over time of
 - a. Strontium 90
 - b. Iodine
 - c. Cesium

6. Protective measures against external radiation in sequence from make-shift to highly effective and elaborate.

7. Provision for feed and water

8. Space, feed, water and air requirements

- 9. What to do after radiation has decreased to safe level.
 - a. How to handle dead animals
 - b. Butchering techniques
 - c. Feeding procedures
 - d. Producing safe feed
- 10. Suggested planning and action procedures for livestock protection.
- 11. Suggested planning and action procedures for decontamination
- 12. Suggested procedures for handling soil and feed production after fallout.
- 13. Suggestion about changes in livestock and crop production with different levels of fallout.
- 14. Effect of cooking procedures on isotope content of meats.
- 15. Emergency responsibilities of USDA agencies and defense boards.

Training programs have been given by the rural civil defense specialist for USDA Defense Boards in 13 counties during the year and presentations have been given at 2 State USDA Defense Board meetings.

Training meeting programs have been given at 5 organized community meetings and at 19 general meetings of different groups and organizations.

The rural civil defense specialist attended the National Meeting of RCD Specialists in Tennessee and the Regional Meeting of USDA Defense Boards in Florida.

Ernest M. Stallings is program leader in rural civil defense.