NORTH CAROLINA AGRICULTURAL EXTENSION SERVICE

ANNUAL REPORT

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

BIOLOGICAL AND AGRICULTURAL ENGINEERING
Section

1967
Annual Year

Name and Title of Worker	Percentage of Time Devoted to Entire Project by Each Worker
H. M. Ellis, In Charge Project Leader	100 %
E. O. Beasley, Specialist	100 %
L. Bynum Driggers, Specialist	100 %
John W. Glover, Specialist	100 %
Ronald E. Sneed, Specialist	100 %
E. M. Stallings, Specialist	100 %
W. C. Warrick, Specialist	100 %
Rupert W. Watkins, Specialist	100 %
	%
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	%
F. J. Hassler, Head of Department of Biological and Agricultural Engineering	%
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Signed _____
Project Leader

Date Submitted February 14, 1968

Signed _____
STate Director of Extension

Date Recommended _____

Signed _____
Administrator, Fed. Ext. Service

Date Approved _____

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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 Dr. George Smith.)

FOREWORD

The major objective of the Extension Biological and 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 overall program of the Agricultural Extension Service. The educational program is necessarily broken down into different areas, and areas are divided into phases which have an extension biological and 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 program is being re-directed to meet the stepped-up demand for engineering knowledge brought about by the rapid adoption of mechanized farming. The fact that the need for knowledge is now generally recognized does not change the situation with respect to the level of knowledge of other specialists and the field agents. The following examples will serve to show how the general program has been re-directed.

Within the past 15 years the principal emphasis in agricultural engineering research in the areas of animal production has changed from the mechanical and civil engineering problems of livestock shelters to automatic control of environment and mechanization of materials handling processes. The program must be kept flexible because each technical innovation produces a change in the internal economics of the production unit, and social changes are taking place as better informed and more efficient producers take over. In the approach to establishment of better practices, we are following the procedure of the team approach. This approach involves those engaged in research, those in the area of development and teaching, and extension specialists of all allied departments to participate in program development. The recommendations

and assistance of this team are used by the extension specialist in the establishment of applied research type teaching demonstrations, and these demonstrations are conducted at points of need.

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 past year.

IV. Program Accomplishments - Farm Mechanization and Rural Electrification

A. 1. General

Interest in mechanization is at an all-time high with the labor squeeze becoming more acute each year. The extension service is being called on for assistance in evaluating various mechanical systems as well as advice on innovations to meet local conditions. Small manufacturers who produce equipment for local conditions are seeking engineering help more and more from the extension agricultural engineer. These manufacturers are too small to afford their own engineering staff, but they fill a definite gap in meeting local conditions with special equipment.

2. Tobacco

The tobacco grower has become aware of the labor shortage only within the last two years. He is now faced with rapid mechanization and is perhaps the most frustrated grower in America today. In addition to trying to keep the growers and county extension agents aware of current developments, there was more extension effort devoted to on-farm testing. Chemicals are becoming more important in controlling weeds, disease, and insects each year. The extension agricultural engineer assisted in a project named "Research on Wheels" which is a program to test on farms new chemicals that have looked promising at the experiment stations. This program gives information that can be used in recommendations and also keep the county agents close to new developments. Many new chemicals require special equipment which was designed and built by the extension agricultural engineers.

3. Cotton

Adverse weather for cotton production was experienced for the second consecutive year, resulting in large-scale re-seeding to soybeans, and spotty yields on the acreage that remained in cotton. Efforts to promote the production of "High IQ (Improved Quality) cotton have continued, with some indications of positive results. Interest among buyers in improved North Carolina cotton has been noted, and growers have shown great interest in producing quality cotton which commands a premium at the market.

Assistance with county meetings on cotton equipment and methods was continued as requested.

4. Peanuts

It is estimated that 90 per cent or more of the peanuts grown in North Carolina for commercial purposes are harvested mechanically. Most of the remaining 10 per cent are cured in stacks for seed since this method of curing apparently results in less mechanical injury to the seed.

Efforts have continued to promote more careful and efficient use of harvesting and curing equipment to reduce field losses and improve the quality of the harvested product. Preliminary field surveys were made which indicated that the field losses from all sources was as high as 20 per cent, most of which occurred in the digging operation. Additional information will be obtained on this point, and means of increasing the rate of recovery will be investigated.

A display of production, harvesting, and curing equipment was arranged in conjunction with the Annual Peanut Field Day, which was attended by approximately 500 people. Several county

meetings have been held throughout the peanut area on production and harvesting practices.

5. Corn and Small Grain Crops

Favorable weather conditions over most of the state during the growing season resulted in a record yield of corn. Soybean production was above average, but less than had been anticipated prior to harvest.

In cooperation with the extension agronomy specialist and others, an in-depth training school was conducted for county extension agents working with forages. Instruction in silage equipment was presented to the agents.

As 1966 was a disastrous year for corn production, work with once-over sod planting equipment was continued in 1967. Several changes were made in equipment, and a total of 72 acres of corn located on twelve farms was "no till" planted in fescue sod. Thirty-three acres were harvested for grain, yielding from 65 to 140 bushels per acre, and 39 acres were harvested for silage, yielding from 9 to 20 tons per acre. Farmers have received the practice rather enthusiastically, and sod planting will no doubt become an accepted practice on many farms.

6. Sweet Potatoes

High labor requirements, particularly in the harvesting operation, continues to be a major problem in the production of sweet potatoes. Large crews and much hand labor are necessary, even with the harvesting aids which are being used by some of the larger producers.

A sweet potato mechanization project was activated as a cooperative effort between research and extension personnel in

the biological and agricultural engineering department, with consultation from the sweet potato specialist and others in the horticulture department. Initial efforts were directed toward the development of a vine puller which would remove the vines, main stem, and feeder roots of the plant, leaving the potatoes free and disconnected in the soil. It is anticipated that this device when perfected will make the present harvesting aids more efficient, and will form a necessary and integral component of a new mechanical harvester. Subsequent efforts will be directed toward the perfection of the vine-pulling device, and the development of digging, lifting, sorting, and packaging mechanisms to form a complete mechanical harvester.

Discovery of the sweet potato weevil in North Carolina has required the application of DDT to sweet potatoes being stored in or near infested areas. Assistance has been given the sweet potato specialist and others concerned with the weevil problem in the selection and use of equipment to apply and remove DDT dust.

7. Horticultural Crops

Trellis tomatoes have become an important crop in the mountain areas of North Carolina. Due to the weather, disease is hard to control, and the farms are small, which limits their possible investment. A special sprayer for tomatoes was developed, and a training meeting for county extension agents was conducted covering its design and use. The plans were turned over to local sprayer manufacturers who are making it available at a reasonable cost. The plans were also published in the extension tomato production bulletin. Many growers are interested in con-

verting existing sprayers or building their own.

A training meeting was also conducted for blueberry growers on spraying. Most growers have not learned the requirements for spraying where complete coverage is required.

8. Alfalfa

The alfalfa weevil is a major obstacle to growing alfalfa in North Carolina. Due to chemical residues its control with chemicals is limited. The entomologists have been working with flame control for several years in various states. Entomologists in North Carolina had developed a burning method using varsol; however equipment was not available for field scale burning with this method. The extension agricultural engineer developed special ignition plans and plans for altering existing standard sprayers so their new burning method could be recommended. Even though the varsol is more expensive than L.P.G., the saving in equipment using a converted sprayer makes this method economical and makes it especially economical for the small farmer.

9. Farm Machinery Schools

County schools were conducted on the proper operation and care of tractors and sprayers. County sprayer schools have become the most frequently requested meeting since chemicals have become such an important part of crop production.

Two special meetings were conducted to instruct dairy farmers in selecting and operating stand-by electric generators.

10. 4-H Work in Biological and Agricultural Engineering

The 4-H tractor maintenance project, the 4-H automotive project, and the 4-H electric project received continued support in 1967.

4-H Tractor Project

Six district tractor operator contests were held, and the winners competed in a state contest during 4-H Week. The state winner competed during September in the eastern regional tractor contest at Richmond, Virginia, placing fifth in a field of 23. The annual North Carolina State Fair contest was held as usual with 18 county winners participating. Assistance was provided for several county fair contests over the state.

4-H Automotive Project

A 4-H skilled auto driving event was conducted during 4-H Club Week to emphasize safe driving in connection with the 4-H automotive project. An extension engineer also attended a national committee workshop to study ways to improve the automotive project.

4-H Electric Project

The 4-H electric project is one of the most popular projects in the state. It is supported locally by the electric suppliers who also sponsor a state electric congress. Ninety-three of the state's 100 counties had 4-H member delegates attend the 1967 electric congress.

There is also a demonstration program as part of the 4-H electric program. The extension specialist conducted a district electric demonstration contest in each of the six extension districts, and a state contest.

A special reference notebook on the 4-H electric project for extension agents was prepared and distributed. This notebook contained a complete set of 4-H electric

guide sheets which were prepared by the federal extension service.

John W. Glover and Eustace O. Beasley are responsible for work in farm mechanization and rural electrification.

IV. Program Accomplishments - Crop Processing

A. Tobacco

1. Bulk Curing

a. The primary objective of educational efforts in tobacco bulk curing was to teach curing fundamentals and proper equipment use to farmers. The secondary objective was to demonstrate the functional feasibility and economy of converting conventional type barns to bulk curing.

b. Educational efforts were directed primarily to agricultural leaders who influence the plans and thinking of farmers. These agricultural leaders, county extension personnel, equipment dealers, and sales people were taught curing fundamentals and proper equipment usage by training sessions, workshops, and agent farmer meetings.

Several conventional type curing barns were converted to bulk curing by farmers who used the advice and council of the biological and agricultural engineering department. These barns functioned satisfactorily and demonstrated sizeable economies in "first cost". A number of tours were conducted to acquaint leaders and farmers with the conversion idea.

c. The better understanding of curing fundamentals on the part of agricultural leaders and farmers was primarily responsible for better curing results and increasing acceptance of bulk curers. A realization of the superior curing potential in the bulk process, in the face of a critical labor shortage, was responsible for a tremendous increase in the number of bulk barns put into operation in 1967. The number of bulk

barns on North Carolina farms more than doubled in 1967.

2. Tobacco Harvesting Mechanization

a. The objective of educational efforts in tobacco mechanization was to acquaint agricultural leaders and farmers with mechanization possibilities and alternatives.

b. Efforts were exerted primarily through training sessions for agents and farmer-agent meetings for farmers and interested commercial personnel. A simple harvesting device which was built and tested in 1966 was improved and displayed at the tobacco trade fair held in Greenville in March. Plans for building this "taxi" type harvester were made available to farmers who requested them. In less than one year more than 500 of these plans have been requested and mailed.

c. The frustration and stress associated with imminent labor shortage and the "promise" of miracle harvesting devices have been partially dispelled by educational efforts. Many farmers have solved their most pressing labor problem by use of the taxi harvester developed here and others like it produced by commercial concerns.

B. Corn Storage and Drying

1. The objective was to educate county extension agents and farmers concerning the advantages of and methods for proper drying and storage.

2. County extension personnel were exposed to drying fundamentals in training sessions. Farmers and commercial interests were trained at agent-farmer meetings.

3. Early harvest advantages made possible by proper drying and price gains associated with storage, coupled with the availability of

used C.C.C. grain bins, induced the establishment of many storage facilities in North Carolina in 1967.

The large yield of corn and soybeans dramatically emphasized the opportunity for increased return on these crops through provision of on-the-farm drying and storage facilities. The ASCS state committee made available to farmers through the county ASCS offices a quantity of surplus C.C.C. bins, which were dismantled in the Midwest and shipped into North Carolina. These 3200-bushel bins were sold to farmers at auction, with minimum bids of $450 to $500 each. Approximately 2000 were sold, increasing the on-farm storage capacity in the state by about 6,000,000 bushels. Assistance was given the ASCS and county extension personnel in proper erection and use of these facilities.

4. There was an increase of approximately 15,000,000 to 16,000,000 bushels of on-farm storage in North Carolina in 1967.
5. Four special district training schools were conducted in cooperation with Duke Power Co. for teachers of vocational agriculture on grain drying.

C. Peanuts

1. The objective of the peanut curing program was to promote proper operation to maintain high peanut quality. The peanut crop is approximately 90 per cent mechanized, harvested, and cured. Curing is an integral part of mechanized harvesting. Many growers tend to use excessive heat to speed drying, which lowers the peanut quality. Also some equipment manufacturers tend to overrate their equipment, which misleads the grower.
2. County meetings were conducted on proper operation of curing equipment. Peanut curing instructions were published in the grower

news, and additional articles were distributed through extension agents. An educational program was also conducted with the equipment manufacturers to keep them quality minded.

D. Commercial Agriculture

Extension assistance was given in the planning stages of grain drying and storage on several large farms and for one proposed elevator. The largest farm grain facility involved an on-farm storage capacity of 95,000 bushels, plus drying and handling.

Special assistance was also given to two large peanut seed producers to plan a system that would reduce labor and insure high quality seed. The peanut seed is extremely sensitive to handling in storage conditions.

John W. Glover and Rupert W. Watkins are responsible for work in crop processing.

IV. Program Accomplishments - Irrigation

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

a. To conclude a 5-year applied research study on corn, cotton, and peanuts.

b. To assist county extension agents in developing an educational program on the value of irrigation and good irrigation practices.

c. To cooperate with manufacturers, distributors, and dealers of irrigation equipment in informing them of farmer needs for irrigation equipment and in the promotion of better system design.

d. To prepare educational materials on irrigation and to promote the use of better irrigation practices through demonstrations, radio, and television programs, and newspaper and magazine articles.

e. To assist other state and federal agencies with irrigation problems.

2 and 3. a. A 5-year applied research study on corn, cotton, and peanuts was concluded in 1967. The study was originally designed to study the response of these crops to irrigation. Other objectives have been added which include:

(1) Critical periods or periods of moisture stress.

(2) Optimum fertilization and plant population levels for maximum response under irrigation.

(3) Amount of irrigation required for maximum net returns.

(4) Evapo-transpiration rates of these crops.

Because of variable rainfall distribution, results have not been constant; however, it has been established that each of the crops will respond to irrigation during certain periods of deficit soil moisture. The period of most critical moisture requirement has been established for corn. Field studies will continue on peanuts to determine more exactly the critical period of soil

moisture and also the response of different varieties to irrigation.

Some trends have been established for the fertilization and plant population levels. It is apparent that high rates of nitrogen and plant population rates of 24,000-28,000 plants per acre are required for maximum production of corn under irrigation. Cotton has shown a negative response to nitrogen rates in excess of 100 pounds per acre. Peanuts have shown no significant response to high levels of land plaster.

Ronald E. Sneed has served as project leader on this study.

b. Each year since 1956 irrigation equipment dealers have cooperated with the irrigation specialists by supplying confidential sales information that enables the specialists to compile total sales of irrigation equipment and additional acreage figures. The 1967 agricultural sales totaled approximately $980,000, adding 2534 acres to the irrigated acreage of the state. This brings the total irrigated acreage in North Carolina to approximately 102,000 acres. Turf irrigation sales are more difficult to obtain, but it is estimated they were in excess of $750,000 in 1967.

c. The North Carolina Irrigation Society, whose membership is composed of dealers, distributors, and manufacturers of irrigation equipment, educators, and farmers is assuming an active role in irrigation in North Carolina. The irrigation specialists have a major role in helping to carry out the program of this organization. An excellent one-day meeting was held in November. Attendance was 68, with 14 states being represented. The irrigation specialist was moderator of a panel on "Mechanization of Sprinkler

Irrigation".

The irrigation specialists met with the Board of Directors and other committees of the Society twelve times to plan and direct the Society's educational efforts. Plans have been made to conduct a series of 26 meetings in March and April 1968 on "Mechanization of Sprinkler Irrigation" to be jointly sponsored by the Society, Carolina Power & Light Co., and the Agricultural Extension Service.

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

d. One news article and one magazine story were prepared. Two television programs were presented. In addition, assistance was given in the preparation of two news articles for daily newspapers and two stories for magazines.

e. Four mimeographed sheets on irrigation were prepared for distribution to county extension agents. Assistance was given in the preparation of two extension circulars.

f. Irrigation schools were conducted by the irrigation specialist for personnel from the research stations and for a group of tomato growers enrolled in a special school sponsored by O.E.O. The irrigation specialists presented programs on irrigation to a number of county groups and adult farmer groups.

g. Assistance was given the Division of Research Stations of the North Carolina Department of Agriculture in the plans for irrigation systems at three research stations. Assistance was given the North Carolina Board of Juvenile Correction in the plans for irrigation systems for two of their farms.

h. The irrigation specialist served on three of the all-practice

demonstration committees, and irrigation was promoted as one of the practices.

i. The irrigation specialist gave a presentation at the sprink meeting of the North Carolina Section of the American Society of Agricultural Engineers on "Irrigation in Eastern North Carolina".

j. The irrigation specialist is serving a second 3-year term on SW241, the Sprinkler Irrigation Committee of the Soil and Water Section of the American Society of Agricultural Engineers.

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

IV. Program Accomplishments - Farm Service Buildings

Major emphasis during the year was devoted to swine production systems with minor emphasis on improved poultry housing systems. Since profit margins tend to get smaller, the goal for livestock and poultry production systems is to provide means by which production can be maximized with the least investment, least labor, and least operating cost through properly designed buildings and related materials handling equipment.

Swine

As management practices continue to change with a definite trend to confinement production facilities, the handling and disposal of animal wastes becomes a greater problem, probably the number one materials handling job facing most producers. Therefore this is an important area of concern in buildings design. Realizing this problem, our educational efforts were directed toward methods that would facilitate this job and at the same time remain compatible with animal husbandry practices. Since pigs are carried all the way from farrowing to marketing on many farms, there is a need for maximizing labor efficiency and consequently an increasing interest in dry-sow and boar confinement.

The use of slatted floors was begun by 1967, but the interest was further stimulated by the preparation of new plans and other information on this subject. An all-practice leaflet was prepared entitled "Slotted Floors for Swine Buildings" which illustrated layouts for slotted floor buildings and also designs for slats of both wood and reinforced concrete. Working closely with a local concrete products supplier, concrete slats were made available, and therefore producers had a source for obtaining slats at a price most could not compete with.

A slotted floor finishing house was constructed in Bladen County which

served as a demonstration facility for that area. In conjunction with this project a study was initiated to measure the solar radiation through several different types of insulation materials installed in the roof. Because of weather conflicts, results were not obtained, but this project will continue.

New plans were prepared for a combination nursery-finishing building and a sow gestation house, both units with slotted floors.

Poultry

Because of labor and other production costs, some broiler producers have begun to show interest in houses whereby reasonable control of the environment can be maintained. A preliminary building plan has been prepared featuring the use of insulation in a mechanically ventilated house. Work here is barely underway, but hopefully will be expanded by working with a very large broiler contractor in the state.

Flies in the summer and waste disposal continue to be problems to the poultryman. Preliminary preparations have been made with a Columbus County producer and the local power supplier to study the effectiveness of electric heating cable in breaking the life cycle of flies when placed in the manure pits.

Other Activities

To supplement the efforts of other extension personnel involved in programs with low-income personnel, a plan for a portable farrowing house was developed. This plan was designed primarily for tenants so that it could be moved as the residence location changed.

Through the ASCS office, used metal grain storage bins were made available to farmers in North Carolina. To aid in proper assembly and erection of these bins, this specialist along with Mr. E. O. Beasley prepared a set of illustrated erection instructions that were provided to every farmer purchasing a bin.

In addition to meetings, talks, and articles prepared for the major and minor emphasis areas, subject matter was also prepared and presented through various channels on beef cattle feeding and handling facilities, silage storage and feeding, egg storage rooms, farm fencing, and other areas in the industry of agriculture.

The following publications were prepared:

1. "Farmstead Planning Saves Labor and Increases Profits", News and Observer, March 13, 1967
2. "Instructions for the Construction of C.C.C. Bins"
3. "Environmental Controlled Poultry Housing", Regional Farm Electrification Conference, October 4, 1967, Natural Bridge, Virginia
4. "Slotted Floors for Swine Buildings", North Carolina Agricultural Extension Service, September 1967

PLAN SERVICE

The following plans were distributed from this department in 1967:

Residences	10,165
General Purpose Barns	486
Dairy and Beef Cattle Buildings	1,149
Swine Buildings	2,461
Poultry Buildings	255
Crop Drying and Storage	416
Machine Storage	267
Equipment	1,423
Miscellaneous, special blueprints, etc.	1,108
Total	17,730

New plans added to the service in 1967 were as follows:

House Plans (USDA)

No. 5997
No. 5968
No. 5998
No. 6002
No. 6003
No. 6004
No. 7182
No. 7181
No. 7178

House Plans (North Carolina)

No. 78
No. 79
No. 80
No. 82
No. 83
No. 84
No. 85
No. 86
No. 87
No. 89

Swine Buildings (North Carolina)

No. 522 - Confinement Housing for Sows
No. 523 - Portable Farrowing House
No. 524 - Slotted Floor House for Gestating Sows

Horse Barns (USDA)

No. 6010 - Horse Barn, 8 Stalls
No. 6011 - Horse Barn, 17 Stalls

In addition to the above plans, 24 other USDA plans were received which are maintained in the files, but are not reproduced in mass because of limited applications and requests.

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, and other visuals for this and other departments. A summary of this work follows:

Banners	11
Certificates	188
Charts	222
Displays	32
Flip Charts	30
Lettering Strips	427
Posters	123
Graphs for Slides	268
T.V. Cards	25

IV. Program Accomplishments - Rural Housing

The promotion of better housing through the interest and activities of extension agents has been the aim through the years of the housing specialist. It is only through agents in the counties that continuous effective housing work with individuals and groups can prevail. Organization of groups to execute certain requisites for certain housing programs can be done better by extension agents than any other group or agency, more particularly in rural counties.

A. Activities accomplished

1. In-depth training school for agents begun two years ago were completed in 1967 with the training of 25 agents in the western district in a continuous 3-day school.

   Resource people from allied agencies and from industry assisted with the training. One particular reason for this was to familiarize the agents with these resource people in anticipation of their use in county programs.

2. Four T.V. lessons in housing were taught by WUNC-TV with emphasis on low-income housing. There were also radio programs.

3. Participation was continued on the Governor's Committee for low-income housing with attendance at three state conferences.

4. Fifty county-wide visits were made by the rural housing specialists in supporting their role as change agents in the area of housing. Agent conference work ranged from assisting individuals with housing problems to planning county extension housing programs.

5. Continuous effort is directed toward maintaining an up-to-date and popular house plan service. Plans 78, 79, 80, 82, 83, 84, 85, 86, 87, and 89 were developed, drawn, and added by the specialist to the stock of plans. From USDA sources Plans 6002, 6003, 6004, 5997, and 7182 were added. A numerical listing of available

plans with certain basic characteristics identified was compiled and distributed to agents and Farmers Home Administration supervisors. More than 10,000 house plans were distributed on request. This was a 25% increase over 1966.

6. Six sets of slides and six lessons with script produced by a regional committee have been obtained for use in county and community housing programs.

7. Perhaps one of the most meaningful activities of the housing specialist was in his presenting the housing situation in North Carolina to the administrative and supervisory staff. Suggestions were made for getting organized communities to adopt housing as a major project. The supervisors of the East Central District have accepted the challenge to program housing education in their district. These supervisors began in January 1968 to formulate plans with the county extension staffs in their district for over-all county housing programs. It was necessary to have agents with enough technical knowledge of housing so that they would feel some proficiency in this area before asking district supervisors to press for comprehensive county housing programs. To date, extension agents are the best technically trained ever, and are very conscious of housing needs.

IV. 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 oriented safety programs as executive secretary of the North Carolina Rural Safety Council.

B. Program accomplishments

1. Radio programs. Conducted or assisted with ten programs which were sent to 75 radio stations and to 15 county agents for their special programs.
2. Radio safety spots. Series of 18 spot announcements with a possible use by all 220 radio stations in the state.
3. T.V. shows. Conducted three T.V. shows and assisted with two others on safety. These were shown approximately 17 times each over the educational network and the seven cooperating stations.
4. Each "Aspect" program is closed with a safety slogan.
5. It is estimated by the T.V. editor that 240 safety spots were used during the year.
6. Five news articles on safety to daily and weekly papers.
7. Over the Director's signature requests went to all county extension chairmen with twenty copies of religious emphasis suggestions, asking that they distribute suggestions to their rural ministers with the request for their help in seeking observance of National Farm Safety Week.
8. Had packets of information on National Farm Safety Week and Fire Prevention Week sent to all county extension chairmen.

9. Met with home demonstration council and assisted in preparation of home demonstration safety program.
10. Assisted with the preparation and conduction of the annual conference of the North Carolina Rural Safety Council.

H. M. Ellis is in charge of the safety program.

SPECIAL PROJECT

FARM MATERIALS HANDLING EXPOSITION

The Biological and Agricultural Engineering Department represented North Carolina State University in sponsoring the second large-scale Materials Handling Exposition conducted in the Southeastern United States. Co-sponsors with the University were the major electric power suppliers operating within the state. These suppliers are: Carolina Power & Light Co., Duke Power Co., Virginia Electric & Power Co., and the North Carolina Rural Electric Membership cooperatives.

Following a very successful exposition, which was the first of its kind in our section, last year, careful planning and preparations were made for an even better exposition the second year. Plans were coordinated with all major departments in the School of Agriculture and Life Sciences of the University and with the North Carolina Department of Agriculture, along with the major farm organizations. Vocational agriculture teachers and others were invited to bring their classes to the exposition, and plans were made for special tours of the exhibits and nearby installations on the University farms. Many groups both from within and from without the state took advantage of these conducted tours. Many cooperatives, the Southern Railroad Co., and several other groups sponsored free bus service from practically all points within the state.

The second exposition was located on the North Carolina State Fair Grounds to provide for easier access and parking. The major objectives were to show our progressive farmers and agricultural leaders the most up-to-date materials handling equipment available and to exhibit it in such a way that its worth could be evaluated as it was explained by top-flight manufacturers' representatives. Along with this objective was to introduce to our agriculture distant manufacturers, and some showed whose businesses are located on the Pacific Coast.

The news people in all divisions - press, radio, T.V., and journals - declared the exposition highly successful and were very ably responsible for the success by their cooperation.

It was decided that it would be advantageous to both states for the 1968 exposition to be located in Virginia.

III. Program Accomplishments - Rural Civil Defense

A. 1. The overall objective of the rural civil defense educational program is to educate, motivate, and guide rural and small town people to understand, plan for and insure survival of themselves, their livestock and their capacity to produce safe food during and after nuclear disaster situations.

1967 Planned Program

a. Train, encourage, and assist county extension agents to plan and conduct an effective county rural civil defense information and education program.

b. Expand 4-H activities, including demonstration contests, project contests, workshop organizations and best county program contest to additional counties as rapidly as possible and gain greater state-wide participation in each.

c. Expand rural civil defense training with and through home demonstration county councils, leaders and clubs, by added programs and more counties participating in an organized sequence of in-depth training.

d. Present a series of four two-hour programs for all organized communities in certain counties to increase knowledge and encourage family and community planning and preparations.

e. Present a series of four two hour training programs for leaders from all or selected organizations, communities and professions in certain counties to increase leader knowledge, favorable rural civil defense influence and family, community, and county planning and preparedness.

f. Gain inclusion of appropriate rural civil defense information in regular programs of extension agents in livestock, soils and crops, food etc.

g. Encourage other organized groups to take part in the rural civil defense educational programs.

h. Complete a set of slides on soils, crops and production and preparation of safe food after fallout.

2. Programs have been carefully planned, organized and conducted in several counties with 4-H Clubs, home demonstration clubs, organized communities and/or leader groups. Other counties have presented programs through schools, civic clubs, farm organizations, agricultural workers councils etc. Mass media has been used to create interest, inform the general public and publicize the work being done. These programs usually consist of four or more two hour meetings and provide training in:

a. Survival of people and family planning and preparedness

b. Emergency supplies and equipment

c. Pre-attack planning and preparing for livestock survival; post-attack feeding, management and butchering of livestock; production of safe livestock product foods and decontamination of meat and milk.

d. Soils, crops and fallout - production of safe food and feed crops after fallout.

Additional training for many groups includes:

a. Field exercises in family, livestock, soils and crops planning and preparedness

b. Shelter training exercise

c. Radiological monitoring

d. Federal, USDA, State and local government responsibilities

To provide helpful training for agents and to instigate county programs, staff conferences were held in 30 counties during 1967 and in 95 of the 100 counties during the past 3½ years. These conferences include training in Rural Civil Defense subject matter and in Extension versus other agency responsibilities. Educational methods, procedures and techniques being used in conducting rural civil defense educational programs with 4-H, homemakers clubs, organized communities and leaders were explained as well as visuals available and their use. USDA defense board organization, functions and needed actions were sometimes discussed. Suggested procedures for incorporating rural civil defense into the on-going programs of all agents were outlined.

Following these conferences county plans were developed and work scheduled and conducted in many counties.

Concentrated 4-H work through organized workshops has been done by the Rural Civil Defense Specialist with a total of 37 counties and with seven during 1967. Seventeen hours of instruction is given each county workshop by the Rural Civil Defense Specialist. Single programs have been given to county council groups in many additional counties to introduce the 4-H rural civil defense activities and survival information.

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 fifteen minute method demonstration or illustrated lecture on any subject pertaining to rural civil defense. The procedure is for May county contest winners to compete in the district contest in June and the six district winners to compete in the State contest held during State 4-H Club Week in July.

In 1967, 55 of the 100 counties participated in the district contest with excellent quality of presentations. Julie Gardner of Martin County won the state contest and later gave her demonstration before 900 delegates to the North Carolina Farm Bureau Federation Annual Convention at Durham. As was planned, many of the participants in these contests gave the same demonstrations before civic clubs, home demonstration clubs, 4-H clubs, community groups, farm organizations and as television and radio programs.

Participation in the 4-H rural civil defense project has been excellent with 56 of the 100 counties declaring county winners and presenting them with medals. Excellent longtime records were entered in district and state competition. A 17 page Rural Civil Defense for survival project record book has been developed and is being used very effectively. Susan Coleman of Currituck County was State project winner for 1967. A special award for Susan was provided by the North Carolina Farm Bureau Federation and the North Carolina 4-H Development Fund of a trip to National 4-H Club Congress. It was the first time a 4-H member from any State had ever won this honor.

County 4-H rural civil defense workshops were organized in 7 counties this year. They had active officers and meet monthly with worthwhile programs. These workshops serve to bring about increased interest and knowledge of club members, leaders, parents, and the general public, as well as increased participation in the project and demonstration contest. Before the workshop is organized, all club members are usually oriented on all 4-H rural civil defense activities at a monthly series of club meetings at which time enrollment is taken. Then the enrolled group is brought together, officers elected and the monthly meetings started. The program for the first six meetings is usually given by the Rural Civil Defense Specialist, covering survival of people and family planning

and preparedness; emergency supplies and equipment; livestock survival and post-attack feeding and management of livestock and proper handling of meat and milk and soils, crops and fallout and production of safe food. A three hour field exercise in family, livestock and soils and crops planning is held for the fifth meeting and a six hour shelter exercise for the sixth.

Rutherford and Martin Counties were dual winners of the state plaque for conducting the best overall 4-H Rural Civil Defense educational program in North Carolina for 1967. Judging of this contest is based on an eight page written form report of all work done and all accomplishments by members, leaders and agents.

Awards in the 4-H program are furnished by the North Carolina Farm Bureau Federation and are as follows:

1. Rural Civil Defense Demonstration Contest

   District - $20 Scholarship to State 4-H Club Week
   State - $50

2. Rural Civil Defense Project Contest

   County - Rural Civil Defense Medal
   District - $20 Cash
   State - $50

3. County 4-H Over-all Rural Civil Defense Program Contest

   Two most outstanding N. C. Counties - Engraved plaques

4. County Rural Civil Defense Workshop

   Certificate to all members completing and turning satisfactory Rural Civil Defense project record book.

The 4-H approach in rural civil defense education has proven effective in North Carolina with outstanding quality and quantity of participation and accomplishment. It will continue to be an important part of our program.

Thirteen counties have been worked with this year through home demonstration clubs. Special training programs were given to home demonstration leaders or homemaker county council groups in each case. Similar training programs were then presented by the leaders or agents in their respective clubs. Charts, slides, mimeographed family and livestock survival planning sheets, bulletins, rural civil defense quizzes and other materials were explained and furnished for use in these local club meetings. It is felt that this procedure is very effective and it has been well received in the counties and clubs.

In several counties the agents have presented programs in all local 4-H clubs using a set of slides on 4-H rural civil defense activities prepared by the Rural Civil Defense Specialist. In other counties the agents have used survival slides or movies for a series of club meetings.

Slides and/or movies have been used by several agents for community meetings, civic club meetings, etc.

During the last half of 1967 the Rural Civil Defense Specialist worked jointly with Dr. T. C. Blalock, State 4-H leader: W. M. Garmon, 4-H Specialist; H. L. Reynolds, Associate editor and Jimmy Tart, Assistant Editor in arranging for the presentation of a series of 10 TV programs on emergency preparedness over the North Carolina Educational TV network. This required considerable planning, preparing of materials, arranging for and conducting three district training meetings for agents and working with the Department of Public Instruction and The TV Stations.

The publicizing of this series was done through schools, 4-H Clubs, other organizations and mass media by agents in the 40 counties involved. Membership cards and project manuals were mailed or delivered to approximately 50,000 boys and girls in North Carolina for viewing this TV Action Club Series of programs and participating in the related project.

The series runs from January 15, through March 18, and is presented each Monday at 5:30 to 6:00 p.m. The subjects involved are hurricanes, earthquakes, tornados, droughts, floods, freezes, outdoor living, fallout and radiation etc.

With approximately 50,000 boys and girls enrolled, we feel that this is a very worthwhile endeavor and will accomplish some important emergency preparedness training to a worthwhile number of North Carolina families.

The Rural Civil Defense Specialist gave a 30 minute presentation at six district meetings of county representatives of all USDA Agencies in all counties, during January. An explanation was given of the objectives, programs, organizations, procedures and progress to date of the North Carolina Agricultural Extension Rural Civil Defense educational program with 4-H clubs, home demonstration clubs, organized communities, adult leaders, and other groups.

A new set of illustrated charts on fallout and safe food after nuclear attack was developed by the Rural Civil Defense Specialist during 1967. Four loan sets of slides with script and leaders outline were made from these for agents use. They have been used by Home Economics Agents with reported excellent audience reaction.

The Rural Civil Defense Specialist developed five different mimeographed materials for use in the TV Action Club series and thirteen new training aids for use in radiological monitoring training during 1967.

The Survival Newsletter was used to acquaint agents with new ideas, programs, visuals, subject matter and successful procedures being used in some counties.

The Rural Civil Defense Specialist gave programs in many counties for agricultural workers councils, USDA Defense Boards, agricultural subject matter meetings, community and civic club meetings.

Ernest M. Stallings is responsible for the Rural Civil Defense Program.