August 30, 1973

Mr. J. D. Dodson
3414 Hillsborough St.
Raleigh, N. C. 27607

Dear J. D.:

Enclosed is the Progress Report for Fiscal Year 1972-73 for Biological & Agricultural Engineering Extension. Also enclosed are four success stories. The success story on apple irrigation is rather long. If you feel that it should be shortened, we would be happy to oblige.

If you have any questions regarding the progress report or the success stories, please contact me.

Sincerely,

George J. Kriz, In Charge, Extension
Biological & Agricultural Engineering

GJK:s
Enc.

CC: Dr. T. C. Blalock

PROGRESS REPORT FOR FISCAL YEAR 1972-73

Biological and Agricultural Engineering Extension

The diversity of activities within Biological and Agricultural Engineering is such that a progress report can only be a topical presentation that highlights the activities. The following report may appear disjointed to the reader, but is in fact our accomplishments.

Animal waste management continued to receive considerable time and attention. The Associate Head in Charge of BAE Extension served as a liaison between producer groups, farm organizations, the School of Agriculture and Life Sciences, and the Legislative Research Commission Subcommittee on Animal Waste Control. Several talks explaining the Federal and State proposed legislation were presented to state and county livestock organizations and a wide variety of other organizations. Four bulletins on animal waste management (by commodity) were coordinated by the associate head. The departments of Biological and Agricultural Engineering, Animal Science, Poultry Science, Soil Science, Economics, and Entomology contributed to the appropriate bulletins which were reviewed and approved by the School of Agriculture and Life Sciences Animal Waste Management Committee, the North Carolina Department of Agriculture, the Office of Water and Air Resources, the State Board of Health, and the Soil Conservation Service. The subject matter presented in the bulletins should be of real value to producers, educators, regulatory agencies, environmentalists, agribusiness personnel, and others interested in this phase of the agricultural industry.

The specialist working in animal environmental control assisted in a study of the swine production industry with emphasis on waste characterization and management. A co-authored publication which is used as a technical reference in classroom instructional material resulted from this activity. The water management specialist designed the irrigation system and is serving as a team member of groups involved in determining the effects of various swine and dairy waste and sludge on the soil-crop system.

The 90-sow demonstration housing system designed by the animal environmental control specialist and located at the Upper Coastal Plain Research Station has greatly enhanced the acceptance of new practices as evidenced by the construction taking place in this state and requests for information from out of state. The environmental control achieved through the system of under slat ventilation is also being incorporated into existing and new buildings with curtain walls as well as totally enclosed buildings. Zone cooling techniques developed for farrowing houses have recently been adapted to a breeding facility in which 198 sows were bred with a conception rate of 90.4%. Two building plans were added to the plan service, Plan No. 528, Finishing Floor - Total Slat Under Slat Ventilation, and Plan No. 529, Totally Enclosed Slotted Floor Nursery with Under Slat Ventilation. The under slat ventilation system has had widespread coverage through articles in producer, general farming, and trade magazines.

Emphasis continues to be placed on structurally sound environmentally controlled poultry houses. Only a few houses collapsed in North Carolina this year from heavy ice and snow storms. The first poultry housing environmental seminar was a success with over 150 in attendance. Industry leaders have requested another seminar during the coming year. As a result of that seminar, several broiler and hatching egg firms have updated their facilities to better control environmental conditions.

The water management specialist continued as a cooperator on a grape irrigation-cultural practice study, a horticultural crops-environmental control study, an apple irrigation-environmental control study, a container grown nursery stock irrigation-environmental control study, a greenhouse tomato trickle irrigation study, and an apple trickle irrigation study. Producers are beginning to install irrigation systems for their particular needs as a result of these studies.

Phase II of a study entitled "Agricultural Water Needs in North Carolina" was completed, and Phase III was funded by the Office of Water Resources Research and

the North Carolina Water Resources Institute. The purpose of the study is to provide tools to predict agricultural water usage and also to determine the optimum crop mix under a limited water availability regime. Pitt County, North Carolina, was selected as the study area for the data base for Phases I and II. Phase III will involve testing the previously developed methodology on other areas of the state.

The multiple pick mechanical harvester for cucumbers was commercially available in limited quantities for the first time in 1973 following the prototype evaluations in 1972. Consultations and demonstrations were held to show proper land preparation and planting techniques and equipment for use with multiple pick harvesting, plus the harvester itself and its adjustment and use.

Several on-farm demonstrations of the trellised tomato harvesting aid-sprayer were held in western North Carolina counties. A quotation on a commercially manufactured version of the machine was obtained and made available to potential purchasers. Assistance was also rendered to growers who built their own harvesting aids from the plans developed by the extension specialist in 1972.

Assistance was rendered on an individual basis to adapt equipment for spraying Christmas trees in western North Carolina. Contacts have been made with manufacturers of tractors and equipment thought to have special potential in the steep terrain of that region to bring this equipment in for evaluation and make it available for purchase if suitable.

Use of air sprayers for application of insecticides and fungicides to row crops (tomatoes) and grapes has been under study during the year. Recommendations on suitability of the equipment as well as operational procedures is expected to be developed from these tests.

A great advancement in weed control for soybeans in the eastern black land soils was made by a retired BAE specialist. Field observation of conventional 6" wide press wheel planters revealed a 3" to 5" deep furrow behind the wheel and an exposed wheel track of only about 4". Herbicides were ineffective except in the 4" wide

track, and early cultivation was difficult. Experimentation with 12" wide press wheels arranged singly and in tandem or in combination with shallow working tines eliminated the undesirable furrow and resulted in excellent weed control over a full 12" band.

In 1973 several large soybean growers modified their multi-row planters to single 12" wide press wheels. Both low gallonage spray and granular applications at recommended rates were used on an estimated 3000 acres. Excellent weed control was obtained, and the early cultivation requirement was reduced and greatly simplified. It is anticipated that many farmers will adopt this practice in future years.

BAE specialists cooperated with other departments in preparing the pesticide training manual, in particular the equipment section and the calibration section. Specialists also participated in agent training in this area.

Increasing labor cost and the fear of insufficient labor are pushing mechanization of tobacco at a rapid pace. For the 1972-73 year manufacturers of bulk curers and tobacco harvesters were for the first time able to sell more machinery than they could assemble and deliver. Approximately 200 automatic tobacco harvesters and 2500 bulk barns were placed on North Carolina farms for use in 1973. The focus now is on educating growers on cultural practices and machinery operation necessary for successful mechanization.

A peanut digging, inverting and salvaging demonstration was conducted at the annual peanut field day in which all the major peanut equipment manufacturers participated. Because peanuts are all mechanically harvested and cured, the marketing time has been shortened, and thus alternative ways to store the peanuts on the farm are being studied.

Four in-service training sessions on crop drying and storage were conducted prior to the harvest season in 1972.

A farm machinery specialist served as co-chairman of the first tractor pulling contest conducted at the North Carolina State Fair. It was a great success, and

plans are being laid for a second pulling contest.

Considerable time and effort were spent in disseminating safety information, holding meetings, etc., in connection with general safety emphasis as well as specific OSHA requirements for farmers and farm related activities.

The 4-H program in the department was thoroughly reviewed, and an in-service training program was conducted for 4-H agents who have responsibility for the department's projects.

1972 - 1973

SUCCESS STORY

BIOLOGICAL AND AGRICULTURAL ENGINEERING EXTENSION

MARKETING MACHINE PRIMED TOBACCO

In the late 1960's progress in tobacco mechanization was nil. Ten or more years had passed since the development of the mechanical harvester by the North Carolina Agricultural Experiment Station, and several years had passed since two unsuccessful commercial efforts to market a machine which embodied the research proven components.

Leaf alignment was the hang-up. Hand primed tobacco had traditionally been offered for sale with the leaves aligned. The mechanical harvester would not align the leaves, and no device for aligning machine primed leaf seemed forthcoming. Although the value of leaf alignment was questionable, the farmers' fear of marketplace discrimination against non-aligned leaf seemed paramount.

Extension bridged the gap by demonstrating the marketability of non-aligned, machine primed leaf. Farm scale tests in 1969 showed only a token marketplace preference for aligned leaf. More farm scale tests in 1970 substantiated these results. Intensive educational efforts expounding the market acceptance of machine primed leaf allayed the farmers' fears and renewed enthusiasm in the machinery manufacturers' camp.

In 1971 the first successful unsubsidized full scale farm operations using the mechanical tobacco harvester were recorded. Three machinery manufacturers offered machines for sale, and four farmers in North Carolina reported harvesting their "whole crop" with mechanical harvesters. In 1972, some 39 harvesters were purchased by Tar Heel tobacco growers, and 1973 saw about 200 of these $15,000 harvesters on North Carolina's farms.

Thus, mechanical harvesting of tobacco is firmly established and spreading rapidly. Extension may justly be proud of having catalyzed an attitude change which brought about this progress.

1972 - 1973

SUCCESS STORY

BIOLOGICAL AND AGRICULTURAL ENGINEERING EXTENSION

UNDER SLAT VENTILATION IN SWINE BUILDINGS

The effect and influence of controlled air movement is apparent as one enters a swine building equipped with the North Carolina system of under slat ventilation. Meeting the basic principles of ventilation, the impressive impact is in odor control. Obnoxious odors are eliminated in the building and thus a major reason for the acceptance by swine producers.

Work with innovative producers, interdepartmental cooperation and the demonstration facilities at the Upper Coastal Plain Research Station provided the impetus for the educational program in this area. As producers accept changes in intensified production facilities, this technique enhances the successful operation of those facilities.

Even though the system is most effective in totally enclosed houses with total slotted floors, it can also be incorporated in open side wall buildings with partial slats. Thus, existing houses can be improved through the incorporation of this ventilation system. Plans are available for the different types of swine buildings featuring the under slat ventilation system. As a result of national coverage in three major magazines, numerous requests have been received from outside North Carolina for the plans. Over 50 houses have been constructed in the past year in North Carolina using this ventilation system.