

1983 Combined Annual Report

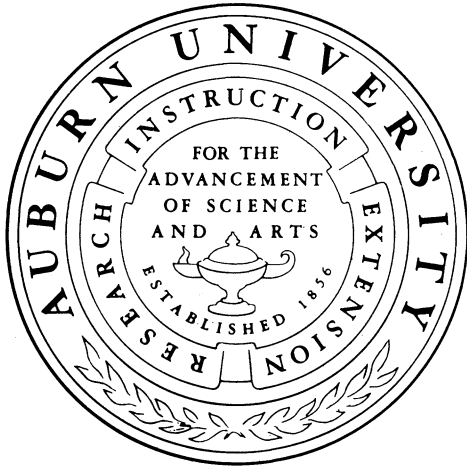
School of Agriculture, Forestry, and Biological Sciences

Alabama Cooperative Extension Service

Alabama Agricultural Experiment Station



AUBURN UNIVERSITY



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ON THE COVER: Auburn University's historical dedication to agricultural service is recorded in stone at the entrance to Samford Hall.

Foreword

Auburn University's agricultural components continue to serve all Alabama citizens as they fill their teaching, research, and extension functions under the land-grant college system. Each of the units—the School of Agriculture, Forestry, and Biological Sciences, Alabama Agricultural Experiment Station, and Alabama Cooperative Extension Service—has a specific area of responsibility. These functions blend together, however, into the overall program that not only contributes to growth and development of Alabama's total economy, but reaches into every home in the State to make life more pleasant and fulfilling for all Alabamians.

This report offers a summary of significant accomplishments by the three units during 1983, a year of challenge to Alabama's agricultural and forestry industries and related businesses. Efforts in teaching, research, and extension focused on areas of greatest needs to assure that limited financial resources available could make the greatest impact on the State.

The teaching program of the School of Agriculture, Forestry, and Biological Sciences strengthened its advising system, updated and modernized curriculums, purchased computers and other high-tech teaching equipment, and increased formal recognition of superior teaching in its continuing efforts to better serve student needs. Special efforts were made to correlate offerings of community and junior colleges with Auburn degree requirements so that transfer students can get the best possible education and still graduate in reasonable time.

Recruitment efforts were stepped up to enroll adequate numbers of students with the necessary academic backgrounds to fill the wide-open job market for agricultural graduates. Financial assistance for worthy students continues to be an

important need, and progress was made in this area in 1983.

Research and extension efforts presented a unified attack on several major agricultural problems during the year. Noteworthy among these was the information blitz and accelerated research directed toward soybean stem canker. Farmers were informed of the most tolerant varieties available and best production methods to minimize damage from the threatening disease. Hundreds of breeding lines were evaluated as plant breeders worked overtime to speed development of resistant varieties for the future.

Opening of the Fescue Diagnostic Laboratory at Auburn signaled another phase of Auburn's all-out efforts to overcome serious losses caused by fescue toxicity effects on grazing beef cattle. Samples of seed and grass tested indicated high rates of infestation in the State and area. Cattlemen had already been informed about the seed-transmitted fungus that is responsible for toxicity, identified in earlier Auburn research, and services of the new laboratory will allow farmers to identify clean and fungus-infected seed to avoid perpetuating the problem and lead to a "phasing out" of infected pastures.

The tradition of service that dates to the signing of the Smith-Lever Act in 1914 was evident in activities of the Cooperative Extension Service in 1983. Workers at county, district, and state levels responded to problems facing farmers, agribusinesses, home owners, youth, and other population groups, problems that were intensified by unusual conditions encountered during the year. Whatever the problem at a specific time or place, county and district agents and state specialists were ready with the latest scientific information available to meet the need.

"People programs" have traditionally been Extension's strong point, and this tradition was strengthened in 1983 by successful efforts to assist and develop leaders in all communities in Alabama. These grass-roots leaders are the people who have demonstration projects on their farms to help extend improved methods of production, who assure success of farmer and consumer meetings, tours, and other organized programs, who provide leadership for 4-H and other youth activities, and who support useful public programs at all levels of government.

Scientists of the Alabama Agricultural Experiment Station continued their wide-based research program that combines applied research aimed at today's problems with basic studies to provide the new knowledge that will be needed in the years ahead. Production research was directed even more to economic aspects to help farmers survive the ever tightening cost-price squeeze. Projects were organized and executed to find methods that maximize the bottom line, profit figure rather than just yield level.

Some of the new and exciting research endeavors underway in 1983 included embryo transplant activities, soil erosion studies by satellite technology, genetic engineering studies with both plant and animal application, use of naturally occurring fungi as a natural means of nematode control, biological methods of insect control, development of new products for utilizing forestry production, and methods of recovering and reusing nutritional and energy components from animal waste.

We take pride in what was accomplished during the year and pledge our continued support of all facets of life in Alabama. Your continued interest, support, and guidance are solicited.

Stanley P. Wilson

Vice President For Agriculture, Home Economics, and Veterinary Medicine

Robert A. Voitle

Dean, School of Agriculture, Forestry, and Biological Sciences

Gale A. Buchanan

Dean and Director, Alabama Agricultural Experiment Station

A. Ray Cavender

Acting Dean and Director, Alabama Cooperative Extension Service

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*Information contained herein is available to all persons
regardless of race, color, sex, or national origin.*

SCHOOL OF AGRICULTURE, FORESTRY, AND BIOLOGICAL SCIENCES

THE SCHOOL of Agriculture, Forestry, and Biological Sciences continues to build on its reputation for producing outstandingly prepared students. This has never been more important than it is today when the federal government is predicting a 13 percent shortfall annually of students that have developed the agricultural mind-power necessary to compete in today's society. Faculty and staff are dedicated to providing an environment that not only satisfies the students' thirst for technical

knowledge but promotes intellectual growth.

The programs in the School are dynamic ones that are designed to provide knowledge to meet the many needs of a changing society. These needs include not only the ability to provide an abundant supply of food, fiber, and high quality recreation, but producing these in a manner that is compatible with the environment and which is economical for consumers and profitable for agriculture.

NEW OPERATIONS, PROCEDURES, CAPABILITIES

The School continues to work closely with Alabama's community and junior colleges so that students transferring to Auburn can do so with the least amount of inconvenience. This year a recruitment and retention committee was established, and this group is hard at work refining efforts in these two most important areas. One of the most significant developments of this committee is an advisor's handbook that should allow the faculty to operate much more efficiently and effectively when dealing with students.

Another of the more promising developments in the recruiting area has been the formation of the Ag Ambassadors. The Ag Ambassadors are a highly select group of young men and women dedicated to enhancing the image of and interest in agriculture, forestry, and the biological sciences as well as Auburn University. The Ag Ambassadors will assist at School or other University sponsored events and be available to speak on topics related to agriculture or youth opportunities before farm oriented groups, civic clubs, business groups, school assemblies, banquets, or similar events. The School has been successful in increasing graduate teaching assistant stipends which should allow it to better compete for outstanding graduate students.

For the first time, a School exhibit was developed emphasizing opportunities for youth. This past year it was shown at the North Alabama State Fair, Ag 100 reception in Montgomery, the Ag Alumni Fall Roundup, Sunbelt Ag Expo, the South Alabama Fair, the Alabama State Fair, and at Auburn High School.

The Dean continues to work closely with the Curriculum Committee to encourage revisions that will benefit the overall program of the School. A major change made this year was to shift the Food Science Program in the School to the School of Home Economics. It is felt

that this move will offer the maximum opportunity to increase enrollment in this important area.

The Dean's Office, along with a number of departments, continues to actively pursue scholarship donors. Results are encouraging, and these efforts should assist in the recruiting efforts.

The Teaching Improvement Committee redesigned a teacher evaluation form which is completed by the students. In addition, the committee worked with the Dean in establishing a Dean's Award for Teaching Excellence, the first of which were presented to Dr. Bill Mason, Coordinator of the General Biology Program, and Dr. Ralph Harris, Professor in the Department of Animal and Dairy Sciences. This particular award is different from the Outstanding Teacher Award given by the students in that the individuals are selected by their peers.

Currently the students in the School select the best teacher from their departments to compete for the title of Outstanding Teacher in the School of Agriculture, Forestry, and Biological Sciences. This year's nominees were Dr. William Hardy, Agricultural Economics and

Rural Sociology; Dr. Clarence Johnson, Agricultural Engineering; Dr. Joe Hood, Agronomy and Soils; Dr. Ralph Harris, Animal and Dairy Sciences; Dr. Bryan Truelove, Botany, Plant Pathology, and Microbiology; Dr. Claude Boyd, Fisheries and Allied Aquacultures; Dr. Conrad Brewer, Forestry; Dr. Harry Ponder, Horticulture; Dr. Claude Moore, Poultry Science; and Dr. Larry Wit, Zoology-Entomology. Dr. Joe T. Hood was selected as the 1983 recipient from the School.

A number of physical improvements and equipment purchases were made within the School this past year. A fume hood and air conditioner were purchased for the electron microscope facility to render that area safer and more comfortable. Two laboratories were renovated and converted into several offices in Funchess Hall so that all faculty might have private offices. Microscopes were purchased for the Botany, Plant Pathology, and Microbiology, Fisheries and Allied Aquacultures, and Poultry Science departments. A significant amount of equipment was purchased for the Forest Engineering Program. New equipment obtained for the School's computer laboratory included a "state-of-the-art" network system and hard disk storage. A number of overhead projectors were also purchased this year for use by various departments. A computer terminal room was developed in Funchess Hall and another in the Animal Sciences Building. This services both students and faculty.

A new roof was placed on Funchess Hall, which made a dramatic improvement in that facility. Efforts begun on the renovation of the main Agricultural Engineering Building should not only improve the building's appearance but its efficiency as well. This past year saw an increase in maintenance monies in a number of teaching departments as well as in Research Operations, Research Information, and the Donald E. Davis Arboretum. A vinery at the Arboretum was constructed by Research Operations in 1983 with monies donated by friends of Dr. Henry Orr, Professor Emeritus of Horticulture. The vinery was subsequently

Outstanding contributions of Professor Emeritus Henry P. Orr were recognized with the 1983 dedication of the Henry P. Orr Vinery.

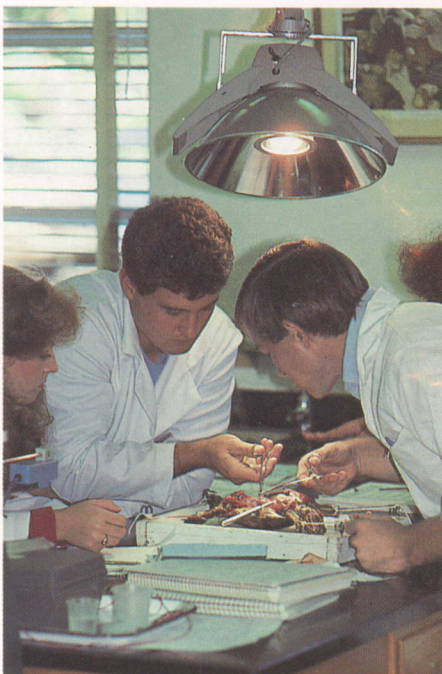


dedicated to Dr. Orr in recognition of his outstanding contributions.

A new Strengthened Subject Matter Option Program for A and AA certification in general biology has been reviewed by the State Department of Education and has been approved subject to some minor revisions. This will allow graduates who are presently certified to teach to return to Auburn University and obtain a masters or Ph.D. in their area of specialization, thereby becoming more proficient.

Enrollment in pre-veterinary options in Animal and Dairy Sciences, Entomology, Microbiology, Poultry Science, Zoology, and Wildlife Management continues to grow. This option allows students to more easily pursue a bachelor's degree in their chosen department while also obtaining the prerequisites for admittance to the veterinary medicine program.

A new curriculum in Rural Sociology, which had been approved at the University level, was given final approval by the Alabama Commission on Higher Education, thereby offering better service to students in this important area. Courses and curricula are constantly being changed to keep programs on the "cutting edge."



Enrollment in pre-veterinary options continues to grow as students take advantage of the expanded career options offered by this addition to curricula in the School of Agriculture, Forestry, and Biological Sciences.

graduate Agricultural Finance course was changed from 3 to 5 credit hours. A new course, titled World and Agricultural Trade, was offered in the Department for the first time in the spring quarter of 1983. Problems involving the use of microcomputers were covered in several courses taught in the Department.

Students in the Agricultural Economics Club initiated a newsletter entitled "The Economic Exchange," published weekly during the school quarter. Its purpose is to enhance communication among students and between students and faculty.

Every 5 years the Department of Agricultural Economics and Rural Sociology carries out a survey of former B.S. and M.S. students. A total of 610 graduates was recently contacted to obtain information on location, employment, incomes, and comments concerning the curriculum. About three-fourths of the graduates were pursuing careers in agriculture, agribusiness, and related areas. Agribusiness and finance (25 percent) and credit (17 percent) were the agriculturally related occupations accounting for most of the responding graduates. About 10 percent of the graduates claim farming as their major occupation.

The majority of graduates indicated that training received at Auburn was closely related to the requirement of both their beginning and present career choices. Areas recommended for additional training or course offerings in the department included: computer applications, management, cooperatives, sales, and human and personal relations. A report entitled "Characteristics and Status of Graduates in the Department of Agricultural Economics and Rural Sociology" was published based on the findings of the survey of former students.

DEPARTMENTAL REPORTS

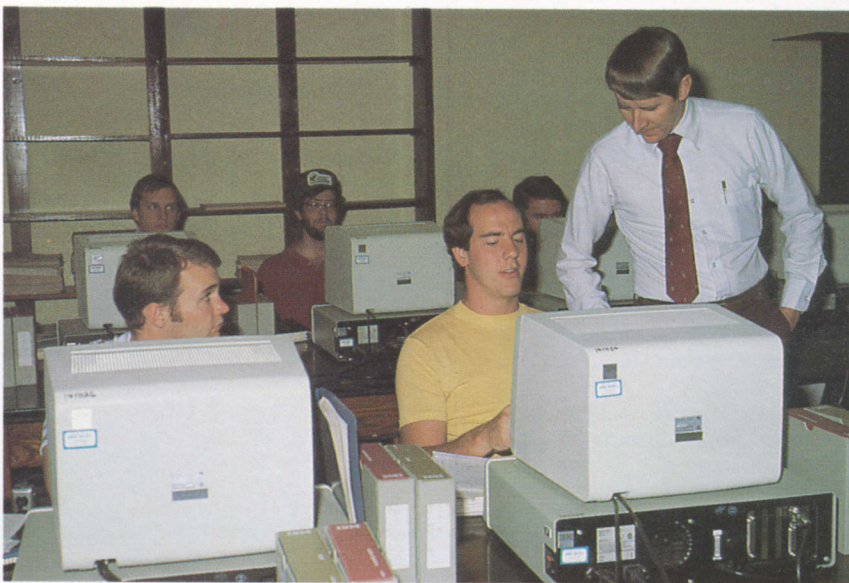
Agricultural Economics and Rural Sociology

The Department continued to utilize the microcomputer laboratory not only for teaching the formal course, Microcomputer Applications to Agriculture, but also in training sessions for various groups. Groups of farmers, Soil Conservation Service personnel, vocational education teachers, faculty, and others were given training in microcomputers and their use in agriculture during the year.

A new curriculum, Rural Sociology, was approved by the Alabama Commission on Higher Education. The curriculum is designed to link basic understanding of agricultural production, marketing, and distribution to a broader appreciation of social relationships, processes, and organization. Formal academic training in the sciences and production is intended to foster a practical problem-solving approach to social issues. Graduates will be prepared to undertake people-oriented careers in business, industry, and government or to pursue further training in the social or agricultural sciences. The curriculum includes a directed field experience course that will provide students practical work involvement in an agribusiness firm or in other organizations that serve farmers and rural people.

Further development of courses, policies, and procedures for the Ph.D. program in Agricultural Economics was carried out during the year. Advanced courses in Agricultural Policy, Economics of Agricultural Production, and Advanced Agricultural Finance were developed. Recognizing the importance of agricultural finance and credit in the training of young people in agriculture, the under-

Training in the use of computers is an integral part of the training offered to prepare students for careers in the high-tech fields of agriculture.



Agricultural Engineering

A revised curriculum in Agricultural Engineering was implemented in 1983. Computer usage in engineering analysis and design has been increased considerably. Laboratory work has been strengthened in many of the courses.

The content of Electrical Systems in Agriculture has been increased from 3 to 5 credit hours. Major additions to the course content are in the area of linear feedback and control systems theory in solid state control devices. Nine new laboratory sessions are being added.

Agricultural Processing and Food Engineering has been increased from 3 to 5 credit hours. A significant amount of new engineering analysis and laboratories has been added. Engineering analysis and design principles and equipment selection for crop, food and feed storage, preservation, and manufacturing are covered. Thermal processing, curing, drying, refrigeration, materials handling, pumps, fans, and storage processes are taught.

A new 6-credit course in Environment of Agricultural Structures and Waste Management is now required of agricultural engineering majors. Functional requirements and engineering analysis and design of animal structures and agricultural storage buildings are considered. Emphasis on environmental control systems and energy management is stressed. Animal waste transport, biological treatment, and processing, with emphasis on total utilization for refeeding and energy production, is considered.

A complete continuous systems simulation language for use on the Department's computer system has been developed for graduate instruction and



Agricultural engineering students gain visibility on campus by using antique steam tractor they maintain for special campus events.

research programs. This general purpose, user oriented CSMP-type language allows mathematical models of biological and physical systems to be evaluated with either numerical or graphical output. Applications are being made to waste management, irrigation, and tillage.

Agronomy and Soils

A number of improvements have been made in departmental procedures in the past year. Among them is the system whereby advisors are allowing students to make appointments for registration by

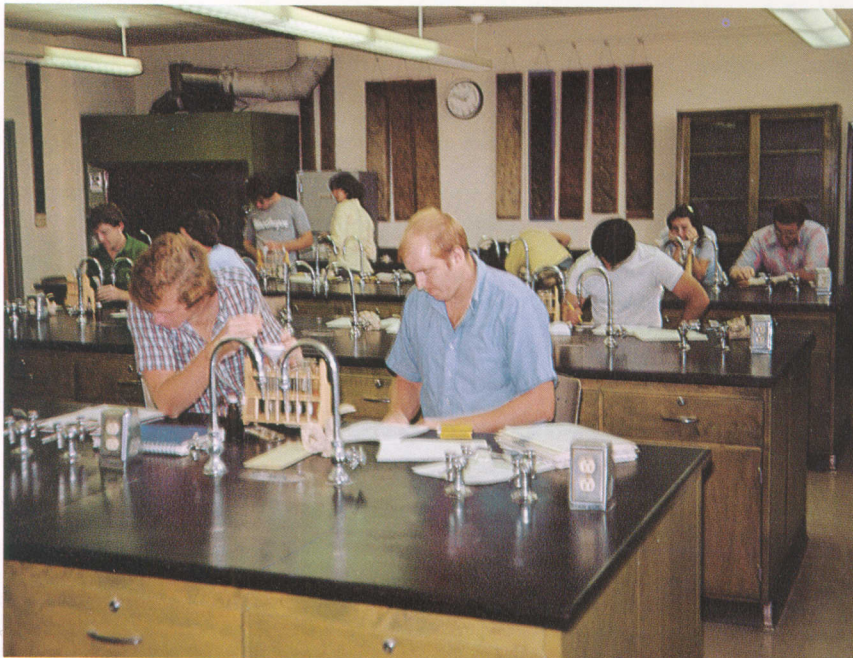
providing sign-up sheets on their doors. This makes it easier for the student to contact his professor and permits the professor to distribute his time more evenly among his advisees. The Department has purchased new projection screens for all classrooms and laboratory rooms used for teaching.

A newly established set of required basic courses for graduate students will help to maintain the highest standards for the graduate program. In conjunction with the USDA Office of International Cooperation and Development, the Department of Agronomy and Soils gave a fertility management course attended by 15 international students. Most of the teaching staff participated in this program.

Undergraduate students participated in the regional soil judging contest and graduate students were on the weed science judging team which entered the regional contest. A number of students were involved in internship programs in the department. These programs give students valuable experience in the field and contribute significantly to the learning experience. Two students within the Department placed second in the Southern Weed Science Society Graduate Student Paper competition.

Prospective students in the Department are being written a personal letter encouraging them to attend Auburn University in the Department of Agronomy and Soils. The Agronomy Club has sponsored a sale of "Auburn Agronomy" jackets and caps to faculty and students to increase visibility. In addition, students with academic problems are given special counseling in hopes of retaining them.

The science of soil reaction is an essential part of agricultural training.





Study of physiology of reproduction provides senior students with scientific base for careers in animal agriculture.



The Auburn University Herbarium is the official reference collection of plants for the State of Alabama.

Animal and Dairy Sciences

The Department of Animal and Dairy Sciences' teaching program continues to increase, and currently the ADS curriculum has the largest enrollment in the School of Agriculture, Forestry, and Biological Sciences. Animal and Dairy Sciences graduates are employed in a variety of positions, including management positions which range from seedstock farms to agricultural industries. An excellent pre-veterinary medicine program also prepares students for training in the field of veterinary medicine.

NEW OPERATIONS. Major emphasis was placed on the use of computers in the ADS instruction program, with new IBM Personal Computers purchased for the faculty. The new computers have greatly improved the course content, particularly in the junior and senior level courses. The computers have expanded the graduate program and allow graduate students to become fully trained on use of computers for their instruction and graduate programs.

CURRICULUM CHANGES. Students in the production option of the Department can elect to take chemistry and math courses which have more application to their field of interest. Changes in the chemistry and math requirements in 1983 give the students more flexibility in selecting courses for the ADS curriculum. Also, new courses in livestock merchandising and physiology of lactation were offered this year.

DEVELOPMENTS IN THE DEPARTMENT. Grant funds were used to improve

the facilities at the horse teaching unit. New fencing was also established and major landscaping was completed at the horse teaching unit.

Major improvements in the beef teaching unit were also initiated in 1983. A successful embryo transfer program was started and several students participated in the program. A Polled Hereford heifer produced at the beef teaching unit and shown by an ADS major at a national show was selected as the Grand Champion female. The heifer was later sold for \$18,000.

The ADS intern program was an active part of the undergraduate curriculum. The intern program was reported in a paper at the Southern Section of the American Society of Animal Science. The ADS intern program is the largest in the Southeast.

RECRUITMENT. The outstanding curriculum and faculty in the Department continues to attract outstanding young people from Alabama and the Southeast. The Department has no formal recruiting program. Visits with agricultural leaders and potential students are made each time faculty and staff participate in state meetings and other programs. The best recruitment is to have a quality program.

Botany, Plant Pathology, and Microbiology

The Department of Botany, Plant Pathology, and Microbiology is copartner with the Department of Zoology-Entomology in an instructional program in general biology that meets the need for basic training in biology throughout the University. The General Biology Program

offers undergraduate level courses in two specialized sequences—one for science and professional majors in medicine and one for nonscience and education majors. The present sequence of courses for nonscience majors has been developed only during the past 2 years and includes course offerings in human ecology and the relationship of microbes to man.

During 1983, a program in Biological Statistics (BST) was organized. Additional courses are listed in that program to provide students with an introduction to computer applications, computer programming, and statistics. Graduate students with interest in agriculture, forestry, or biological sciences may now obtain a minor in applied biological statistics.

Facilities for microbiology instruction were improved substantially last year by the purchase of student microscopes offering both high resolution and phase-contrast capability. New space and money for equipment were also provided during 1983 for a laboratory course in molecular genetics to be offered at the Leach Nuclear Science Center.

The curricula of the department have been expanded by the addition of courses emphasizing plant and microbial genetics, ultrastructure, and biochemistry.

Fisberies and Allied Aquacultures

The Department is in the process of computerizing certain of its graduate student records. Once the system is in place, it will be much easier to monitor the progress of students. With the large num-



Students from around the world come to Auburn to study in the world renowned fisheries and aquaculture program.

ber of students, it is important that they be encouraged to select committees, develop plans of study, and develop examinations in a timely manner.

Two new courses were added to the curriculum: FAA 599, Research Methods, was developed to better advise the incoming students in a systematic way on matters related to beginning their thesis and dissertation research. In addition, a new section was added to the Special Problems Course, FAA 698, Aquaculture Facilities. This was added to give the students credit for special assignments in designing facilities for use at the Fisheries Research Unit at North Auburn.

A number of courses were restructured during 1983. In particular, FAA 520, 521, 522, 528, and 529 have been redesigned and submitted to the Curriculum Committee. If approved, these changes will be implemented in 1984. These changes are a part of a major revision in the Aquaculture curriculum.

Progress was made during the year in developing a computer system in the Department for use in the teaching program. A series of 11 Apple IIe computers, disk drives, and matrix dot printers in individual offices and laboratories has been linked together in a network and joined with a centrally located CORVUS hard disk storage facility and letter-quality printer. Two of the individual computers can be linked to the IBM mainframe in the Computer Center. With these two computers serving as "dumb" terminals, it is possible for all the machines in the network to access the mainframe. Several of the staff and a large number of the students are utilizing this facility.



Students in forest engineering use state-of-the-art surveying equipment in their studies.

A major restructuring of the master of aquaculture program was begun in 1983. The program has been in effect for 4 years, and experience indicated a need to change certain aspects. The program objectives could not be realized and the number of hours allotted to the field internship part of the program was not sufficient. Another problem encountered was the lack of supervision and direction. The program had been organized without committing additional faculty supervision to it. As a result, the students in the program did not feel they were receiving adequate supervision. Fortunately the School was able to provide monies for part of an FTE to support the program. A program coordinator has been identified, and increased interest in the program is evident. It appears that enrollment will also increase.

In the past year the Department initiated a plan to reduce the number of students in the graduate program and shifted the proportions enrolled in the three graduate degrees. To more nearly match enrollment with resources, it was decided to gradually reduce graduate enrollment. The plan is to decrease the number of students in M.S. and Ph.D. programs while increasing the number seeking the master of aquaculture. This shifting emphasis should reduce the graduate load on the research staff.

A major emphasis in the teaching program is on graduate education. The Department continues to have one of the larger graduate programs in the university. Plans call for an increased enrollment in the undergraduate program, but slowly so there will be additional job

forest management, or broaden their education base in a number of areas. opportunities for these graduates. To meet the projected growing demand for graduates in fish farming, a new fish production option was begun in 1983. This option places more emphasis on field laboratory courses.

In June the Department provided a one-week, non-credit short course in management of farm ponds for sport fishing for Alabama vocational agriculture teachers. Training for this group will be continued, with consideration being given for offering a credit short course for their use. This group of high school teachers would be of considerable assistance to the Department in the recruiting of undergraduates.

Forestry

CURRICULUM CHANGES. The curriculum leading to the bachelor of science in forest products in the Department of Forestry was revised in 1983. The major changes were to increase the number of courses in business and to provide more flexibility in the curriculum through a restricted electives category.

The goal of the Forest Products curriculum remains essentially the same, to produce a graduate who has a good knowledge of wood as a material, along with sufficient business and engineering principles to function effectively in the forest products industry. Through proper choice of both free and restricted electives, individual students can emphasize areas such as basic science, business, or forest management, or broaden their education base in a number of areas.

ACCREDITATION, OTHER ADVANCES. A major activity for the Department during 1983 was reaccreditation of the Forest Management curriculum and initial accreditation of the Forest Engineering curriculum. A review team representing the Society of American Foresters and the Society of Wood Science and Technology visited the campus in April 1983. Final action on accreditation was taken at the Society of American Foresters annual meeting in October 1983. The Forest Management curriculum received a full 5-year accredited status, the maximum possible. The Forest Engineering curriculum received 2 years' accreditation, with some minor adjustments necessary to receive an additional 3 years. These adjustments will be made in 1984. The Forest Products curriculum was reviewed by the Society of Wood Science and Technology, but SWST is just initiating professional accreditation and the Auburn visit was a "trial run."

The forestry teaching program received an unexpected, but welcome, addition when Robert E. Mitchell, Chief Forester and Vice President of MacMillan-Bloedel Inc., was named an adjunct professor in the Department, March 1, 1983. This arrangement was made possible through the generosity of MacMillan-Bloedel. The firm retains Mr. Mitchell on its payroll, but allows him to spend approximately half time working in various

aspects of the Department's program. During 1983, Mr. Mitchell taught Introduction to Forestry and will teach this course again in 1984, as well as a senior level forestry problems course. Our students are fortunate to have an individual with Mr. Mitchell's expertise and experience as their instructor in these courses.

STUDENT RECRUITMENT. At the annual meeting of the Department of Forestry Advisory Committee in November 1983, a program was initiated to involve Advisory Committee members in student recruitment. Specifically, the program will be initially aimed at identifying students at Alabama's junior colleges who have an interest in forestry. Each junior college has been assigned to one or more members of the Advisory Committee who will contact the junior college administration, identify students interested in forestry, and then meet with these students and their instructors to discuss Auburn's forestry curricula, prerequisites, and forestry career opportunities.

Horticulture

The Department purchased two new pieces of equipment that will be useful in the teaching programs. From special funds from the Dean's Office, the Department acquired a CPT word processor. This machine will speed up the preparation of examinations and class handout

materials and simplify record keeping on students and graduates. At the beginning of the academic year the Department purchased a Kodak Ectographic Auto Viewer and projector. This self-contained, rear mounted projector and screen with built-in audio is a piece of equipment the Department has needed for years. The machine's primary use will be for teaching Plant Materials where students can, with the help of the machine, study on their own time, and at their own pace.

For some time the Department of Architecture, which teaches two required courses in Landscape Architecture for horticulture students, has had difficulty finding space for these students. The number of students in Landscape Architecture is limited by the number of drawing tables available. The Horticulture Department has agreed that the Landscape Architecture courses for horticulture students will be taught in Horticulture's landscape design teaching laboratory in Funchess Hall.

Funds were made available to hire one student half-time to maintain the field research in teaching areas on campus. This has resulted in a marked improvement in the horticulture student orchards and gardens on campus.

The Department has long used the ornamental plantings on campus in its ornamental horticulture teaching pro-

Job opportunities are bright for ornamental horticulture students who gain valuable experience through a teaching program in which they design landscape plans and install the landscaping around campus buildings.



gram. In the past this has been a matter of studying the material already present on campus. This approach was changed last year when students began to actively landscape and maintain parts of the campus. Among other projects, these students drew up the landscape plans for and installed the landscaping for Comer Hall. They pruned and renovated the shrubbery around the Telfair B. Peet Theatre and Dudley Hall and planted trees in the lawn area of Comer Hall and the Library. One student landscaped Alumni Hall and won the Tidy Tiger Award for that project.

The Department made two major curriculum changes in the past year. Introduction to Horticulture, HF 101, was extensively revised to make it a 3-hour course instead of 1 hour, and a new 3-hour course, HF 412, Interior Plantscaping, was developed and taught for the first time.

In revising HF 101 to make it a 3-hour course, the Department has developed a dual-purpose course to serve the needs of freshmen in horticulture as well as many other students throughout the campus who wish to gain some understanding and feel for horticulture but who do not wish to major in the program. Such "service" courses in horticulture have been extremely popular on other parts of the campus. As our new HF 101 becomes better known, this course can provide an interesting elective to many students on campus.

The proliferation of fast-food restaurants has resulted in an increase of job opportunities for those trained in ornamental horticulture, especially in the maintenance of lawns and shrubs. These students have been well trained to profit from this trend. A new service that is gaining importance is the planning and maintenance of interior plantings. A number of students have recently found employment in that field.

Believing that job placement is a prerequisite to recruiting, Department faculty have made that their number one goal with a large measure of success already evident. At this time organizations are waiting in line for graduates from the horticulture programs. Now that they can provide more jobs than they have students, faculty feel they are in a strong position to recruit.

Poultry Science

The Department of Poultry Science was the "spotlight" department at the Sunbelt Agricultural Exposition in Moultrie, Georgia, in 1983. The Department developed an outstanding exhibit that created widespread regional interest.

Continuing emphasis is being placed on recruitment within the Department since job opportunities far exceed the number of graduates available. The De-



Use of an electron microscope in the poultry science teaching program gives students experience and knowledge in use of scientific equipment.

partment works with the placement of students and probably is the lead department in the nation in placing students in the processing area.

The Department is continuing its efforts to improve its scholarship program, which will also assist in recruiting. A student in the Department is the 1983 Vice President of the Southeastern Poultry Science Club.

The new pre-vet option resulted in the enrollment of the first three students in this program in the fall of 1983. In addition, two students are participating in the first summer intern program. This program is expected to grow as students and industry recognize its value. The Department has made a slight modification in the curriculum for Poultry Science Agribusiness majors to provide more applicable math and computer training for these students.

Zoology-Entomology

The Department of Zoology-Entomology has made significant strides in its academic program during the past year. A major change was the approval of the Integrated Pest Management curriculum in the Department. In addition, internship options were opened in both the Wildlife and Entomology areas. There has also been a rapidly expanding enrollment in the pre-vet program within the various entities in the Department.

The Department's vigorous student recruiting program continues to be one of the best in the School. One new innovation established this year was a formal interaction with all high school science clubs and their sponsors throughout the State. Additionally, the faculty in this Department are extremely active participants in high school programs, science

fairs, and the Alabama Junior Academy of Sciences. At the graduate level, a computerized mailing list has been developed to target information on Departmental graduate programs to specific entities throughout the United States. There is a highly structured Departmental mechanism for answering inquiries from potential graduate students and putting them in contact with the appropriate Departmental faculty.

The teaching program for the Department of Zoology-Entomology has continued to evolve to be more responsive to the needs of students served. During the past year, more than 5,000 students were exposed to course offerings in the basic life sciences as well as entomology, marine biology, and wildlife management. Major curriculum changes included the establishment of both entomology and wildlife management internship programs to provide hands-on experience as part of the educational process. Additionally, the establishment of a new Integrated Pest Management curriculum within the Department will afford the opportunity to provide students with necessary educational experience for employment in the expanding pest management industry.

Recruitment of outstanding students continues to be a priority program within the Department. In times of declining enrollments elsewhere, the Department has continued to attract increasing numbers of majors into its various programs, both at the undergraduate and graduate levels. Recently established pre-veterinary medicine curricula have exhibited significant growth.

Students and faculty in the Department have continued to be recognized for outstanding achievements. The Student Wildlife Society Competition Team earned third place honors in the Southeast against stiff competition from nine other major universities, while the Student Entomology Team was crowned as Southeastern Champions. This year's School of Agriculture, Forestry, and Biological Sciences Outstanding Student Award also was earned by a major within the Department. Individual faculty within the Department were recognized with the Dean's Award for Teaching Excellence and the Outstanding Teacher Award. Faculty honors include election to presidencies or other key offices in regional, national, and international societies.

Despite severe economic pressures, the Department has continued to expand its programs to meet the needs of students served. Stipends for graduate assistants were increased on an average 15 percent and a new scholarship program was established by the Alabama Pest Control Association. The Department has also continued to expand its already excellent computer teaching facilities. The recent



Conducting insect population studies under varying habitat conditions is one phase of the innovative entomology teaching program.

location of the University Satellite Computing Facility within the Department provides ready access of computer terminals to all students.

General Biology

Twelve different General Biology faculty spent much of their time in 1983 developing and adjusting to new courses now offered in the freshman program. Several of these faculty were involved in the development of two new laboratory manuals written exclusively for two of these courses. One of the manuals has been published by Kendall-Hunt Publishing Company and the other is presently being prepared by University Printing Service.

The new principle course for non-science majors (BI 105, Perspectives in Biology) was also prepared for listing in the Auburn University Independent Study Program Catalog for the current year. This involved the writing of a 300-page course book that is now in press. The unique feature of this correspondence course is the inclusion of the laboratory experience. This may be the only biology course in the United States offered for independent study that includes a laboratory component.

Much new office equipment was obtained and installed in the General Biology secretarial service centers in 1983. Virtually all teaching and testing materials are now developed by word processor. The high-speed printer allows rapid production of multi-copies of ditto masters producing clear-copy materials for large classes. Virtually every professor

has developed some type of test blank procedure on word processor disks. Even with technical manuscripts, the secretarial staff turnaround time is usually less than 24 hours.

The two new IBM Personal Computers purchased in late 1983 are being used by most faculty to store class rolls and test scores and to compute final grades. At least one-half of the faculty are spending the time necessary to become proficient on these machines. Both undergraduate and graduate students are also using this equipment, often at night.

Enrollment in the general biology courses took a sharp upward turn in 1983. Teachers assigned a total of 1,250 grades at the end of fall quarter 1982. That jumped to 1,444 in the fall of 1983. This increase in teaching loads was accommodated by more judicious use of the large lecture room and assignment of larger teaching loads for both faculty and graduate teaching assistants.

Agricultural Journalism

Although it does not exist as a separate department, a number of students are enrolled in the new curriculum of Agricultural Journalism. This curriculum will prepare graduates for a variety of careers requiring skills in writing articles, reports, and broadcasting news related to agriculture. The curriculum provides specialized knowledge of agricultural subjects as well as journalism training. It provides a new opportunity to students who are scientifically oriented and desire to work in communications. Job opportunities in this area continue to be bright.

ALABAMA COOPERATIVE EXTENSION SERVICE

PERHAPS THE MOST effective way Extension goes about its assigned job of "helping people help themselves" is by working with and helping develop *leaders*. All agriculture and forestry demonstration work is based on this principle: identifying energetic, forward-looking people who are willing to shoulder responsibility, and then helping them show the better way to others. It's a time-tested method, and a theme that runs through all phases of Extension work.

As you will see, the theme of leadership development is prominent throughout the brief articles which make up this report. Just a glance will tell you that most of the accomplishments reported in agriculture and forestry are based on successful leadership development, either in demonstration projects or in our work with associations and other clientele groups. In 4-H, shaping the future leaders of our rural communities and our agriculture and forest industries is a central concern.

AGRICULTURE AND NATURAL RESOURCES

Forest Demonstrations Show Way to Productivity

At the end of 1983 there were 39 active forest management demonstrations in Alabama, totalling nearly 23,000 acres, and 9 more being developed. Purpose of the demonstrations is to show non-industrial private landowners the benefits of multiple-use forest management and increased productivity. Currently, there are about 200,000 of these owners, who

In home economics and home gardening, the theme is most obvious in the reports on training Master Volunteers. And in community resource development almost all efforts are directed through leaders of public, professional, or volunteer organizations.

In terms of long-range benefits, the most significant achievement related to leadership in 1983 was launching of a project known as LEADERS—the Alabama Agriculture and Forestry Leadership Development Program. LEADERS aims at strengthening the voice of agriculture and forestry in public affairs by giving intensive training to selected individuals who have already demonstrated leadership capability in agriculture, forestry, or agribusiness careers.

For convenience, details of the LEADERS program are given in the CRD section of this report. Clearly, however, the promise of LEADERS goes far beyond any single Extension program area in its potential for impact on the future of Alabama.

control about three-fourths of our 22 million acres of forestland, and this land is producing only about half its potential timber yield.

The demonstration program is coordinated by Extension, in cooperation with the Alabama Forestry Planning Committee and county forestry committees. Achievement of full production potential on the demonstration acreage alone would mean an eventual increase in forestry income of \$250,000 per year. Nearly 2,300 peo-



Nearly 2,300 people attended forest management education programs on demonstration properties in 1983.

ple visited these demonstrations last year. As more and more owners are influenced by them, the additional income will run into the millions.

Water Quality Training Aids Catfish Farmers

Catfish farming became more profitable in 1983 as prices paid for fish were higher and feed prices lower. Losses caused by the catfish farmer's number one killer, low oxygen, were reduced by 80 percent from 1982, adding additional revenue to catfish operations.

Aiding farmers in their efforts to control losses were four intensive multi-county water quality training courses given to catfish producers by aquacultural specialists at the Alabama Fish Farming Center in Greensboro. Newsletters, farm visits, and office consultations supported the program aimed at reducing fish losses. No fish were lost by training course participants. In fact, overall losses to low oxygen were reduced to 100,000 pounds during 1983 compared to 500,000 pounds lost during 1982. The result was \$200,000 additional income to catfish producers in west Alabama.

Finance Workshops Cut Credit Costs

Many Alabama farmers experienced serious financial difficulties in 1983. One Extension response was a series of 13 financial management workshops held at various locations around the State and involving both farmers and lending agencies.

Water quality management education helped catfish farmers cut fish losses by 80 percent.





In 1983 Extension expanded microcomputer-application assistance to farmers, and continued its own search for improved efficiency through electronics, as in this micro-system used by pest management specialists.

The need expressed by both farmers and lenders was for a better understanding of farm records and financial documents, to enable them to build on financial strengths and shore up financial weaknesses. The workshops concentrated on practical management tools such as cash flow plans, enterprise budgets, and profit and loss statements, showing participants how to use these tools to cut the amount they pay in interest cost by at least 10 percent. Farmer and lender response was enthusiastic, and similar workshops will be held in other areas of the State.

Farmers Look to Extension For Computer Help

Managing farm resources has become a very complex problem, and many Ala-

bama farmers have found that microcomputers can be very useful in dealing with their farm management problems. Most of these "computer farmers" have also turned to Extension for assistance in making the best possible use of computers.

During 1983, Extension helped nearly 2,000 people learn computer uses in various kinds of meetings, including seven farmer workshops.

In 1983, plans were finalized for establishing an Extension microcomputer facility on the Auburn University campus. This facility will be used for training Alabama farmers, Extension personnel, agribusinessmen, vocational-agricultural teachers, and others in applying microcomputer technology. In addition to computer education, Extension is also able to assist farmers with the use of Univer-

Jennifer's tomato represents a sector of our agricultural economy worth over \$500 million last year. Extension serves nearly 700,000 home-gardening households primarily through the media.



sity-developed public domain software programs. As more farmers acquire microcomputers, the demand for such help will surely increase.

Demonstration Program Helps Small Farmers

Extension has developed an extensive demonstration program to help small and limited-resource farm families improve their productivity and income through better methods of farm management, marketing, and home food supply production. This program is conducted in all counties. The Extension Service at Auburn University and the Extension Programs at Tuskegee Institute and at Alabama A&M University cooperate in conducting this program in their respective areas.

Each farmer selected for the program conducts either a whole-farm demonstration or an enterprise demonstration for livestock, crop, or home food supply production. In some areas, TVA provides incentive fertilizer or seed.

In 1983, whole-farm management demonstrations were completed on 29 farms. Agricultural enterprise demonstrations were conducted on 108 crop and 102 livestock farms. Whole-farm demonstrations averaged a net income of \$8,255. Crop enterprises had an average value of \$1,033 and livestock enterprises \$1,211. Home food supply demonstrations were conducted on 914 farms, and had an average value of \$224.

Horticulture Information Reaches Huge Audience Through Mass Media

Interest in home horticulture has increased rapidly over the past 10 years. Demand for information on gardening, lawns, and ornamentals is great. To meet the demand, Extension makes use of mass media to supply needed information to Alabama's 1.35 million homeowners and 675,000 home gardeners.

The year 1983 was typical. County Extension offices handled a flood of telephone calls and letters in the spring following distribution of 34 horticulture TV spots to seven stations. It was estimated that each of these short programs reached over 200,000 people. Using information supplied by specialists at Auburn, county agents spread the word through their own radio programs, and through newspaper columns and articles. A special Spring Garden Packet of 31 articles was prepared at Auburn and sent to 23 newspapers. Five major papers, with a combined circulation of over 350,000, used the packet as a Sunday supplement; and the others used the articles in their homeowner sections.

Ideas Shared on Pecan Tour

The 125 people attending the Central Alabama Pecan Tour and Field Day last summer had the opportunity to share ideas and to see innovations in pecan orchard management.

Thanks to the cooperation of several central Alabama pecan growers, tour participants saw pecan trickle irrigation systems, techniques in pecan pest management, the results of pruning large trees, and equipment for mechanizing pecan culture. Tour stops at research plantings at the E.V. Smith Research Center near Milstead and the Turnipseed-Ikenberry place near Union Springs allowed growers to see first-hand ongoing research on pecan pest management, high density plantings with the variety Cheyenne, and management of older trees.

Grower interest in innovative ideas, as seen on the Pecan Tour, which was a cooperative effort of Extension and the Alabama Pecan Growers Association, has helped Alabama become the third-ranked state nationally in pecan production.

Cotton Producers Shown Higher Yield Potential

Four Extension demonstrations in three counties comparing low and high density cotton plantings (65,000 vs. 132,000 plants per acre) have shown an average increase in yield of 100 pounds of seed cotton per acre on the lower density. Cotton also was 10 percent earlier in maturing in the lower density stands, with 25 percent fewer barren plants. One of the demonstrations showed a 26 percent increase in yields, with only half as many barren plants.

The reason for high density stands was that when cotton growers started harvesting with mechanical cotton pickers they were encouraged to plant more seed per acre in order to have a more even and efficient flow of cotton into the picker. Now, most growers are planning for increased yield by reducing planting density.

Operation SOIL Stops Erosion

Operation SOIL, a multi-agency program launched in 1983, is designed to reduce serious soil erosion problems in 16 north Alabama counties which account for a third of the State's cropland. On fully 80 percent of this cropland, erosion rates have been ranging from 2 to 8 times what is considered acceptable for sustained agricultural production.

Important progress was made in 1983 by establishment of 35 conservation tillage demonstrations in 9 counties, including corn, grain sorghum, soybean, and alfalfa crops. Because no-till or conservation tillage is one of the most effective

erosion control methods available to the farmer, this program element will be expanded to all 16 counties in 1984.

Fescue Toxicity Service Aids Cattlemen

Surveys have shown most of Alabama's 850,000 acres of fescue pasture to be highly infected with the fungus recently shown to be responsible for "fescue toxicity," a syndrome in cattle that dramatically reduces animal gains and hinders reproductive efficiency.

On June 1, 1983, a Fescue Toxicity Diagnostic Center was opened on the Auburn University Campus as a joint project of the Alabama Cooperative Extension Service and the Alabama Agricultural Experiment Station. It offers producers a place to have fescue seed or plant samples tested for the fungus, and is the first such producer-oriented facility in the United States.

A massive Extension educational program was initiated to make certain fescue growers are aware of the Fescue Toxicity Diagnostic Center and their options regarding fescue. Elimination of the fungus from fescue pastures could increase gross income from beef cattle gains by over \$29 million annually in Alabama. Requests for fescue analyses have been received at a rate of about 100 per month, indicating the success of this program and its value to producers.

Extension's fescue toxicity information program aimed at dramatically increased cattle gains through elimination of fungus from pastures such as this.



Benefits of conservation tillage got statewide emphasis. Rye provided mulch for this beautiful no-till corn in Morgan County.

No-Till on Peanuts Shows Cost Advantage

Alabama's 183,000 acres of peanuts bring considerable income to the State, but they are an expensive crop to grow. Current estimates are that the average peanut producer spends about \$500 per acre before he sees any return for his investment. Ability to minimize production costs is therefore a key factor determining profit or loss.



Improved reproductive efficiency in swine herds was focus of the CHORE educational program.

In 1983 Extension demonstrations showed that the no-tillage approach to peanut production can be a significant cost saver. On five of six demonstration farms, no-till showed savings of from 5 to 25 percent, while maintaining acceptable yields.

BCIA Adds 50 Herds

Interest in performance testing of beef cattle continued to increase in 1983 with the addition of 50 new herds in the Extension-sponsored Alabama Beef Cattle Improvement Association. Some indication of the impact of performance testing on production can be seen in the fact that adjusted weaning weights are 88 pounds higher now than in the late 1960s. At present stocker calf prices, this improvement is worth about \$45 million for Alabama cattlemen. Much of this increase in performance has resulted from the use of superior sires, and the central bull testing programs have contributed greatly. Weight per day of age of bulls tested at Auburn University, the oldest

central test in America, has increased from 1.93 pounds in 1951 to 3.01 pounds in 1983.

Chore Produces Extra Pigs

CHORE, an acronym for Concentrate Harder on Reproductive Efficiency, is a new Extension swine educational program started in January, 1983, to increase the productivity of Alabama swine herds. The idea is to show Alabama swine producers how to carry out the key management and production "chores" that really improve reproductive efficiency, and can give them at least one extra pig per sow per year.

The latest research-tested information on reproductive efficiency has been made available in CHORE packets through county Extension offices. In addition, Extension has set up 218 demonstrations to show the practical applications and pay-offs from CHORE.

The Alabama Pork Producers Association, the Alabama Feed Manufacturers Association, and related agribusiness firms have been involved in launching CHORE by supporting the development of materials and by promoting the program.

Alabama DHIA Earns National Recognition

The Alabama Dairy Herd Improvement Association was evaluated by the national DHIA in 1983 according to the standards of a recently established nationwide Quality Certification program. The result: national recognition for Alabama DHIA for outstanding performance.

The new Quality Certification program is part of a reorganization of DHIA efforts designed to improve quality of service to members and strengthen the program as a total dairy management system rather than simply a production testing program. In the new arrangement, Extension provides educational and technical assistance to DHIA personnel who conduct the managerial aspects of the program.

Alabama producers have responded well to the changes. The Extension dairy specialist, county agents, and the DHIA manager have combined forces in meetings throughout the State to explain the reorganization and present updated information on use of records in decision-making. Currently, over half of Alabama's dairy herds are enrolled in DHIA, averaging 13,369 pounds of milk per year, as compared to less than 10,000 pounds for non-members.

Computer Analysis Provided For Poultry Producers

Looking for ways to help poultry producers become more efficient and maximize profits, Extension specialists designed a computer analysis program in 1983 to examine relationships between various production factors and cost in broiler complexes. The program, carried out with the involvement of Auburn research personnel, has so far been applied on 7 percent of Alabama's annual chick placement.

In one complex, representing 34 million broilers annually, the program identified a feed additive as a significant cost-saver, but saw no saving from a particular vaccination program. Factors generally identified as significantly influencing cost are feed conversion, market weight, percent livability, percent condemned, and market age. Applications of the program are being further explored, and it is expected that use will increase statewide.

Successful Wheat Storage Demonstrated

Over the past 5 years, wheat production in Alabama has increased significantly. The question has been, can we store wheat safely in Alabama? Wheat is

difficult to store in Alabama because it is harvested in early summer and must be stored when humidity and temperature are high and when insect infestations can be a problem. Addressing the practical problem, Extension has conducted demonstration work in several locations in the State. One farm in Hale County has successfully stored wheat in several bins for over a year. The 90,000-bushel facility was designed and built specifically for wheat storage, and includes a high speed automatic batch dryer. Data on this farm demonstration indicate that if Auburn University's recommendations are followed, farmers can successfully store wheat in Alabama. This demonstration will pioneer long term storage of wheat in the South.

Swine Housing Demonstration Shows Cost Saving

The cost of constructing conventional slatted and partially slatted swine finishing buildings has prevented many Alabama hog producers from constructing new facilities. A program to design and demonstrate lower cost swine finishing buildings utilizing state of the art technology in flush type manure removal systems was initiated during 1983.

To demonstrate these principles, a demonstration was established on a farm in DeKalb County, and a swine finishing facility capable of handling 1,000 head constructed. Compared to the cost of constructing a conventional slatted floor facility, savings were about \$40 per head

capacity with the new design. This amounted to a savings of \$40,000 in construction costs for this DeKalb pork producer. Open gutter flushing techniques used for manure removal in the building resulted also in reduced labor cost for cleaning and reduced odors in the facility.

Six-Point Program Fights Soybean Stem Canker

Losses to stem canker, a new and serious threat to Alabama's soybean industry, reached an estimated \$17 million in 1983. In response, Extension formulated a six-point educational program to help soybean producers battle stem canker in 1984. Key points in this program, already proven successful in the field, are crop rotation, use of stem canker resistant varieties, proper cultural practices, fungicide seed treatments, use of clean seed, and delayed planting.

Extension's educational campaign for the 1984 growing season started with three area meetings, including Extension and Experiment Station scientists, to acquaint leaders of Alabama's soybean industry with the stem canker control program. Numerous county meetings, articles in farm magazines and newspapers, and radio and TV programs were then used to introduce the six-point program to soybean producers. Information disseminated to soybean producers will be updated with the latest information from researchers in Alabama and surrounding states during the 1984 growing season.

Wiregrass Peanut Practices Improved

Begun only 9 years ago with 10 growers in one county, the Wiregrass Crop Pest Management Program has now been proven to have spurred revolutionary improvements in pest control practices among area peanut producers. A survey conducted in 1983 shows that nearly all Wiregrass growers have adopted the highly efficient and economical integrated pest management practices which are the heart of the program. The key finding is that 90 percent of the growers now use scouting to determine which pest control techniques are needed, and to eliminate those that are not.

Other significant findings: 87 percent now follow the recommended leafspot disease spray schedule; 78 percent use scouting to make weed control decisions; and 83 percent use threshold levels for leaf-feeding insect control decisions rather than the previously used automatic sprays which were more expensive and which kill beneficial insects that help control pests.

Scouts Trained for Cotton IPM Program

Over 170 persons were trained in three shortcourses by Extension specialists in 1983 to serve as field scouts for the cotton IPM program. Growers employing trained personnel to monitor insects obtain improved insect control through greater use of beneficial insects, treatment thresh-

Successful wheat storage know-how demonstrated at facilities such as this will pioneer long-term storage of wheat in the South.



A six-point educational campaign launched in 1983 will continue in 1984, helping soybean producers battle the serious problem of stem canker.





Pesticide applicator training is a vital service provided by Extension. In 1983, fly-ins such as this helped aerial applicators refine their performance and avoid environmental problems.

olds, and improved timing of insecticide applications. The economic benefits of IPM on cotton have been measured as increased yields of approximately 150 pounds of lint per acre, with little or no additional cost. Scouts trained in 1983 monitored insects on 149,000 of the state's 219,000 acres planted to cotton. Private consultants, who also attend these scouting shortcourses, monitored another 60,000 acres for growers.

Pesticide Applicator Training Safeguards Health, Environment

In 1983 as in other recent years in Alabama, very few cases of human or environmental injury from pesticides were seen. This is mainly because applicators have been made aware of the potential hazards of pesticides and have learned to use them safely. Extension conducts training programs for both farmers and commercial applicators each year. In 1983 nearly 4,000 farmers and over 1,200 commercial applicators signed up for this training.

In addition, Extension pest management and ag engineering specialists teamed with the Alabama Aerial Applicators Association to help aerial applicators refine their performance. Several fly-ins were held, and computer analyses were used to make suggestions for making applications more economical and reducing potential for environmental problems. Since three-fourths of all insecticides applied to row crops in Alabama are applied aurally, the statewide impact of this training will be considerable.

Mosley Awards Encourage Wise Resource Use

Last year Auburn University honored 19 Alabamians with the W. Kelly Mosley Environmental Award. Financed by an annual gift of \$15,000 by W. Kelly Mosley and sponsored and administered by Extension in cooperation with other agencies, the program encourages wise use of our forest resources by spotlighting the achievements of those who are either out-

standing practitioners of multiple-use forestry or whose work contributes to that practice.

In 1983 about 2,500 people attended Mosley Award recognition programs, which were also widely reported in the media and in trade journals and magazines. When people become aware of the achievements of others, they are encouraged to adopt the same beneficial practices.

4-H AND YOUTH

4-H—Responding to Changing Needs

Five years ago Alabama 4-H undertook an intensive self-study, resulting in the 1978 *4-H Program Review*, that has provided a blueprint for the direction 4-H has taken in the past 5 years.

Changes that were made have proved beneficial. 4-H curriculum committees were created to guide programs and publications. As a result of a recommendation to provide training to agents in recruiting and training leaders, agents' in-service training, area leader training workshops, sub-district leader meetings, and leader publications have been initiated. A third suggestion that has been followed is to provide more community and special interest club opportunities.

One of the most notable aspects of the years since the 1978 *Program Review* is that 4-H enrollment has held steady in spite of the fact that full-time 4-H professional positions have been decreased. Total enrollment for 1983 was 116,583; 72 percent were young 4-H'ers aged 9 to 12.

About 16 percent were farm youth, 7 percent urban, and 77 percent from towns under 10,000 and rural non-farm areas. This shift in 4-H population from farm to small town and urban areas has challenged 4-H to provide programming designed to meet the special interests and needs of these youth.

Citizenship Program Builds Leaders

During the first week of June each year 87 Alabama 4-H young people join fellow 4-H members from throughout the United States at the Citizenship—Washington Focus program. Using the nation's capitol as a classroom, they find out how government works and how they can be active and effective leaders in their communities.

At Citizenship Focus they make new friends from other states, use their leadership skills at special workshops and seminars on citizenship, and serve on committees. They learn more about their country's history and see for themselves how a bill becomes a law. They increase

their knowledge and appreciation of their American heritage. They exchange ideas with other 4-H members throughout the nation.

This program has helped maintain the interest of older youth in 4-H. Upon returning from Citizenship Focus, the teenagers use their newly acquired leadership and communication skills in their county programs. Of the youth who run for state council, apply for work at the state 4-H center, attend State and National 4-H Congress, participate in Caldwell Leadership Conference and serve as junior leaders at 4-H camp more than half attended Citizenship Focus.

Youth Learn to Reduce Energy Costs

The Alabama 4-H energy emphasis during 1983 was on modifying windows to manage heat loss and solar heat gain. Four-H'ers learned that using insulated shutters, sunscreens, and storm windows could reduce energy costs by up to 20 percent. A community service program promoted by county Extension offices in cooperation with the Alabama Power Company taught people to make their own storm windows at a very low cost. In two counties, workshop participants made storm windows providing significant savings for some 60 families over commercially available windows. This program will continue into 1984.

The 4-H Youth Development Center continued its efforts in energy management to reduce operating costs and to provide educational demonstrations for youth. The solar water heating system was modified in 1983 to be more effective in providing hot water for the cafeteria. Storm windows and sunscreens were installed in the lodge to help reduce the heating and cooling load. This project was planned and coordinated with cooperation from the Alabama Power Company and Vulcan Metal Company Supply Corporation.

Plans were made and work begun to install a heat recovery water heating system in the new dormitory at the Center. The system is expected to provide 80 to 90 percent of the hot water needs for the new dormitory, and save \$500 to \$600 a year.

Youth Learn Food Skills— and More

In 1983, over 60,000 Alabama youth were helped through food and nutrition programs to develop essential life skills related to selecting foods needed to stay healthy. Project activities provided over 30,000 girls and boys the opportunity to develop food related skills. In the process, they acquired other important life



These 4-H'ers studied water quality factors at a 4-H resource conference: just one example of 4-H preparing future citizens to meet the needs of a changing world.

skills. Sharing what they learned with community and school groups developed desirable citizenship responsibility and enabled them to understand those different from themselves. Presenting programs taught them to speak before groups. Competing in foods awards events prepared over 30,000 youth to function more effectively in today's competitive world. More boys competed in county and district events, and for the first time in the history of 4-H a boy won top state honors in a foods program when Joe Adams of Etowah County won first place in the meats demonstration.

In a statewide foods and nutrition study of 234 4-H'ers, all youth acquired nutri-

tional knowledge and each developed five or more skills in food preparation. Two-thirds reported learning skills in selecting and buying food and 9 out of 10 said they gained skills in planning meals, leadership, and communication. Half changed their attitude toward children, elderly, and handicapped.

Volunteer Leadership Recognized—and Enhanced

Some 25,000 adult and teen volunteers helped deliver the 4-H program in 1983. They are a vital part of the total 4-H program. Accordingly, *Alabama Salute to Excellence*—a new concept for

Learning to understand the meter was one factor in the 1983 4-H energy program, which helped youth learn to reduce energy costs.





This camper was one of over 60,000 4-H'ers who learned healthier nutritional habits in 1983.



Some 25,000 adult and teen volunteer leaders worked in the 4-H program in 1983. Salute to Excellence recognized their invaluable contribution.

recognizing and training these volunteers—focused on programs designed to enhance their leadership skills and understanding of the 4-H program, and to help them work more effectively with young people.

More than 100 volunteer adult 4-H leaders participated in intensive training/recognition programs highlighted by idea sharing and methods of applying new knowledge and ideas in local situations. Specifically:

—An experimental series of five area meetings, conducted with 30 volunteers and professional 4-H staff working together on topics of the group's choice.

—Alabama's annual volunteer 4-H leader retreat, a weekend program of learning, fun, and fellowship attracting 65 adult local 4-H leaders from across the State.

—Representation by 13 4-H volunteer and professional workers in program and leadership roles at the annual Southern Region 4-H Volunteer Leader Forum.

Another 300 leaders participated in sub-district recognition programs during district 4-H roundups, where they had opportunities to get acquainted and share program ideas.

New Livestock Program Expands Participation

Many 4-H members in the State who are interested in livestock may not be situated to raise purebred animals. To provide these club members an opportunity for livestock projects, specific ac-

tivities for 4-H'ers with commercial or non-registered heifers were introduced in 1983. Four fairs cooperated with Extension to establish classes in the junior shows for non-registered beef heifers. Most of the heifers exhibited in 1983 were owned by the 4-H'ers, but some were leased from producers. Participation in 4-H beef and heifer programs increased by about 20 percent over 1982. The quality of the animals exhibited was exceptionally good.

In many cases it exceeded that of the purebred animals exhibited.

A continued increase is expected in both the number of 4-H'ers participating in this program and the number of animals being shown. Commercial beef producers in the State will have an opportunity to observe high quality non-registered animals, and will be encouraged to improve both the quality and growth rate of their own herds.

HOME ECONOMICS

Home-Based Business Training Offered

Alabamians looking for ways to turn their skills into money-making home-based businesses found a resource in Extension programs in 1983. Designed to be taught in 4-hour seminars at multi-county area meetings, three home-business training programs focus on the basics of starting and operating a business.

"Sew for Pay," begun in 1982 and continued through 1983, was presented 21 times across the State to about 1,200 people. Participants were introduced to sewing specialties, pricing structures, resources, and organizational guidelines. Participants continue to receive "The Sew for Pay Newsletter" quarterly to update information and resources in the field.

"Catering/Food for Profit" was presented nine times across the State to about 700 people in the summer and fall of 1983. Special emphasis was placed on government regulations and health codes.

Participants were introduced to ways to use their expertise in operating a food-oriented business from their home legally.

"CASH: Creative Artisans Succeeding At Home," the newest home-based business program, was piloted during 1983 in two locations and will be presented at nine sites during 1984. "CASH" focuses on assisting people with product oriented businesses by providing information about pricing strategies, product development concepts, marketing alternatives, and planning.

Families Helped to Make It Through Hard Times

As a continued response to the financial and emotional stresses on Alabama families due to the high unemployment rate, Extension intensified the multi-disciplinary program "Making It Through Hard Times" in 1983.

A series of nine publications with suggestions for coping with various aspects

of unemployment was introduced. Extension agents across the State stressed topics such as dealing with creditors, job hunting information, tips for saving money in meal preparation and in energy consumption, information on increasing income, and public assistance availability. The information also was stressed in newsletters, radio and television programs, and special emphasis meetings. Statewide, county agents distributed over 27,000 publications.

A random survey of 12 counties indicated that almost 5,000 individuals in these counties requested information on "Making It Through Hard Times." The survey also indicated that they had put into practice skills introduced in the publication series: 74 percent making better use of food, 51 percent cutting costs on utility bills, 39 percent using hints for job hunting, and 10 percent actually earning extra income.

Home Study Popular With Employed Homemakers

Extension home economics is helping to meet the need of the employed consumers and other busy persons through Learn-At-Home courses. The Microwave Learn-At-Home Course, introduced in 1983, assists consumers in selection, use, and care of the oven. The Food Preservation Learn-At-Home Course was first offered in January of 1978. It has achieved popularity among many homemakers in that it offers them an opportunity to learn at home the recommended techniques for home canning and preserving of food products.

The "Money Management Makes Cents" Learn-At-Home Course is aimed at families who do not have time to attend meetings but who need and want agent feedback. Families who complete the course prepare a current net worth statement, household inventory, budget and a family savings plan.

Another type of home study course is "Money Management Tips for Young Families," a series of 12 monthly newsletters aimed at helping families organize their money matters. Changes made and reported by participating families include increasing savings, learning to save money through better shopping habits, using coupons, bartering, and preparing and staying with a budget.

Family Strength Emphasized

As part of its continuing program aimed at bolstering the strength of Alabama families, Extension promoted National Family Week on a statewide level in 1983. Governor Wallace signed a proclamation urging localities to observe Fam-



Extension programs across the State helped families stretch income by learning skills in clothing construction and home improvement, including furniture restoration.

ily Week, and Extension Home Economists sponsored eight area meetings across the State, titled "What's Happening to the Family?" The program included videotaped remarks by Governor Wallace, Senator Heflin, and Department of Pensions and Security Commissioner Frazier.

Another phase of the family strengths program has received national recognition—a project funded in five counties by the Department of Pensions and Security for parents identified as abusive or

An innovative aspect of Extension's family strengths program was use of game-playing to teach values of family and interpersonal relationships.



neglectful. County Extension agents offered parent education classes for these people. A total of 281 families took part in the program, and Extension parenting assistants made almost 4,000 home visits.

Food Programs Show Way to Better Health

Extension Home Economists were very active in the Food and Fitness campaign in 1983, with 67 counties conducting educational programs designed to give dietary guidance. In addition to numerous news articles, radio spots, television programs, and agents' newsletters, agents held 255 meetings related to Food and Fitness attended by almost 9,000 persons. Food and Fitness exhibits reached an estimated 37,000 persons. Food and Fitness topics included weight control, food safety and food supply, exercise, fad diets and diet aids, dietary guidelines, home care for common illnesses, diet and chronic illness, food myths, and food additives.

A survey showed that one-half to almost three-fourths of the target audience felt the program had helped them eat a greater variety of foods; select foods lower in fat; eat less salt and sugar; and plan meals and snacks to better meet nutritional needs. Over 90 percent stated that Extension programs had helped them save money on groceries.

Through the Food Preservation program, Extension helped families preserve 332,000 quarts of food at an estimated retail value of nearly \$500,000. Of 1,300 pressure canner gauges tested, 15 percent were recommended for replacement.



This Extension food and fitness exhibit was viewed by over 15,000 at the Food and Nutrition Expo in Birmingham.



Master Food Preserver Volunteers helped over 3,000 families in six counties learn recommended food preservation methods.

The Expanded Food and Nutrition Education Program (EFNEP) continued to help improve the nutritional level of 6,700 low-income families with young children and the 7,000 EFNEP 4-H youth. This federally funded Extension Program operated in 44 Alabama counties, with 262 part-time paraprofessionals working individually with homemakers in homes and in small groups.

Master Volunteers Pass Expertise to Others

Two Master Volunteer programs give volunteers intensive training in a given subject matter by the county agent for

home economics. These volunteers then pass on their expertise to others.

In 1983, 61 Master Food Preserver Volunteers in six counties were trained in food safety and freezing, drying, and canning techniques. These volunteers then devoted a total of 1,263 hours to helping over 3,000 families learn recommended food preservation practices.

In 1983, Extension launched a Master Money Manager program. Volunteers receive intensive training in money management. They then commit to give others assistance in money management programming. Three counties have completed one series of lessons for enthusiastic participants and are currently supervising volunteer pay back hours.

COMMUNITY RESOURCE DEVELOPMENT

Leader Development Project Started

To fill the need for more effective leadership in public affairs by representatives of our agriculture and forestry industries, Extension took action in 1983 to gather support for and organize a cooperative leadership development program. Known as LEADERS, the Alabama Agriculture and Forestry Leadership Development Program is patterned after similar programs in other states. These programs have successfully demonstrated increased involvement of their "graduates" in local, county, state, and national affairs. Extension believes the Alabama program has the same potential.

The first LEADERS program class will begin in 1984, and will involve 30 participants engaged in agriculture, forestry, or agribusiness who have demonstrated leadership potential and commitment to careers in these industries. Over a 2-year period, these future leaders will attend study institutes in various locations in Alabama and will travel to Washington, D.C., other agricultural states, and foreign countries. Subjects studied will include government, economics, public policy, communications, and foreign affairs.

LEADERS is the result of cooperation among Auburn University, Alabama A&M University and Tuskegee Institute, and a committee of agriculture and forestry leaders assisted by a team of faculty and Extension personnel. The program has been partially funded by the W. K. Kellogg Foundation. The ultimate aim of the LEADERS program is to develop the participants' potential to exert influence on public decisions affecting agriculture and forestry industries, the state of Alabama, and the nation.

Marine Industries Supported Through Sea Grant Services

Traditional Extension programs have always been an important part of life in coastal Alabama. About 10 years ago, Extension broadened its program efforts there as part of a new and unique concept: Marine and Coastal Resource Development. This fledgling effort has matured and developed into the Alabama Sea Grant Advisory Service, which is operated in cooperation with the Mississippi-Alabama Sea Grant Consortium. This service offers technical and advisory assistance to government, commercial interests, and the public, with the aim of

fostering wise use and development of our coastal resources.

One major area is support for Alabama's seafood industry. In 1983, Extension's Sea Grant office and the Naval Ocean Research and Development Activity joined forces to help both the sea food industry and sportfishermen. The project involved locating and mapping concrete rubble from the old Dauphin Island Bridge, which had been destroyed during Hurricane Frederic.

The rubble was to have been disposed of in deep water, where it would act as artificial reefs to attract and concentrate populations of finfish. Unfortunately, not all the rubble was placed where intended, and Alabama shrimpers began suffering damage when their expensive nets snagged on large pieces of debris in highly productive shrimping areas.

Sportfishermen, on the other hand, did not know the locations of these rubble reefs to fish them. The solution was an underwater survey using side-scan radar, followed by diving verification and publication of the locations by Loran C coordinates. The result: sportfishermen can find plenty of fish at these reefs, while commercial shrimpers can now avoid these areas, and damage to their nets.

Public Sector Management Improved

A new area of involvement for Extension during 1983 was training in human resource management in the public sector. Modern concepts of job analysis and design, selection, performance appraisal, and compensation are keys to the effective operation of local governments and other organizations in the public sector.

As an example of this work, Extension provided in-depth assistance to the Madison County Department of Waste Control in developing a job-related performance appraisal system. This project was then incorporated into an overall educational program on solid waste management which was presented to 31 county and

26 city governments at a solid waste management seminar. As a result, this information was picked up by an international association of solid waste managers, and Extension was contacted and agreed to present the same program at an international seminar.

200 + Community Facilities and Services Projects Assisted

Over 200 community facility and service projects received assistance from Extension in 1983, including water and sewer systems, solid waste systems, rural health clinics, fire departments, public recreation facilities, transportation services, and multi-use public buildings. Extension assisted local governments, volunteer organizations, authorities, etc. by providing technical information, helping assess needs and capabilities, recommending specific management practices to improve efficiency, developing budgets, and training personnel.

In some cases Extension was called on to educate potential users of community facilities and services. A good example of this type of assistance and its value was demonstrated in Clarke County. The cost of the county garbage collection service was supposed to be recovered through user fees; however, only 22 percent of the rural households were participating, and the service was costing the county about \$66,000 a year more than it was receiving.

The County Commission asked the county agent for help. Extension outlined and assisted in carrying out a public-awareness solid waste sign-up campaign which resulted in a 165 percent increase in the number of rural households using the service. Now the county no longer has to subsidize the garbage service with money from the general fund.

Similar solid waste participation programs are being carried out or planned in four other counties, and there is a need for such programs in at least 42 other counties. Total potential savings to county

governments is estimated to be three to five million dollars.

Rural Industrial Development Stepped Up

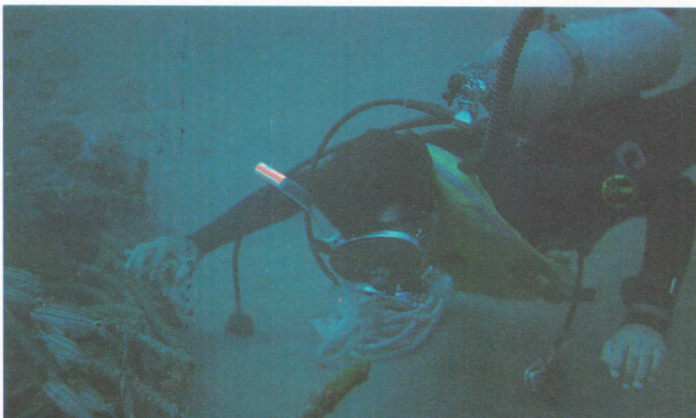
STEP is an acronym for *Start Tapping Economic Potential*, Extension's integrated program of assistance to counties and communities who want to strengthen and diversify their economies. The program has been successful in helping to attract industry to Alabama, and in helping develop existing industries. A good example of this work in 1983 was the Escambia County effort.

When the Escambia County Industrial Development Authority decided to undertake development of a STEP existing-industry expansion program, the Authority's Executive Director, David Hutchison, contacted the county Extension office. He then attended an Extension industrial workshop in Auburn and discovered just what he needed to get his program going.

One of the first steps was to visit local manufacturers and determine what their needs were and if they had expansion plans. Several companies called after the visit and accepted the Authority's offer to help with expansion plans, financing, or other problems. From talking with plant managers, the skills needed in Escambia County were determined. A significant good-will gesture was an existing industry appreciation dinner held in Flomaton, with about 160 people attending.

In the short time since this program was initiated, one firm has relocated its plant in the Atmore Industrial Park and is building a 10,000-square-foot building. Employment will increase by 12 to 15 people over the next 2 years. When announcements are made on other expansions and new firms later in 1984, over 200 jobs will have been created with capital investment of six to eight million dollars. The Escambia County Industrial Development Authority is happy with the success they have achieved by following the STEP program.

Rubble from the old Dauphin Island bridge was a net-snagging problem for Alabama shrimpers. Extension teamed with NORDA to locate and publicize trouble locations.



Expansion at the Atmore Industrial Park followed adoption by the Escambia County Industrial Development Authority of Extension's rural industrialization recommendations.



ALABAMA AGRICULTURAL EXPERIMENT STATION

WORK OF THE Alabama Agricultural Experiment Station during 1983 demonstrated a balanced approach between basic and applied research. Major efforts went into applied projects designed to supply solutions to current problems facing agriculture. At the same time, needs of the future and voids in knowledge about critical scientific areas were addressed in new and exciting basic studies. Productivity of researchers in both areas is illustrated by the publications record for the year: 227 articles in refereed journals, 171 articles in other journals, 48 publications issued by the Experiment Station, and 454 news and picture stories released to Alabama news media.

Numerous field day programs at substations around the State offered farmers,

homeowners, and agribusinessmen a close-up look at research underway and an opportunity to relate this research to their own needs. Highlights of the field day series were two research tours that drew large crowds. Attendance at the E. V. Smith Research Center tours in July numbered in the thousands despite record-breaking heat. More than 500 from northern Alabama were on hand for the Tennessee Valley Agricultural Show and Research Tours in August, which featured presentations on all phases of research underway at the Tennessee Valley Substation.

Some of the exciting findings from the year's research are highlighted on the following pages.

AGRICULTURAL ECONOMICS AND RURAL SOCIOLOGY

Research in the Department of Agricultural Economics and Rural Sociology concerns the economic and human resource problems of agriculture, agribusiness, and related areas. Because of the diversity of agriculture, researchers in this department must focus on a varied set of problems. However, increased emphasis is being given to management, marketing, and the financial problems of farmers and agribusiness firms.

Part-time Farming

Part-time farming is on the increase in Alabama. Of the 57,503 Alabama farm operators reporting in the most recent Census of Agriculture, only 37 percent indicated their principal occupation was farming. Almost half of the farmers reported 200 or more days work off the farm during the year. The financial status of many farm households is improved as the result of the income and benefits contributed by off-farm work.

The Alabama Agricultural Experiment Station study revealed that part-time farmers were, in general, younger than full-time farmers. Their farms and gross sales were smaller and they tended to have enterprises that required less time and labor than full-time farmers.

Part-time farming links farm families to benefits and opportunities not readily available in the farm sector. Job-related health insurance, life insurance, unemployment benefits, and pensions may insulate the farm household from some of the uncertainty of agricultural markets

and ensure quality of life in retirement years.

Broiler Marketing Studied

Broiler marketing in Alabama continues to change in response to changing market demands. Between 1965 and 1980, for example, there was a 10 percent decrease in the proportion of State broilers processed as ice-packed broiler products (down to 81 percent). Broiler processors are packaging a larger proportion of their output in product forms more suitable for marketing and distribution as value-added broiler products. The value-added forms used are frozen, chill packed, vacuum packed, and further processed. These forms accounted for 19 percent of the output of Alabama broiler firms in 1980, according to Auburn developed data. The most popular value-added form was frozen.

Out-of-state destinations accounted for 88 percent of Alabama's broiler production in 1980. The Southeast has increased in importance as a market region for Alabama broilers as compared with the East North Central Region. Foreign countries have begun to play an important role as markets, receiving 8 percent of the broiler products processed in Alabama in 1980.

Production and Credit Management for the Catfish Enterprise

Production and credit management are key factors for farmers who are consid-

ering going into catfish production. The conditions under which a catfish enterprise would become a part of an optimal farm organization were studied by means of a model that maximized profits and net worth. Cotton, soybeans, beef cattle, and catfish enterprises were possibilities in the model. Three pond sizes were considered.

The catfish enterprise exhibited a strong tendency to enter the optimal farm organization when the 20-acre pond building alternative was available, capital was adequate, and a high management intensity was employed. When capital was limited, however, smaller ponds were the only alternative, and the catfish enterprise was diminished or excluded from the farm organization. The catfish enterprise generally increased net worth by about 1-5 percent annually.

Private Land Ownership in Alabama

More than 30 million acres, 93 percent of the total land in Alabama, is privately held by more than a million individuals and entities. Ownership is concentrated in the hands of individuals and family owners who represent 99 percent of the ownership units and 79 percent of the acreage. Average size of individual and family parcels was reported to be 23 acres, while nonfamily parcels averaged 693 acres. Nonfamily corporations represented 14 percent of the acreage with an average size of 4,190 acres, according to available data.

Almost two-thirds of the privately held land in Alabama is used for farming despite the fact that only a fourth of the owners hold farmland. Foreign interests in Alabama farmland involve less than 2 percent of the privately held land and even less of the total land area. Most foreign owned land is devoted to the production of timber and is concentrated in the southwestern section of the State.

Number of farmers continues to decrease, but nearly two-thirds of the privately held land in Alabama is used for farming.



AGRICULTURAL ENGINEERING

Agricultural engineering research in 1983 highlighted possible reuse of poultry litter, swine waste utilization for feed stock and methane production, proper use of traveler irrigators for more efficient water application, and power and machinery tillage studies.

Potential Uses for Used Poultry Litter

Broiler producers in Alabama depend mainly on pine shavings and pine sawdust as a source of litter. Each year over 500 million broilers are grown on this litter. These birds add approximately 2.5 billion pounds of manure (wet basis) to the litter.

When broiler houses are cleaned, the shavings-manure mixture is used primarily for fertilizer or as a component of cattle feed. These uses generally require little or no processing. However, there has been increasing interest in drying and separating the larger wood particles from the manure and finer wood particles to increase the value and use potential of the two fractions. Auburn research has centered around separation and characterization of these fractions to determine their potential for use as animal feed, fuel for heating, and for relittering poultry houses.

Initial studies determined the particulate makeup of pine shavings as they are received from the planer mill. The large particle size consisted of all particles failing to pass a number 8 sieve; the remainder was considered small particles (fines). This determination was based on fine particle size considered compatible with manure to be pelleted or otherwise used as fertilizer or animal feed. The large

particles could then be used for relittering of poultry houses or burning as fuel. Based on an average of multiple tests, the large particle fraction made up 72 percent of the sample and the fines 28 percent of the sample weight.

Tillage Tools, Practices

Research on tillage included studies on the geometry of tools and effects of tillage on crop production. One segment provided information relative to implement design, while the other gave practical findings for on-farm use.

The spacing and arrangement of the chisel tools influence the way soil and surface residue flow through the tillage implement. Data were collected to determine the influence of chisel tool spacing and arrangement on energy requirements and functional performance of chisel tillage implements. The results indicate that performance of full-sized chisel tillage implements may be predicted by small-scale models of the implements. These prediction methods may be useful to designers and engineers in the design of chisel tillage implements with greater energy efficiency and functional performance.

The moldboard plow, chisel plow, subsoil bedder, and disk harrow were evaluated as primary tillage tools for cotton production at the Tennessee Valley Substation. Plots were located in 1983 in the same place they were in 1980, 1981, and 1982. Severe dry weather occurred in July and August resulting in low yields for all plots. Seed cotton yields in 1983 ranged from a high of 944 pounds per acre for the moldboard plow to a low

of 804 pounds per acre for the disk harrow, with the chisel plow and subsoil bedder intermediate at 860 and 909 pounds, respectively. The 4-year average seed cotton yields were about equal for the four tillage treatments, approximately 1,950 pounds per acre.

Cotton Yields in Cover Crops

Emergence of cotton planted in winter cover crops (vetch, clover, and wheat) was improved in 1983 over the previous year and was acceptable for all treatments. Stand reduction from emergence to final stand was significantly less in 1983 than 1981, but not as good as 1982. The legume covers, especially clover, still caused a problem in retaining a final stand, resulting in depressed yields.

Seed cotton yields for early planted treatments (May 5, 1983) resulted in 1,682, 1,241, 1,199, and 872 pounds per acre for wheat, no cover, vetch, and clover, respectively. The late planted treatment (June 6, 1983) had similar results of 1,710, 1,466, 1,302, and 930 pounds per acre for wheat, no cover, vetch, and clover, respectively. An additional section of early, strip killed covers (killed April 5, 1983) was investigated in the early planted treatment. The effect appeared to improve the cotton stand and yields in the clover cover condition.

AGRONOMY AND SOILS

Research conducted in the past year reflects the changing needs of production agriculture in Alabama. Major efforts have been made to improve production efficiency and yields of major crops, increase feed and forage production for animals, and develop new plant varieties. Emphasis was placed on overcoming limitations associated with pests, soil physical properties, soil acidity, and low soil fertility.

A highlight of the year was release of a new centipedegrass cultivar, AU Centennial. Two new projects were initiated in cooperation with the Tennessee Valley Authority to study the influence of cropping systems on runoff and associated soil loss. Continuing studies are evaluating tillage systems, crop rotations, and starter fertilizers in attempts to boost production of cotton, corn, grain sorghum, soybeans, and wheat.

Starter Fertilizers for No-tillage Systems

Data from studies conducted with starter fertilizers at several Alabama locations confirmed that starter fertilizers will improve yields of crops grown in no-tillage systems. Starter fertilizer in-

Separation and characterization of poultry house litter identified different components that can be valuable as animal feed and fuel for heating, and for relittering poultry houses.



creased the total yield of ratooned grain sorghum 36 bushel per acre (from 131 to 168 bushels in one test and from 161 to 195 bushels per acre in another test). Four tests were conducted with cotton: seed cotton yield responses were 0, 200, 290, and 1,143 pounds per acre. With cotton planted after wheat grain harvest, the percentage of open bolls on October 15 averaged 6 and 53 percent for the no starter and starter treatment, respectively.

A simple optimum starter fertilizer combination could not be defined, but it appears that 100 pounds per acre of 20-20-0 or 20-20-8 will be sufficient. Potassium was critical in the Tennessee Valley soils but not the Coastal Plain soils. The biggest yield responses to these starter fertilizers were on soils that needed subsoiling and when the fertilizers were placed deep in the subsoil track.

Herbicide Applicators Compared

Research at four locations evaluated herbicide application in soybeans using a conventional hydraulic boom equipped with either 11002 or 8000067 flat fan tips versus controlled droplet application (CDA). All plots received Lasso® 4E + Lexone® 75 df applied preemergence and Basagran® 4 + Blazer 2L® applied post-emergence over-the-top at normal and one-half normal rates. This allowed for four rate combinations.

Although method of herbicide application and herbicide rate combination affected soybean injury at some locations, injury was only slight and was of no consequence. Soybean yields from uncultivated rows were the same at three locations regardless of method of application. At the remaining location, some combinations of application equipment and soybean oil carrier reduced yield, indicating that the higher rate of soybean oil concentrate was detrimental. Soybean yields from cultivated rows were the same for all methods of application at three locations, but using the controlled droplet applicator and soybean oil concentrate produced a lower yield at one location.

Herbicide rate combinations did not affect soybean yields at three locations, while combinations receiving the normal rate of Lasso + Lexone had lower yields at one location. This shows that herbicide rates could be reduced but were not specific for the controlled droplet application method. Low volume herbicide application is viable but needs additional refinement.

Erosion Research by Satellite

A computer modeling approach for the Universal Soil Loss Equation, which utilizes a digitized soils data base derived from soil surveys and Landsat satellite

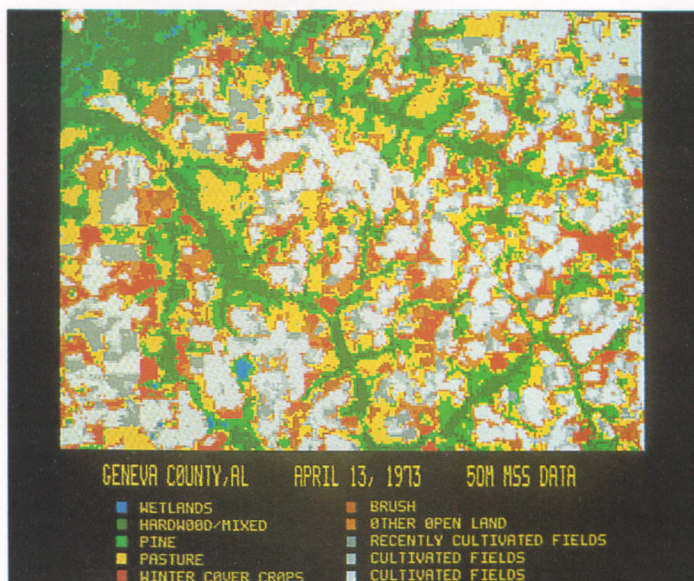
data, was used to study soil erosion in northeast Geneva County. This targeted area of concern for the Soil Conservation Service has been a primary site for much Experiment Station research on the soils in the region, and the National Aeronautics and Space Administration has made it a primary site for much soils-related remote sensing research.

For years the Universal Soil Loss Equation has been widely used to estimate soil erosion on a field basis, but obtaining the same information for a large area would be time consuming and costly. A computer modeling approach using geographically oriented data such as a digitized soils data base and satellite data can attempt to provide this information

synoptically for a large area. The soil erodibility (K factor) and slope-slope length (S and L factors) would be determined from the soils data base. The land cover and condition (C factor) can be determined from the remotely sensed data and as resolution improves with future satellites the conservation practices applied (P factor) would also be possible. The rainfall (R factor) would be constant or adapted to fit one of the data bases for variations over a large area.

Once the data bases are in place, values for the factors can be easily entered to demonstrate how changing the slope length, altering the cropping system, or installing terraces can affect the estimated soil erosion loss.

Information provided in photos made by satellite is proving valuable in erosion control research.



ANIMAL AND DAIRY SCIENCES

Research in the Department of Animal and Dairy Sciences in 1983 emphasized reproductive physiology, environmental physiology, nutrition, biochemistry, meat technology, genetics, and breeding. Several new projects were initiated in the physiology and genetics areas with emphasis on molecular biology, growth control mechanisms, and reduced fat deposition in animals.

Physiology Studies Contribute

Approximately 40 percent of the calves on commercial dairy farms fail to receive adequate amounts of colostrum at birth. This results in disease problems and a high incidence of deaths up to 3 months of age. Therefore, research was begun to discover methods of improving the immune system in young dairy calves to reduce the incidence of diseases. Researchers found that adding ascorbic acid to dairy calf diets can stimulate the im-

une system and reduce the incidence of disease and deaths in young dairy calves.

An experimental mastitis control method involving multiple infusion of benzathine cloxacillin during the dry period was more effective than the single infusion or no infusion treatment. Quarters treated three times during the dry period had 35 percent fewer infections than non-treated quarters.

Reproduction problems and extended postpartum interval continue to be a major problem for Alabama cattlemen. A recent study with Angus and Hereford cattle indicates that anestrous conditions following parturition are likely the result of endocrine and biochemical changes which occur during gestation. The physiological events associated with nursing a calf further increase the postpartum interval. These findings will be used in future efforts to improve reproductive efficiency in cattle.



Calf gain on fungus-infested pasture was only two-thirds as much as on fungus-free fescue.

Advances in Nutrition Research

Fescue toxicity in beef cows and calves had dramatic effects on production traits in 1983 tests. Cow-calf performance during a 128-day fescue grazing season from November 17 to May 29 showed wide differences between fungus-free and fungus-infested pastures. Cows grazing fungus-free fescue gained at the rate of 1.01 pounds per day and their nursing calves had average daily gains of 2.54. In contrast, cows on fungus-infested fescue lost 0.51 pound per day and their calves gained only 1.79 pounds per day. Milk production at 230 days postpartum was reduced (11.7 versus 6.6 pounds) by the fungus-infested treatment.

At the end of May, the cows and their calves were put on dallisgrass-clover pastures. When the calves were weaned in August, those that had been on the infected fescue pastures were 110 pounds lighter than those that had received the fungus-free pasture. It was found that fungal infection concentrations exceeding 20 percent will depress steer daily gains an average of 0.2 pound for every 10 percent increase in the infection level.

A study was conducted to determine ensiling characteristics of the chopped whole corn plant with various levels of chemically processed broiler litter. Results revealed that the addition of broiler litter to chopped whole corn reduced the production of lactic acid and volatile acids, but as much as 10 percent processed broiler litter could be added to the forage without jeopardizing the production of fermentation acids essential to the preservation of corn silage. Also, the addition of 10 percent broiler litter to green forage improved the feed's crude protein content. This represents another excellent way broiler litter can be used as a feed ingredient.

Restructured Meat Products Improved

Studies on restructured meat products continue to highlight the research program in meat science. Restructured meat systems present the opportunity to change the physical state of the meat to a more uniform appearance. This Auburn-developed technology also allows the processor to convert lower valued meat cuts

into quality products which are well received by the consumer.

Restructured beef, chicken, and pork nuggets were manufactured to determine the effect of phosphate on freezer storage of the nuggets. Recent studies indicate that the addition of phosphate not only improved the textural properties but reduced oxidative rancidity of the nuggets during freezer storage. These products open a new market for beef and pork produced in Alabama. Future studies will include forage fed beef from cattle produced under production systems currently used in Alabama.

ANIMAL HEALTH RESEARCH

Research of the Department of Animal Health Research is organized to investigate problems or conditions that affect the health of food producing animals. These may be infections, diseases, parasitic diseases, or abnormal physiological conditions.

Respiratory Tract Disease of Cattle

Respiratory disease still remains one of the most important disorders of cattle despite the availability of vaccines. Re-

searchers at Auburn are studying the fundamentals of the immune response to determine why vaccines are often ineffective. This information is needed so that rational immunization strategies can be developed.

The possibility of using interferon against such diseases is being investigated since it now appears possible to produce it at a price that will allow its use in domestic animals. Because human interferon is active in vitro in bovine cells, there is a possibility that it might be useful in viral infections in cattle. Auburn researchers are currently testing human interferon for its ability to prevent respiratory disease induced by infectious bovine rhinotracheitis virus, one of the principal viruses involved in shipping fever of cattle. In addition, many kinds of interferon are being tested for their ability to prevent viral infection of cells of domestic animals to determine whether interferon should be considered for testing in other animal species.

Parasites of Cattle

Progress is being made to overcome the problem of internal parasites of cattle. This is of economic importance to the Southeast because, with the area's rainfall and humidity, the free living larvae of these parasites survive well on pasture forage. As a result, the cattle of this region are easily infected.

Various methods of delivering the antihelmintic drug to the cow have been studied. It was found the fenbendazole incorporated into cold-pressed feed blocks or molasses blocks removed 99 percent of the *Haemonchus*, *Ostertagia*, *Cooperia*, and *Osophag ogostonum* parasites of calves. The calves appeared to prefer the molasses block. This provides a delivery system of the antihelmintic drug

Such internal parasites as the coccidia *Cryptosporidium* were found to be easily transmitted by contaminated facilities, from calf to calf, or by animal caretakers who come in contact with infected and uninfected calves.



so that the calves will not have to be handled on an individual basis.

The coccidia *Cryptosporidium* is a causative agent of diarrhea in newborn dairy calves up to 1 month of age. Not only is the parasite pathogenic by itself, but it weakens the calves and makes them more susceptible to viral and bacterial infections. Studies at Auburn have shown that cryptosporidium is easily transmitted

to calves from contaminated facilities, from one calf to another, and by animal caretakers who come in contact with infected and uninfected calves. The drugs (monensin and lasalacid), both presently marketed as feed extenders, have some anticoccidial action but are not effective in preventing the disease when administered daily to calves exposed to cryptosporidium oocysts.

BOTANY, PLANT PATHOLOGY, AND MICROBIOLOGY

The Department of Botany, Plant Pathology, and Microbiology is a large department with extensive research programs dealing with several interdisciplinary aspects of plant science and microbiology. The Department also administers the new Fescue Diagnostic Center that is already making significant contributions to solution of the fescue toxicity problem. Agriculturally related research in the Department has traditionally centered about areas of plant pathology and weed science, with particular emphasis given the study of fungi and nematodes pathogenic to Alabama crops and on the mode of action of herbicides. The Department maintains a large reference collection of fungi and higher plants and is also extensively involved in the study of fungal toxins (mycotoxins) and biostatistics. The programs in areas of plant biology and microbiology are especially complementary for the advancement of biotechnology, the application of new genetic and biochemical developments in plant and microbial systems, which is destined to impact significantly on agriculture by the turn of the century.

Fescue Diagnostic Center Operating

After one year of operation, the Fescue Diagnostic Center has processed 1,315 samples. These samples came from 18 states and two foreign countries.

Judging by the data collected thus far, the fescue endophyte is widely distributed in the United States. The mean percent infestation for the states examined was 69 percent for plant samples and 59 percent for seed samples. Plant samples from Alabama also showed 69 percent infestation, indicating that Alabama is representative of the United States. Samples submitted by Alabama residents came mainly from Black Belt counties, with the Piedmont also fairly well represented.

Approximately 9 percent of all samples were completely free of the endophyte. Fescue plants from such fields in Alabama are being used as seed sources for endophyte-free Kentucky-31 seed.

The Fescue Diagnostic Center has also served as a clearing house for information pertaining to fescue toxicity by responding to over 100 requests for information, seed, data, methods of detection, and antiserum. Samples analyzed for out-of-state seed laboratories are to be used as points of reference for seed certification and endophyte research in those states. Personnel from the State of North Carolina Seed Testing Laboratory are scheduled to be trained in diagnostic procedures at the Center.

Rust Control in Forest Nurseries

Results of seed treatment tests with loblolly pine seed indicate that Bayleton 50 WP® applied as a seed dressing at a rate of 1 gram per pound of seed was as effective as the seed soak procedure commonly used to protect emerging seedlings from fusiform rust. In addition, Bayleton seed dressing was compatible with Arasan and Anthraquinone, two chemicals commonly used as bird repellents by forest tree nursery personnel. Protection from fusiform rust afforded by the Bayleton

seed treatment procedure lasted 36 days from sowing.

Results of field tests where Bayleton was applied as a foliar spray showed that the dosage rate could be reduced without affecting efficacy. Incidence of fusiform rust in plots receiving 4 ounces active ingredient per application did not differ from rust in plots receiving 6, 8, or 12 ounces per application.

As a result of these tests, recommendations for fusiform rust control in southeastern forest tree nurseries during 1984 will reflect a savings of over \$175,000 in chemical costs alone. In addition, the environment will benefit from the decrease in the amount of pesticide applied.

New Fungicides Inhibit Sterols

During the past decade, a new generation of systemic fungicides has been developed that effectively controls a broad spectrum of plant diseases caused by fungi. Although chemically quite diverse, these fungicides have the same mode of action in that they inhibit the formation of specific sterols, such as ergosterol, required for fungal growth.

Current work with these fungicides at Auburn involves combining both basic and applied research approaches to understand how blocking the synthesis of growth-essential sterols is translated to fungal growth inhibition, and hence inhibition of infection. Research is further directed to determine how these fungicides can be applied most effectively in disease control under natural field conditions.

Diseases of peanuts, pine trees, cereal grains, and pecans are currently receiving the greatest attention as potential targets for the sterol-inhibiting fungicides.

The finding that low rates of Bayleton will keep pine seedlings free of fusiform rust (top, as compared with diseased seedlings at bottom) offers chances for savings in forest nurseries.





Problems and solutions to forest harvesting identified during 1983 could lead to improved efficiency of operations in the future.

FORESTRY

Forestry research during 1983 covered a wide spectrum of activities within the overall umbrella of growing, harvesting, and processing timber. Particularly significant advances were made in the areas of predicting forest growth and yield, deriving new products from southern hardwoods, increasing efficiency in forest site preparation, deriving chemical products from wood residues, increasing forest growth through herbicide application, increasing operating efficiency of forest harvesting systems, and improving the productivity of forest tree nurseries.

Predicting Forest Growth and Yield

Preliminary mortality, crown ratio, and diameter growth models were developed in 1983 for several tree species and species groups. Significant relationships have been identified but data problems still exist. Additional data have been obtained and will be evaluated for their potential in model development or model evaluation. A preliminary analysis of Alabama survey data identified several variables, most noticeably age and topographic class, that were meaningless or ambiguous for growth projection purposes. A simple diameter growth model appears most reasonable considering data availability.

Site Preparation Effective

Preliminary statistical analysis of 2-year data indicated that quantity of topsoil lost from site-prepared areas significantly alters the soil nutrient concentrations. However, no statistically significant differences in 2-year pine seedlings heights were detectable, partially due to a high degree of variation.

Preliminary analysis from studies on the effects of herbicide-burning combinations suggest the following:

- Winter burning followed by spot treatment with liquid hexazinone significantly reduced both basal area and number of stems of woody competition after one season.
- There appears to be no significant difference in total basal area or number of stems of woody competition between liquid hexazinone and pelletized picloram treatments after one season, although some differences in species susceptibility are evident.
- Summer, hand-directed foliar spraying of sweetgum and oak sprouts was quite effective with water mixtures of liquid hexazinone, trichlopyr, and a picloram-2,4-D combination.
- A late winter burn killed 14 percent of sweetgum and oak rootstocks, while a spring burn in the same area killed 19 percent of the tagged rootstocks.

Forest Harvesting Systems Improved

Various machines and techniques for thinning pine plantations were studied

during 1983. Only first commercial removals in pine plantations were examined because of the need for and lack of information on this subject. Project results have identified problems and solutions.

Thinning patterns which minimize damage to remaining trees and at the same time make the work more systematic and less costly have been identified. Certain combinations of equipment and certain machine attributes have proven more effective than others. Many of these machine attributes have been passed on to equipment manufacturers to be incorporated in future machines. Production rates have been estimated for several machines working in thinning applications under a variety of terrain and stand conditions.

New Products from Southern Hardwoods

The physical and mechanical properties were determined on 3-layer, oriented strand boards from southern hardwoods made with three mixtures: mixture 1, 35 percent red oak, 15 percent white oak, 30 percent sweetgum, and 20 percent yellow poplar; mixture 2, 55 percent red oak, 15 percent white oak, and 30 percent sweetgum; mixture 3, 100 percent red oak.

Results indicate the average mechanical and physical properties of boards from mixture 1 are superior to mixtures 2 and 3. Flexural board properties are lower than those of commercial CDX southern pine plywood, but in such properties as rail shear strength, interlaminar shear strength, and plate shear modulus, the oriented strand boards are considerably stronger and stiffer than plywood. As shown by these results, appropriate mixtures of high and low density southern hardwoods can be used to fabricate commercially acceptable oriented boards for sheathing in housing. Such boards, while 5-10 percent denser than aspenite waferboards, would also be substantially stronger and stiffer.

FISHERIES AND ALLIED AQUACULTURES

Research on fisheries management in the United States is approximately a half-century old. Most of this effort has been directed toward management of the biology of various fish populations under exploitation. Little effort has been directed to understanding the attitudes and interests of the fishermen exploiting those populations. Because such attitudes are important to the marketing of Alabama's fish resources, the Department has in-

cluded such subjects in its recent research program to supplement projects dealing with various aspects of sport fishing and commercial aquaculture.

Fisheries Satisfaction

In a recent study, angling groups on four reservoirs were asked to rate their incompleting trip quality and fishing success as either poor, fair, good, or excel-

lent. Trip quality ratings were not correlated with ratings of fishing success. Thus, the number of fish that fishermen catch is not a good indication of how much they enjoy the trip. Catches were significantly different regarding total number of fish per angling group, yet anglers did not rate their fishing success differently. Collectively, fishermen adjusted their success expectations according to intended target and reservoir system fished. Virtually identical ranges of numbers of fish per angling group within each success category demonstrated that individual fishing success ratings were subjective.

The results obtained indicated that it might be possible to substitute other factors associated with fishing for the actual catch and killing of fish.

Polyculture Increases Production

Production of channel catfish on Alabama farms has been demonstrated to be a profitable enterprise. As a result, several thousand acres of ponds are currently in production. Virtually all of these ponds are managed for monoculture, with only catfish stocked. Therefore, polyculture offers good opportunities for significantly increasing production in catfish ponds by stocking several species with complementary feeding habits in the same pond.

An experiment on polyculture was conducted in 1983, using four ponds ranging in size from 1¼ to 2½ acres and stocked with channel catfish at a rate of 4,000 per acre. In addition, each pond also was stocked with 250 hybrid Chinese carp (bighead carp x silver carp) per acre. Feeding rate was determined based on the number of catfish in the ponds. It was assumed that the carp could feed on algae and small crustaceans (zooplankton) that are not utilized by catfish.

On draining, an average of 4,400 pounds per acre of catfish was removed from these ponds. This is a good rate of production for this species in monoculture. In addition, an average of 1,100 pounds per acre of hybrid carp was removed from the ponds, and the carp were sold for approximately the same price as the catfish.

Brackishwater Bass

Fishing for largemouth bass in brackish areas of northern Mobile Bay is an important recreational activity. The economic value of that fishery is important. These fish are found in abundance in those waters, and environmental conditions appear to be ideal for their growth; however, one of the characteristics of the fish in that area is their relatively small

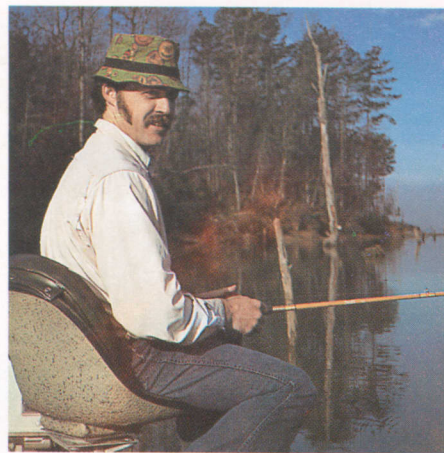
size. This species grows to a much larger size in other waters of the State.

Recent research was done to determine whether those fish were genetically different from bass in the same river system, but upriver from the Mobile Delta. By comparing enzyme systems from the two groups, it was determined that all of the bass in the Mobile Bay drainage are a common genetic group. Similar studies indicate that the bass from this drainage are genetically different from bass in other river systems in the State. Apparently the small size of bass caught in Mobile Bay is a result of local environmental conditions rather than the genetic stocks there.

Catfish Problems Studied

It seems that the more rapidly the catfish industry grows the more new diseases farmers face. In 1983, a severe anemia occurred in cultured channel catfish in Alabama and Georgia. Evidence indicates that the anemia was caused by some compound in the feed. Although the toxic substance has not been identified, it was shown that the feeds contained no pesticides, heavy metals, peroxides, or known mycotoxins that could have caused the anemia.

Experimental inducement of severe anemia by feed was demonstrated in cage



Fishermen reported that factors other than number and size of fish caught helped determine satisfaction with fishing trips.

cultured channel catfish during a 4-week study. Severely anemic fish had hematocrits as low as 2.0 to 5.0, while the average hematocrit was 25.8 in control fish. Hemoglobin concentration and erythrocyte counts were lower in affected fish than in controls, and clotting time of the blood was greater in test fish. Mortality during the study was 9.0 percent in the test fish, compared to 0.5 percent in the controls. Fish mortality was not associated with any specific brand of feed.

HORTICULTURE

Research in horticulture is involved with fruit and nut crops, woody ornamental nursery crops, floriculture, vegetable crops, and food science as related to horticultural crops. Because of the wide range of crops in horticulture, the Department must concentrate research where it will do the most good for the economy of the State. Emphasis has been placed on pecans and peaches and to a lesser extent on apples, plums, strawberries, and blueberries; on problems of the ornamental nursery industry; on the nutrition of vegetable crops and the breeding of new varieties of tomatoes, southern peas, watermelons, and cantaloupes; the testing of new varieties of vegetables and organization of a foundation seed program for sweet potatoes; greenhouse research on florist and foliage plants; and coordinated consumer quality determinations of the effects of research on fruit and vegetable products. Much of the work is conducted on 11 substations and outlying fields throughout the State.

Shade Tree Evaluation

Increased emphasis on tree plantings in cities, residential districts, and along streets and highways has accelerated the introduction of new species and cultivars

for use in these landscape areas. Limited information on many of these trees has led to the selection of trees poorly suited to a particular site, resulting in high maintenance and removal costs. Thus, there was a need for a comprehensive evaluation of traditional and new introductions of shade and ornamental trees. This need was the basis for a study begun to evaluate leaf color, flowering, and fruiting, and to evaluate the adaptability and growth rate of species and cultivars of shade and ornamental trees for the Southeast. It is designed to last 35 years.

Trees were grouped into two classes: small trees (under 30 feet) and large trees (over 30 feet) in height when mature. For the past 3 years, approximately 150 species and cultivars of trees have been evaluated. Considering overall growth characteristics, American dogwood, white flowering crape myrtle, Muskogee lavender flowering crape myrtle, Natchez white flowering crape myrtle, and Yoshino cherry are the best small trees for shade and ornamental use.

Trees selected in the large tree evaluation because of their superior landscape qualities are: trident maple, True-shade honey locust, Aristocrat and Bradford ornamental pear, and sawtooth oak.



Evaluation of large numbers of shade trees identified superior landscape species, such as Bay Beauty dogwood, which combine overall tree desirability and bloom beauty (inset).

Disease Resistant Watermelons Released

Disease is a major factor limiting production of watermelons in Alabama. Gummy stem blight, anthracnose, and *Fusarium* wilt are three of the most serious diseases. Severe crop losses and reduced yields of melons have resulted from these diseases in certain fields in Alabama. Although satisfactory control of gummy stem blight and anthracnose may be accomplished with the proper application of organic fungicides during normal weather conditions, no control measure is effective during periods of high humidity and high rainfall.

The discovery that certain plant introductions were resistant to gummy stem blight and race 2 anthracnose led to an Alabama Agricultural Experiment Station watermelon breeding program to develop multiple disease resistant breeding lines that produce high yields of excellent quality fruit. This research resulted in release in 1983 of AU-Jubilant and AU-Producer, varieties that are resistant to gummy stem blight (*Didymella byron-*

iae), *Fusarium* wilt (*Fusarium oxysporum niveum*), and anthracnose (*Colletotrichum laginarium*, race 2). Both are superior to the current varieties of their type in yield, quality, and disease resistance.

Thermal Blast Peeling Developed

The food processing industry— and producers of fruits, vegetables, and nuts—stand to gain by an Auburn developed process for efficiently peeling, skinning, or shelling of food products. Known as "thermal blast peeling," the system offers rapid removal of outer coverings and other inedible portions from food products with minimal loss or damage to edible portions. It has proved effective in the peeling of fruit and vegetable crops, coring peppers, shelling of legume seed pods, shucking and silking corn, popping corn, skinning onions, shelling of nutcrops, scaling and skinning of fish, and removal of shells from shellfish.

The process is accomplished by heating the surface of the product rapidly in

an atmosphere of superheated steam under elevated pressure, supplemented with radiant heat from the vessel wall, and then flashing to atmospheric pressure by instantaneous opening of the vessel cover. The result is an explosion which blows the product from the vessel and simultaneously blasts the covering from the product by violent action of highly energized moisture beneath the product covering. High peel yields have been achieved for most food products, and new processed products, such as canned, peeled plums, can be produced. In the case of the pimiento and bell peppers, the inedible core is also blown free of the edible pod during the thermal blast treatment. Patents are pending on the process and apparatus.

HOME ECONOMICS RESEARCH

The home economics research program is concentrated in the areas of nutrition and textiles with one project in the housing area. The nutrition projects are studying nutrition-health interactions and nutrient metabolism. Textile research is related to clothing as a protective barrier against pesticides, to fabric flammability, and to the prediction of performance of textiles in actual use. The housing research is a part of a nine-state southern regional project studying housing status and needs of moderate- to low-income people.

Vitamin E and the Cardiovascular System

Cardiovascular disease is a leading cause of mortality in Alabama as well as in the United States as a whole. In addition to risk factors such as age, smoking, and obesity, the probability of developing the disease is also increased by (1) a high total cholesterol level in the blood; (2) a reduced high density lipoprotein-cholesterol (HDLC) level and an increased low density lipoprotein-cholesterol (LDLC) level; and (3) the balance between different types of prostaglandins in the blood and blood vessel walls.

Various diet modifications have been used in attempts to reduce total cholesterol and LDLC levels and increase the HDLC level. Aerobic exercise and vitamin E supplementation of the diet, either singly or in combination, have been thought of as ways of modifying cholesterol and prostaglandin synthesis in the body. However, this was not the case in the first of several experiments needed to test this hypothesis. Using 32 male hamsters, 16 were fed a "normal" diet and the other

16 received the normal diet plus additional vitamin E. After 6 weeks, blood serum from the hamsters was analyzed for total cholesterol, HDLC, and for prostaglandin content. No differences were found between the two groups in any of the three analyses.

Upholstered Chair Wear Study

Sixty chairs upholstered with cotton fabrics of varying weights and constructions were placed in homes in Montgomery and Elmore counties for use by families. After 2 years of wear, the chairs have been brought back to Auburn University for analysis of their wear performance. Furniture industry representatives were invited to Auburn to see the results of the wear study.

Although none of the chair frames showed damage, some of the manufacturing problems found during the wear study were loss of adhesion of convolute foam to seat cushion, side arm panels pulling away from the metal tack strip, inadequate seam allowances on chair skirts, and curling of the skirts in humid weather. After needed changes in manufacturing procedures were made, several chairs were re-upholstered and additional wear trials performed.

Fabric soiling was the most prevalent fabric problem, followed by fabric wear or abrasion. A laboratory test method was developed to simulate the effects of wear and soiling observed on the chairs. Such a laboratory test method permits screening of fabrics for use in upholstery in less time and at less cost than can be done with a wear study.

Alabama Housing

Data from a questionnaire on perception of housing alternatives, which was administered to a sample of low- and moderate-income families in the southern region, were compiled. The Alabama respondents in this study were primarily female (75 percent), white (71 percent), and married (68 percent). Most had completed high school or some higher education (61 percent) and most of the households had annual incomes of \$10,000 or more (77 percent).

Findings related to housing conditions in Alabama indicate that 94 percent of the houses were conventional, 87 percent of the households owned their own homes, 64 percent were paying \$200 or less on monthly housing costs, and 51 percent had lived in their present homes for less than 10 years. The respondents were satisfied or very satisfied with their present homes (88 percent) and did not want to move (71 percent). Only 52 percent of the Alabama respondents believed there was an energy crisis, but 73 percent reported that the energy situation had an impact on their housing decisions.

Most of the respondents had heard about manufactured housing (95 percent), apartments (92 percent), earth-sheltered homes (88 percent), passive solar (67 percent), and active solar (63 percent), but only 49 percent had heard about retrofitted houses. Most respondents would not consider living in manufactured (79 percent), apartments (60 percent), or earth-sheltered houses (56 percent), but most would consider living in retrofitted (65 percent), active solar (54 percent), and passive solar houses (50 percent).

POULTRY SCIENCE

Research in poultry science has, for the past several years, emphasized disease and parasite control or closely related areas. Major thrusts continue in these broad areas, but examples in this report show another important segment of the program. With feed costs accounting for approximately two-thirds of poultry production costs, research dealing with nutrition and feeding seems to be appropriate and timely.

Reproductive Performance and Protein Level

Low protein feeds can be used for both male and female breeder chickens without lowering reproductive performance. This was learned in studies of reproductive performance with varying levels of protein in the diet.

Broiler breeder males were fed a ration of 12, 14, 16, or 18 percent protein from 29 days of age through their breeding cycle. The 16 percent protein diet served as the control group for maintaining body weight. Semen was collected from 10 males per treatment and data recorded on semen volume, visual score, sperm cell counts, packed cell volume, and percentage males in production.

Throughout the study, males given the 12 or 14 percent protein diets produced greater numbers of spermatozoa per ejaculate than males provided the 16 or 18 percent protein diets. A significantly larger percentage of males fed the 12 or 14 percent protein diets came into semen production before those given the higher protein diets. Protein treatments had no significant effects on body weight. Total testes weight per bird was similar across groups with the exception of males fed the 14 percent diet. Males given the 12 percent diet were more efficient producers of semen.

The reproductive performance of females fed a similar protein feeding regime was studied. There were no significant differences in fertility and shell quality and only a slight difference in egg production among females fed either a 12, 14, 16, or 18 percent protein diet during the laying period.

Feed Utilization Improved

Research on impaired digestion by coccidial infections and certain modern feeding practices has created a great deal of interest among broiler producing companies during the past year. Feed is crit-

Condition of upholstered chairs after 2 years of consumer use provided guidelines for the furniture industry to use in extending the life of their product.



ically important because it constitutes about two-thirds of the cost of producing a dozen eggs or a pound of broiler. Thus, increasing feed efficiency can significantly improve economy of production.

One or more outbreaks of coccidiosis in broilers may result in 1 to 100 points poorer feed efficiency during a 7- to 14-day period than that of uninfected birds, or 1 to 30 or more points during the life of a 3½- to 4½-pound broiler.

Birds that become too hungry digest little of the food that passes down their tracts during the first 30 to 60 minutes after feeding. This occurs with growing breeder pullets when fed every other day, which is a common practice. Meal feeding of broilers four times during each 24-hour day resulted in feed efficiency superior to that when birds were fed *ad lib* two or three times a day and/or were allowed to be without feed too long. Several companies, by employing improved meal feeding programs, have seen a 3- to 7-point improvement in feed efficiency. It was estimated that a 1-point improvement in feed efficiency to the United States broiler industry in 1983 was worth at least \$16 million.



With feed costs representing the major expense of poultry production, Auburn research dealing with nutrition and feeding is making important contributions.

Feeding Time Affects Shell Quality

Results from egg shell quality investigation at Auburn may change feeding practices used in many broiler breeder operations. Findings indicate that feeding breeder hens in the afternoon results in better quality egg shells than when using the early morning, feed restriction feeding systems.

Laying hens possess a unique digestive (crop) and skeletal system to supply additional calcium for shell formation during periods of inadequate intake. In the Auburn tests, however, neither metering of calcium (feed) from the crop nor reabsorption of skeletal calcium was sufficient to allow hens to produce eggs with maximum shell quality when deprived of calcium for a single day or even for a few hours within a day. The most important time for hens to consume calcium was found to be during the afternoon at the initiation of shell calcification.

These results have broad application to the broiler egg industry because broiler breeders are restrictive fed and consume their daily feed allowance within the first 2 to 6 hours of the morning. Results indicated that broiler breeder hens become even more calcium deficient at night than commercial Leghorns. Broiler breeders fed during the afternoon laid eggs with better shells than hens fed during the morning.

ZOOLOGY—ENTOMOLOGY

Research of the Department of Zoology—Entomology continued to address both basic and applied research missions during 1983. Two programs within the Department, entomology and wildlife science, are unique in Alabama and have provided timely research findings relative to insect pest management and wildlife management and ecology. Entomology research workers have made significant progress relative to chemical and biological control of insect pests on cotton, soybeans, peanuts, livestock, and various vegetable crops. Wildlife biologists within the Department have continued to generate research information which should permit improved management of the State's wildlife resource.

The Department also has vigorous ongoing research programs in the basic life sciences, in marine biology, and in field zoology. Fundamental research in the area of cellular physiology and molecular genetics has provided basic information which not only expands knowledge of cellular processes but may also provide new strategies for pest management. Active research programs in protozoology and parasitology have dealt with cryptosporidiosis, a parasite-induced syndrome with extremely harmful effects in both man and animals, including cattle.

Controlling Scale Insects on Ornamental Plants

Scale insects are among the most important insect pests of ornamental plants. They feed on all plant parts in all stages of growth, resulting in unattractive or unmarketable plants or even plant mortality. Economic losses resulting from damage and control expenses cost Alabama nurserymen millions of dollars annually. There are 167 species of scale insects known to occur in Alabama, including such economic pests as San Jose scale, tea scale, and white peach scale.

Entomologists at Auburn are studying the scale insects from both the basic and applied points of view and then incorporating the results into integrated pest management programs. The life history of euonymus scale and pine tortoise scale provides information for timing spray programs against these pests. Insecticide efficacy trials have been conducted on a number of pests, including citrus mealybug, euonymus scale, tea scale, and white peach scale. Results show that they may be effectively controlled with such compounds as Cygon®, Meta-Systox-R®, Orthene®, and Supracide®.

Although chemical control plays an important role in the management of scale

insects, alternative control measures are being investigated. Natural host plant resistance, biological control using parasites, and new application techniques with conventional insecticides are being incorporated into a pest management program to combat scale insects which attack ornamental plants.

An Emerging Zoonosis

Pioneering work at Auburn has resulted in the addition of *Cryptosporidium* to the list of more than 150 zoonoses, diseases for which the agents are naturally transmitted between other vertebrate animals and man. *Cryptosporidium*, a small protozoan parasite that invades intestinal cells, causes diarrheal disease in domestic and companion animals and in man.

In persons with an intact immune system, cryptosporidiosis manifests itself as a severe, short-term, flu-like, gastrointestinal illness. Preliminary studies indicate that this coccidian parasite may be a major cause of human diarrheal disease, especially in developing countries whose societies are primarily agricultural and where veterinary public health services and food hygiene practices are inadequate.

Persons with immune deficiencies, especially those with the recently recognized acquired immune deficiency syndrome (AIDS), are at risk of developing a life-threatening infection if exposed to fecal contamination containing oocysts (the infective stage) of *Cryptosporidium*. Presently there are no known drugs that are effective in the treatment of this newly recognized disease.

Biological Control of Insects

Information gained in 1983 research on insect pathogens affecting insect defoliators of soybean further advanced the field of biological control of insect pests.

The soybean looper is infected by several fungi in Alabama, including *Entomophthora gammae*. Infectious spores of this fungus, which are forcibly ejected away from the dead insects' bodies, were found to be produced principally between 9:00 p.m. and 10:00 a.m. daily during the summer months, with peak production occurring between 3:00 and 4:00 a.m. Daily temperatures are lowest and humidities are highest at this time, and these conditions are required for the fungal spores to successfully germinate and infect healthy looper larvae. The research is also seeking to determine other factors which promote mass mortality in looper populations which is often seen in soybean fields in mid-summer. Such information will ultimately allow prediction of when natural regulation of soy-

bean looper can be expected, with resultant savings of expenditures for pesticides.

New formulations of *Bacillus thuringiensis* were found to be highly effective for control of velvet bean caterpillar and soybean looper. This bacterium, marketed under several trade names, is highly selective for lepidopterous larvae and does not destroy beneficial insects when sprayed on the crop.

Free-Roaming Dogs

Results of a new project by Auburn wildlife researchers indicate that free-roaming domestic dogs may be a source of concern. In the study, two groups of dogs in rural Lee and Macon counties were radio-tagged. One group (pack I) was well-fed and cared for, having a high degree of association with its owner. Dogs of the other group (pack II) were not

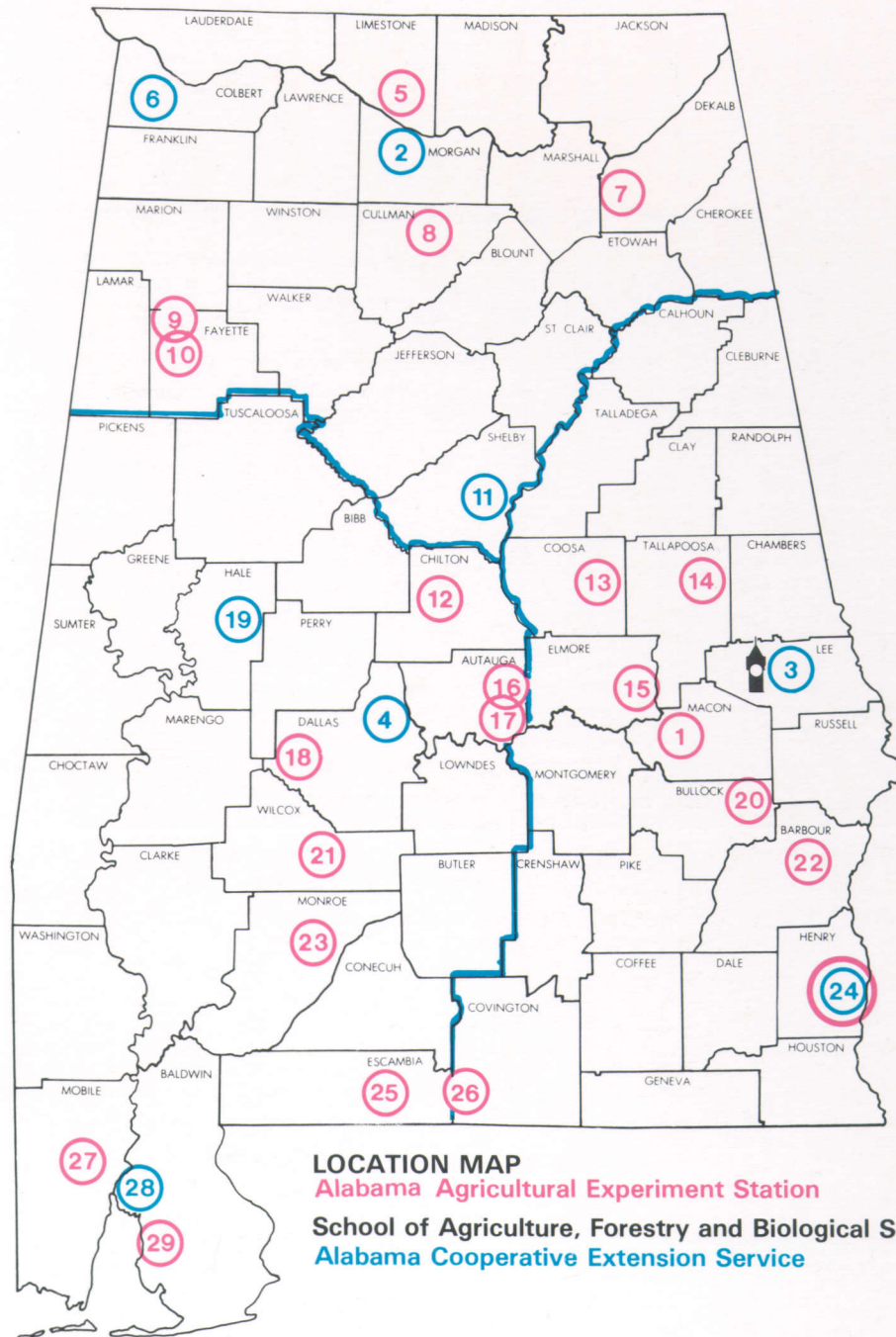
particularly well-fed or cared for and had a low degree of association with the owner.

Pack I regularly roamed over an area of 4.5 square miles in the vicinity of the owner's residence. Pack II roamed over 3.8 square miles. Both groups did more roaming during the months of January to April than at other times of the year.

Both groups of dogs engaged in hunting and chasing deer, rabbits, squirrels, bobwhite, opossum, and other wildlife species. Deer were chased but never caught by either group of dogs. However, rabbits (swamp and cottontail), grey squirrels, fox squirrels, chipmunks, cotton rats, and opossums were sometimes killed. Livestock were sometimes chased or harassed by these radio-tagged dogs. No injury to livestock was ever observed; in fact, one group of cattle regularly chased the dogs when they attempted to traverse their pasture.

Both chemical and biological control methods are being studied in efforts to combat scale insects, which are major pests of ornamental plants.





LOCATION MAP
Alabama Agricultural Experiment Station
School of Agriculture, Forestry and Biological Sciences
Alabama Cooperative Extension Service

 **AUBURN UNIVERSITY CAMPUS**
 School of Agriculture, Forestry and Biological Sciences
 State Headquarters, Cooperative Extension Service
 Main Agricultural Experiment Station

1. E. V. Smith Research Center, Shorter
2. Extension District 1 office, Decatur
3. Extension District 2 office, Auburn
4. Extension District 3 office, Selma
5. Tennessee Valley Substation, Belle Mina
6. The Gilbert Farm
7. Sand Mountain Substation, Crossville
8. North Alabama Hort. Substation, Cullman
9. Upper Coastal Plain Substation, Winfield
10. Forestry Unit, Fayette County
11. State 4-H Center, Lay Lake
12. Chilton Area Hort. Substation, Clanton
13. Forestry Unit, Coosa County
14. Piedmont Substation, Camp Hill

15. Plant Breeding Unit, Tallassee
16. Forestry Unit, Autauga County
17. Prattville Experiment Field, Prattville
18. Black Belt Substation, Marion Junction
19. Alabama Fish Farming Center, Greensboro
20. The Turnipseed-Ikenberry Place, Union Springs
21. Lower Coastal Plain Substation, Camden
22. Forestry Unit, Barbour County
23. Monroeville Experiment Field, Monroeville
24. Headland—
 Wiregrass Substation—
 Extension Area Specialists Office
 Boar Test Station and Swine Demonstration Unit
25. Brewton Experiment Field, Brewton
26. Solon Dixon Forestry Education Center, Covington and Escambia Counties
27. Ornamental Hort. Substation, Springhill
28. Sea Grant Advisory Service
29. Gulf Coast Substation, Fairhope

