

# THE POWER OF PARTNERSHIP

1997 Annual Report of the Alabama Agricultural Experiment Station  
and the College of Agriculture  
AUBURN UNIVERSITY

# 1997 ANNUAL REPORT OF THE ALABAMA AGRICULTURAL EXPERIMENT STATION

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## **C**ONTENTS

Introduction _____	1
Letter from the Dean and Director _____	2
The Past _____	3
Food Production and Food Safety _____	3
Families and the Economy _____	6
Our Environment _____	8
Global Opportunities _____	11
Reaching Out _____	14
The Next Generation _____	17
The Future _____	19
Financial Report _____	21

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## THE POWER OF PARTNERSHIP



Few success stories can be told without acknowledging the many people or groups who offered support and encouragement along the way. This is certainly true for the Alabama Agricultural Experiment Station (AAES), which throughout its 120 years of service has relied on alliances with many groups to be successful through both prosperous and lean times. Those partnerships have allowed the AAES to survive and often thrive in the face of change and austere budget cuts. The 1997 Annual Report of the Alabama Agricultural Experiment Station pays tribute to the power of partnerships that have led to many outstanding research accomplishments, and ultimately a better life for Alabama's citizens.



## Letter from the Dean and Director

*The Power of Partnership* is an appropriate title for this 1997 annual report since it draws upon and broadens a theme that has dominated our work this past year within the Alabama Agricultural Experiment Station (AAES) and the College of Agriculture.

Partnerships of the AAES range from the traditional partnership between the state and federal governments, to the partnerships among five schools and colleges on the Auburn University (AU) campus and with Alabama A&M University (AAMU), and also to the partnerships with universities across the state, in the region, and worldwide. Perhaps the most important partnership the AAES maintains, however, is with the people we serve—producers, processors, agribusiness people, consumers, alumni, and students.

What other partners will be important to us this year and in the future? Certainly among these would be the Agricultural Economic Development group, which is forwarding legislation to support a bond issue to build and renovate facilities at AU and AAMU for agriculture, forestry, veterinary medicine, and animal diagnostic services.

Another important partnership will be the cooperative research program between AU and AAMU. This cooperative program now supports research in food safety and nutrition, environmental and water quality, and plant systems. We expect this program to springboard the AAES's \$2 million per year program to a multimillion dollar program that will answer the most pressing problems facing agriculture.

As I have often said, the objective of successful research partnerships is meeting real needs of real people. We may talk about virtual reality, virtual universities, and so on, but thus far we have no virtual people with virtual needs for food, fiber, and shelter. We need real programs to meet the needs of real people, and we in the AAES pledge to use our resources wisely to do so. This is our Power of Partnership for the people we serve.

James E. Marion  
Director, Alabama Agricultural  
Experiment Station  
Dean, College of Agriculture

# FOOD PRODUCTION AND FOOD SAFETY

*providing a safe and secure food and fiber system*



An AAES-developed test kit, which can determine specific meat proteins in fresh and heat-processed meat products, aids inspectors and consumers in detecting undeclared meat proteins.

## AAES RESEARCHERS

in Nutrition and Food Science have developed an improved test to determine the specific meat protein in fresh and heat-processed meats. These research developments will aid in the battle against illegally processed or mis-labeled meat products.

Researchers have developed a group of specific antibodies for a rapid and sensitive test. The present test can only identify meat species in either raw or cooked products. The new test can be used for both raw and heat-processed meats, and will reduce the cost of the present test by at least 50%. Since the test is simple and inexpensive, it has been developed into a convenient kit, which can be used

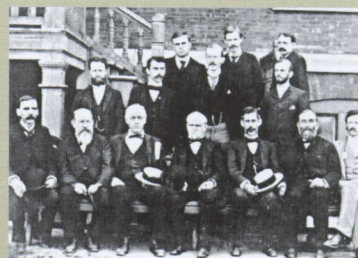
## The Past

*building on the traditional partnership between the state and federal governments*

The history of the Alabama Agricultural Experiment Station is a story of a scientific institution responding to the need to provide the food and fiber

required by a growing population in Alabama. The early history of the AAES is marked by the dual objectives of building a basic core of knowledge and of serving the pressing

needs of farmers. In more recent years, the AAES has sought new uses for traditional farm crops and encouraged



farmers to diversify into new, more profitable farm enterprises.

**1883** The Station's first bulletin described how to

to rapidly check many samples for specific meat proteins.

▼ During the next three years, commercial shiitake mushroom producers could grow 300,000 pounds of fresh shiitake mushrooms. But for southern producers to compete with northern and western producers, they must have the most up-to-date and cost effective information on production methods. Working at one of the few shiitake mushroom research centers in the United States, AAES scientists at Alabama A&M University are collaborating with the Shiitake Producers of Alabama to find ways to increase shiitake mushroom production. Other research plans include evaluating the addition of nitrogen to increase yields. Ultimately, this research will help producers reduce the costs of production, which will lower consumer prices for shiitake mushrooms.

▼ AAES researchers in Plant Pathology and Entomology have played a major role in developing fresh market tomatoes and cucumbers that are resistant to disease and insect pests. These scientists have introduced beneficial bacteria that grow on the roots of these economically important plants. Beneficial root-colonizing bacteria cause changes in the plant, boosting the plant's defense mechanism, increasing growth, and in cucumber reducing the amount of insect-feeding stimulant in the plant.

AAES research efforts on beneficial root-colonizing bacteria are also underway with the University of Florida's Institute for Food And Agricultural Sciences. In addition, AAES scientists are working with a seed treatment company to develop a commercial formulation of bacterial seed treatment for cucurbits.

deadly bacteria that can easily take up residence in ground meat products. Researchers are also looking at the effects of irradiation on such characteristics as storage, vitamin retention, smell, and flavor.

Educating the public about the value and safety of food irradiation is also an important part of the extension component of this project. Thus far, irradiation is passing the laboratory tests but efforts to convince the public of its benefits and safety still are a challenge because of the public's perception of radiation.

▼ A national pilot project for Beef Quality Assurance (BQA) education has been conducted in Alabama in 1997. The program is titled "Beef Quality is Every Cattleman's Business" and emphasizes that everything that is done or fails to be done on the farm can affect the quality of the beef product ultimately purchased by consumers.

Through displays and brief lectures, the program familiarizes Alabama cattlemen with proper management techniques, definitions of USDA yield and quality grading, and the reasons for cow carcass condemnation, among other things. The 14- x 11-foot displays consist of photos, diagrams, 3-dimensional mock-ups, and taxidermy specimens. In addition to being used in Alabama, the displays have been exhibited at the National State BQA Coordinator's meeting in Tennessee, a Pennsylvania auction market at the request of the

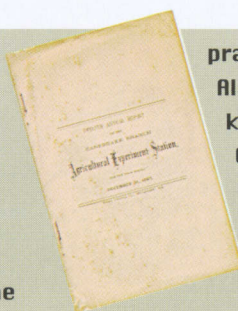
▼ Funded by the Alabama Cattlemen's Association and working with industrial meat processing facilities, AAES researchers in Nutrition and Food Science are looking at the overall effects of irradiation on ground beef. They are studying irradiation as a means for eliminating *E. coli* 0157:H7—a



Through the Beef Quality Assurance program, Alabama cattlemen learn that "Beef Quality is Every Cattleman's Business."

raise German carp, a high protein source bred in a pond located on the Experiment Station farm. The Experiment Station offered to furnish fish to stock the ponds of

interested farmers. **1885** The first branch experiment station was created in the



prairie lands of Alabama, also known as the Canebrake or Black Belt region. The soil in this area was

severely depleted by many years of cotton farming. **1888** A new cooperative soil test program was begun. In the first year, soil

samples from 10 different areas of the state were gathered, and experiments using different mixtures of fertilizers were conducted. The





**Cucumber beetles may not transmit bacterial wilt disease as readily thanks to ongoing research by AAES scientists.**

Pennsylvania Beef Council, the Sunbelt Agricultural Expo in Georgia, and the 100th Anniversary National Cattlemen's Beef Association (NCBA) Convention in Colorado.

Sponsors for the BQA program in Alabama include Alabama Cattlemen's Association, Alabama Veterinary Medical Association, Alabama Farmer's Cooperative, Inc., Alabama Cooperative Extension System, Department of Animal and Dairy Sciences at Auburn University, NCBA, and the Alabama Livestock Markets Association.

▼ AAES scientists have developed two powerful diagnostic tools, which should help prevent economic losses for the cattle and poultry industries. AAES researchers in Poultry Science and Botany and Microbiology, working with the USDA National Animal Disease Center, have developed a procedure to

diagnose a bacterium that poses risks to human health and can cause severe economic losses for cattle producers. In cattle, the bacterium *Campylobacter fetus* can induce abortion and cause infertility. Humans can be infected with the bacterium when they eat raw beef, raw milk, and cottage cheese. This new procedure provides a powerful tool to investigate a disease that results in a loss in animal production and a risk to human health.


AAES researchers in Poultry Science have developed a rapid diagnostic test for reovirus infections in chickens. Reoviruses cause a number of debilitating diseases of commercial chicken and turkey flocks worldwide. Because this test can be adapted to many other poultry viruses, it represents a major breakthrough for the diagnosis of all viral diseases of poultry where the disease cannot be diagnosed based solely on the clinical picture.

AAES researchers in Botany and Microbiology are also working to identify the specific species of pathogens that cause disease in poultry and catfish. Avian cellulitis, caused by an infection that occurs under the skin of otherwise healthy birds, costs the poultry industry \$40 million each year. In catfish production *Edwardsiella ictaluri*, along with another bacterial pathogen, causes more than \$50 million in annual losses.

▼ As part of developing sustainable cotton production systems for north Alabama, AAES scientists at Alabama A&M University and Auburn University and scientists with the Tennessee Valley Authority are studying the potential use of poultry litter as an alternative nitrogen source for cotton. Their research indicates that when fresh poultry litter is applied to cotton, it produces lint yields similar to or better than those produced by commercial nitrogen. In addition, poultry litter has improved the water-holding capacity of the soils that received litter continuously for four years. If cotton farmers use poultry litter as a nitrogen source, Alabama's 430,000 acres of cotton crop alone can use about 43% of poultry waste produced in the state, thus alleviating the litter disposal problem and improving Alabama cotton soils.

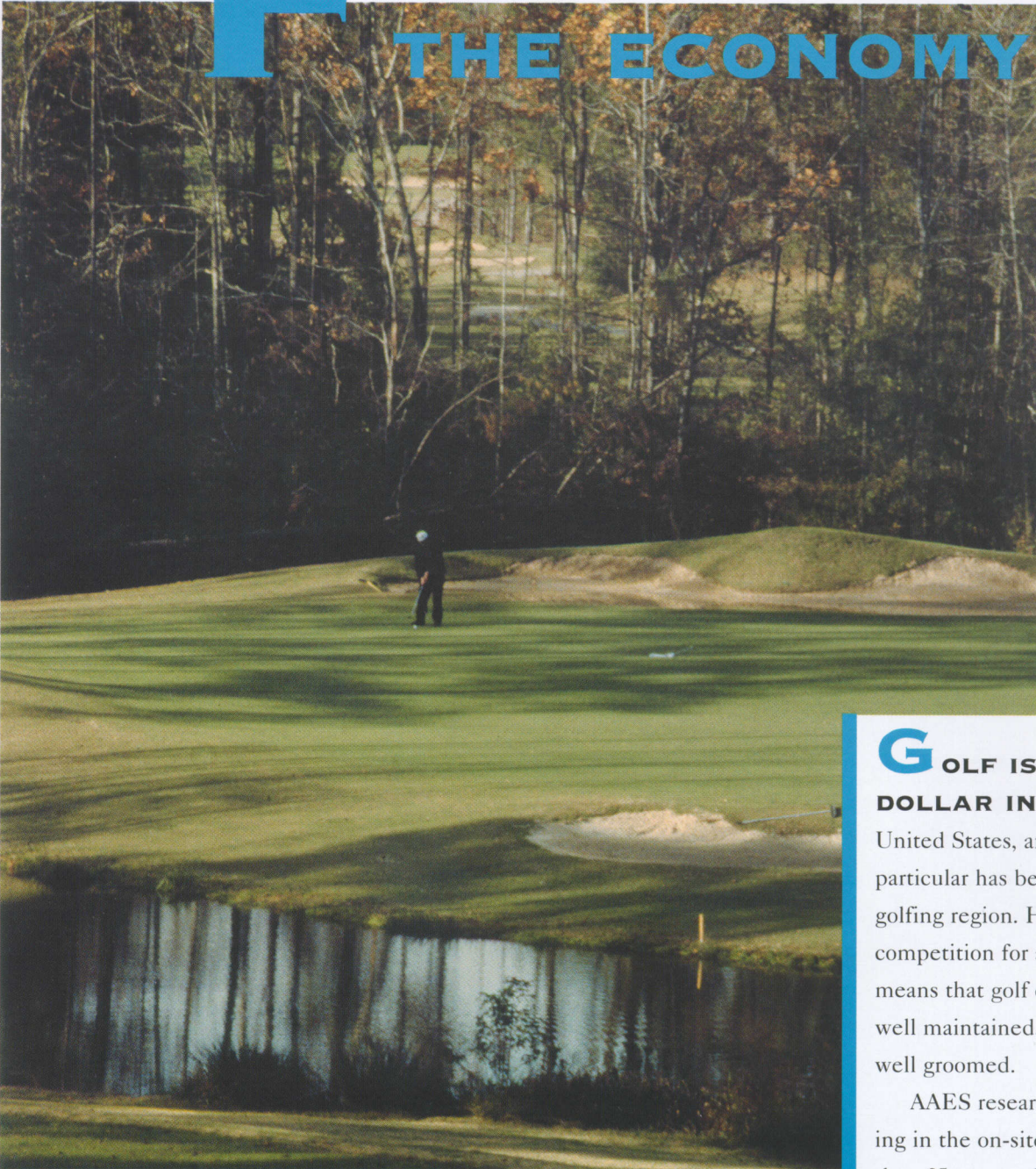
▼ Swine breeders face a dilemma: they want breeding stock that uses feed efficiently, but meat from feed-efficient hogs can lose moisture when it is packaged. Lost moisture, seen as drip in the bottom of the package, means a loss of money for swine breeders and processors, and a product that is unattractive to consumers.

In a project funded by the National Pork Producers Council, AAES researchers in Animal and Dairy Sciences and the swine breeding program are determining the genetic factors in live animals that affect consumer acceptance of pork products.

<p>following year, researchers went directly to the various soil areas of the State to pursue the investigation on a broader scale.</p>	<p><b>1898-1918</b> Educational meetings called Farmers' Institutes were held throughout Alabama. The meetings consisted of lectures by AAES experts and informal</p>	<p>information-sharing sessions on a variety of topics. <b>1900</b> Soil improvement and cotton research continued to receive</p>	<p>special emphasis. A display about the Auburn Station's program of cotton research received special recognition</p>	 <p>at the Paris Exposition, winning a silver medal for excellence.</p>
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# FAMILIES AND THE ECONOMY

*enhancing economic opportunities and the quality of life among families and communities*



AAES researchers are testing new putting green turfgrasses to help the golf course industry attract and keep golf enthusiasts.

**G**OLF IS A BILLION DOLLAR INDUSTRY in the United States, and the Southeast in particular has become a popular golfing region. However, increasing competition for a golfer's dollar means that golf courses must be well maintained, challenging, and well groomed.

AAES researchers are participating in the on-site testing of more than 25 new and existing bentgrass

**1904** AAES researchers collaborated with USDA's Bureau of Plant Industry on a cotton-research program. The program's aim was to improve the cotton industry in the South by encouraging the development of better varieties and cultivation techniques.

**1905** USDA contributed money to the AAES to expand its research on



beef and dairy cattle, forage crops, swine feeding, and livestock marketing. In addition to research at Auburn, hog-feeding research was pursued in collaboration with hog

farmers in Houston and Sumter counties.

**1911** The State Legislature provided funds directly to the AAES to combat the cotton boll weevil. The

and bermudagrass cultivars. In order to subject putting green turfgrasses to "real world" conditions, the United States Golf Association (USGA) in cooperation with the National Turfgrass Evaluation Program and the Golf Course Superintendents Association (GCSA) is sponsoring on-site tests on 16 golf courses across the country. Alabama is the only state other than California that has two in-state test sites: the Country Club of Birmingham, which is being evaluated by Auburn University personnel, and the Country Club of Mobile, which is being evaluated by University of Florida personnel.

AAES agronomists are also studying the effect of mowing height and traffic intensity on new types of bermudagrass. This research is being funded by the USGA, the Alabama Turfgrass Association, and the Alabama and Gulf Coast chapters of the GCSA.

▼ How do families and neighborhood experiences help children be successful with their peers? How can parents make sure children are safe when they stay home alone after school?

AAES researchers in Human Development and Family Studies are conducting a long-term study that provides practical answers to these and other questions about children and families. Through this study,

researchers hope to identify risk factors that can lead to problems and protective factors that help children develop good social skills.

Collaborators in the study with Auburn University include researchers at Vanderbilt University and Indiana University. This research has been funded by grants from the National Institute of Mental Health and the National Institute of Children's Health and Human Development.

▼ Where are advertisements for catfish most effective? Newspapers, magazines, radio, television? AAES scientists in Agricultural Economics have found that generic advertisements in magazines can mean a profit for catfish producers. The \$6.5 million spent on advertising in magazines generated at least \$11.8 million in profits, which meant a one-half cent per pound profit for the catfish producer (based on a price of seventy cents per pound).

Advertising in newspapers or on radio or television did not show a strong significance between the money spent and the effect on consumers. Support for this research was provided by the Catfish Institute and the

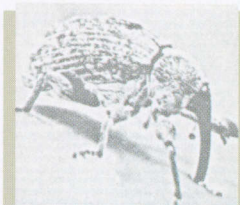
National Institute for Commodity Promotion Research and Excellence.

▼ The Southeast is a hub of the forest industry. In Alabama alone, forestry generates more than \$9 billion worth of products each year and employs more than 65,000 people. In a cooperative effort between education and industry, a new Forest Products Training Center has been established in Alabama to provide services to the forest industry. The Center will be used to show equipment to prospective buyers, train operators, and give forestry students hands-on experience with forestry equipment and forest operations.

Partners in the center include Auburn University; Caterpillar Inc., the



Finding ways for young children to be successful with their peers can help parents avoid problems later on.



Experiment Station used these funds to

send traveling agents from a number of departments to acquaint the farmers with the latest findings of agricultural science and to investigate local farm problems.

**1924-1940** A broad system of branch experiment stations was established throughout the State. A research program aided the spread of electricity to

rural areas, and ambitious projects in forestry and fisheries were begun in a continuing effort to diversify agriculture in Alabama.

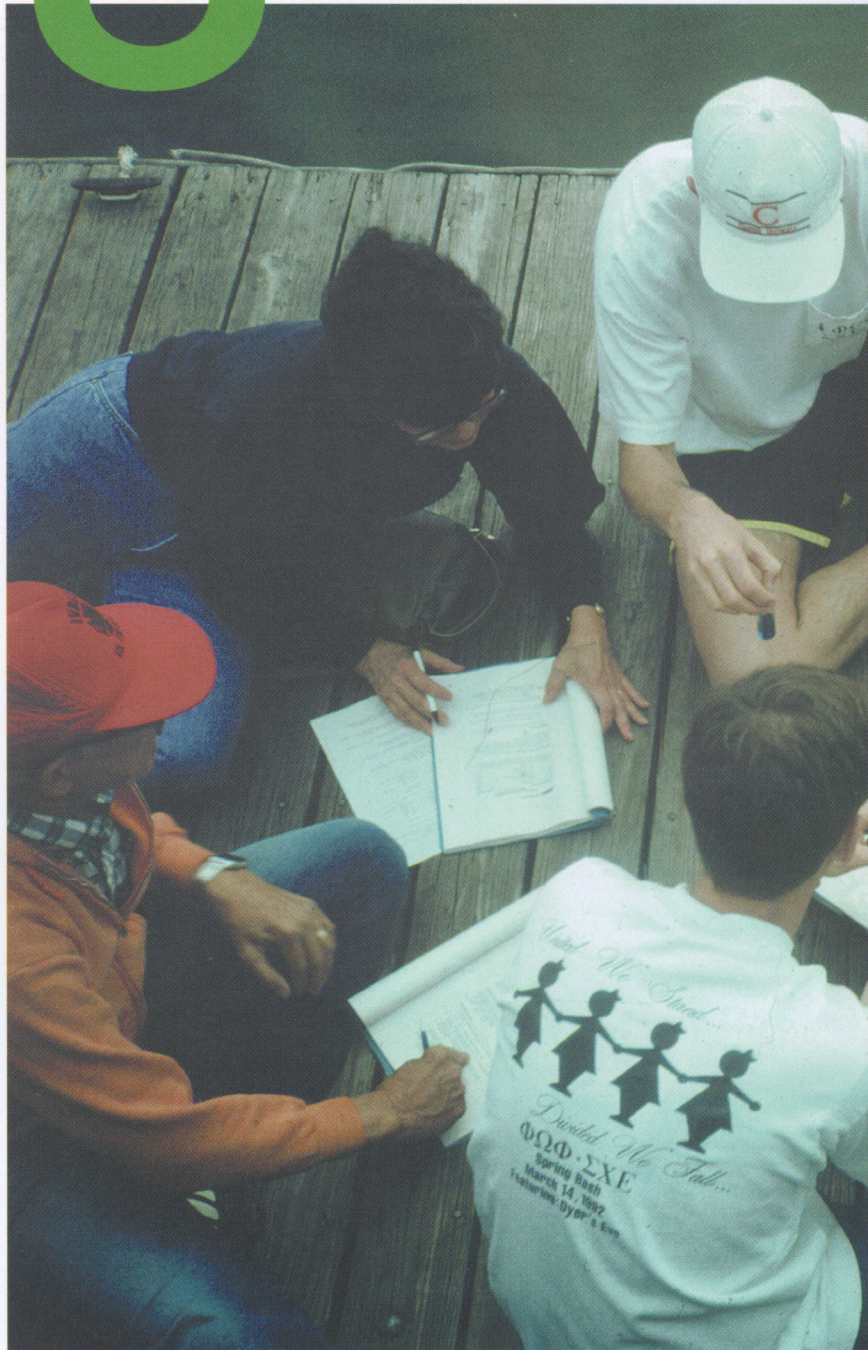
**1933** The Tennessee Valley Authority was created. Sustained cooperative investigation involving seven states and the federal government began. The land-grant

world's leading manufacturer of construction and mining equipment; and Mead Coated Board, Inc., a wood products manufacturing company. The Forest Products Training Center will provide Auburn University with classroom space and an area where students can gain hands-on experience operating forestry equipment, using approved forestry best management practices. It will give Caterpillar a site to demonstrate their new forest machinery. And it will allow Mead Coated Board, which provided a site for the training center, to have the area harvested during the next three years with Caterpillar equipment.



In a cooperative effort between education and industry, the Forest Products Training Center provides hands-on experience for forestry students.

# OUR ENVIR



Water Watch volunteers monitor water quality at more than 200 sites on 100 streams.

colleges of Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia were called on to pool their knowledge and facilities to

rehabilitate the vast watershed of the Tennessee Valley.

1940s  
Demonstration farms were developed. These demonstration farms



mixed cotton cultivation with dairy, poultry, swine, sheep,

and cattle enterprises in different combinations. Visitors in the area could visualize how the experiments might benefit their own farms.

1945-48 AAES research during the Second World War included studies of pest control, nitrogen-fixing vetches, and nutrition. Nutrition research was funded

# ONMENT

*achieving  
greater  
harmony  
between  
agriculture  
and the  
environment*



and lakes in Alabama.

**A**LABAMA IS BLESSED with a plentiful supply of water. Most of us take it for granted, but volunteers in the Alabama Water Watch program do not. Alabama Water Watch helps volunteers learn to monitor Alabama's lakes, streams, and wetlands. By early 1997, volunteers were monitoring more than 200 sites on 100 streams and lakes. Water Watch participants cooperate with water watchers in neighboring states to monitor shared watersheds.

by the Tennessee Valley Authority, the Nutrition Foundation of New York, and the General Education Board, established by John D. Rockefeller.

1950s AAES scientists developed new varieties of white clover, corn, cotton, and other vegetables.

1954 The Alabama Seed Stocks Farm was



established in a cooperative effort

between the USDA and the Crop Improvement Association. The farm immediately started a program to produce cotton, corn, soybean, wheat, rye, clover,

and vetch seeds in large enough quantities for distribution to certified planting seed producers.

1960s The AAES received an increasing

Alabama Water Watch interacts and collaborates with state agencies, including the Alabama Department of Environmental Management and the Alabama Cooperative Extension System; local and state representatives; and environmental, industrial, civic, and commodity groups. It is funded, in part, by a grant from the U.S. Environmental Protection Agency and the Alabama Department of Environmental Management, and is coor-

AAES scientists from Agronomy and Soils and Agricultural Engineering at Auburn University and from Plant, Soil, and Animal Science at Alabama A&M University are collaborating to measure the loss of ammonia from land-applied effluent as well as the changing levels of nitrogen and phosphorus in the soil. They are also studying animal waste lagoon renovation and solid waste management.

In another cooperative project, AAES



**AAES scientists are wading into research that will help show how forestry and other land use practices affect drinking water and the health of streams.**

minated through Fisheries and Allied Aquacultures of Auburn University.

▼ When producers land-apply animal waste, they face several problems: nitrogen in the waste can pollute groundwater; phosphorus can pollute surface water, cause algal blooms, and kill fish; and ammonia in the waste simply smells bad. AAES scientists are involved in several cooperative research projects to address these problems.

researchers in Agronomy and Soils, working with scientists from the University of Georgia and the University of Tennessee, are developing best management practices (BMPs) for farmers when they land-apply animal waste. The BMPs will include appropriate application rates, timing, and crop recommendations.

In addition, AAES scientists in Agronomy and Soils are using geospatial technologies to look at the potential for pollution from animal waste throughout Alabama. They are building a database, which will include the numbers of animals, where they are concentrated, and the availability of land for application of animal waste.

▼ How do forestry and other land use practices affect drinking water and the health of streams? The Sepulga Project—a joint effort of AAES researchers in

Forestry and Zoology and Wildlife Sciences—will answer this and other questions. Major land uses in the Sepulga river basin, which covers a large portion of several counties in south central Alabama, include forestry activities, row crops, and poultry production.

Named as a national demonstration project by the American Forest and Paper Association, the Sepulga Project is supported by many different groups: the National Environmental Education and Training Foundation, American Forest and Paper Association, National Council of the Paper Industry for Air and Stream Improvement, U. S. Environmental Protection Agency, U. S. Forest Service, International Paper Company, Union Camp Corporation, and Temple-Inland Corporation.

▼ Environmental quality, clean water, and quality food production concern everyone. AAES researchers at Alabama A&M University are helping cotton farmers to reduce erosion, water contamination, and environmental pollution by minimizing excessive application of fertilizers.

Using remote sensing, geographic information systems, and global positioning satellites, scientists are developing techniques to monitor and predict excessive phosphorus levels and to manage nitrogen stress in cotton. These techniques will help cotton farmers save money by increasing crop production and decreasing the adverse effects of excessive fertilization.

**amount of grant monies from a variety of public and private sources: TVA, National Aeronautic and Space Administration, Alabama Highway Department, Ford and**

**Rockefeller foundations, and some 50 private industrial firms and trade associations. 1960s The poultry industry in Alabama**



**grew rapidly after the Second World War. When federal inspectors had no reliable process to distinguish between diseased and normal fatty tissue in broilers,**

**they began to condemn large numbers of birds. The Poultry Science Department quickly discovered such a procedure and saved the industry millions of dollars annually.**

# GLOBAL OPPORTUNITIES

*strengthening international partnerships and achieving a competitive agricultural production system*



Cooperative research efforts, such as this project with scientists in Australia, are literally bridging oceans with knowledge.

## RESEARCH CONDUCTED IN

**AUSTRALIA** and New Zealand has helped AAES scientists in Entomology develop control strategies for the whitefringed beetle. Severe infestations of the whitefringed beetle often occur in Alabama sweetpotatoes and can result in loss of an entire field. This beetle also damages pasture grasses and other vegetable crops and plants.

**1967** A root-observation facility, the Rhizotron, was constructed to measure the effect of various fertilization and cultivation practices on the root

systems of annual plants. Cooperating with AAES personnel was the Soil and Water Conservation Research Division of the USDA.



**1969** The AAES was the first experiment

station to receive grants from United States Agency for International Development for its international fisheries program. Between 1967 and 1975, 250

short-term (30-day) visits were made to 49 nations, while at least 5 nations received long-term (up to 2 years) advisory missions from AAES scientists.

A USDA grant allowed entomologists from Auburn University to travel to Australia, where the whitefringed beetle causes serious economic damage in Irish potato production, and New Zealand, where the whitefringed beetle is a pest of pastures. Cooperative research focused on the sampling methods used by Australian and New Zealand scientists. After understanding the life cycle of this pest, AAES scientists were able to recommend control methods involving the use of foliar sprays rather than soil insecticides, which are toxic and expensive.

▼ Bringing together the resources of developing countries and institutions in the United States, the Collaborative Research Support Program (CRSP) is an international, multidisciplinary effort to improve human nutrition through pond aquaculture research. Through CRSP, Auburn University's Fisheries and Allied Aquacultures and research institutes in Honduras and Kenya are collaborating on several research projects.

Researchers in Honduras want to find better ways of managing the effluent from shrimp production and to

understand the effect on the environment when the effluent is released. The management techniques developed for the effluent from shrimp will be applicable to the effluent from catfish production in Alabama.



**In an effort to improve human nutrition through pond aquaculture research, AAES scientists are cooperating in several international projects.**

Auburn University personnel and researchers in Kenya are looking at other strains of Tilapia and developing techniques for controlling reproduction. Tilapia producers in southeastern Alabama will benefit by applying the information from the research in Kenya.

▼ Research underway at Auburn University's College of Veterinary Medicine is helping the future of the beef cattle industry by expanding global markets for cattle embryos produced in the United States. Currently the export of embryos is limited by the possible transmission of pathogens that might be found in cattle. AAES researchers and veterinary faculty members are working to develop methods to prevent the transmission of pathogens.

The export of embryos will benefit embryo suppliers in the United States by providing them with an expanded market. The export of embryos will also benefit international customers from the improved production after genetically superior cattle embryos are introduced into their herds.

▼ Research conducted in Edinburgh, Scotland, has the potential to pay off big for cattle producers in Alabama. An AAES scientist from Animal and Dairy Sciences at Auburn University is working with other scientists at the Medical Research Council (MRC) Reproductive Biology Unit in

**1976 An Agricultural Advisory Council was created to encourage better cooperation between AAES administrators and**



**the commodity groups their research**

**programs served. The council included farmers and representatives from the Alabama Cattlemen's Association, Alabama Forestry Commission,**

**the Alabama Farm Bureau Federation, Alabama's Poultry and Egg Association, the American Dairy Association of Alabama, director of the Cooperative**

**Extension Service, and director and emeritus directors of the Experiment Station.**

**1973-1977 Several cooperative research centers were**





**An AAES study is helping Alabama textile and apparel producers know how consumers in other countries make decisions about purchasing products.**

Scotland. The MRC Reproductive Biology Unit is operated jointly with the Ob/Gyn Department of the University of Edinburgh Medical School, which is world-renown for its accomplishments in reproductive biology.

With the assistance of the MRC scientists, the AAES scientist hopes to develop a cell line which will enable them to characterize the mechanisms of reproductive hormone secretion in cattle. Eventually this discovery would

allow producers to breed cattle more efficiently and increase production.

▼ The textile and apparel industry, which is critically important to Alabama's economy, is facing an increasingly competitive global marketplace. An AAES study by Consumer Affairs is helping Alabama textile and apparel producers identify their customers' needs around the world. Supported by the National Textile Center and industry funds from Russell Corporation, the International Council of Shopping Centers, and Burlington Industries, this study has developed a consumer decision-making model.

The study looked at the how the physical appearance, the price, and the brand name of a product influenced consumer purchases of the product in Mexico, Korea, and China. If research can determine consumer attitudes and purchase behaviors in international markets, then U. S. producers can build on their strengths and improve sales of their products in other countries.

established at Auburn. The Forest Products Laboratory was built for government forest specialists and AAES personnel to



conduct research about timber harvesting,

reforestation, and wood waste use. The Environmental Studies Service Center, staffed by joint employees of the National Weather Service and the AAES, provided Alabama,

Georgia, and Florida farmers with weather information related to farming practices. Another cooperatively developed research and service facility was the Seed

Technology Center, which processed, tested, and certified superior plant seed for distribution by the Crop Improvement Association.

# REACHING ROUT

*working  
with our  
partners to  
solve  
problems*



Variety trials provide information about how to select annual bedding plants that will help keep Alabama beautiful all season long.

**H**ORTICULTURE IS A **MULTIBILLION DOLLAR** enterprise in Alabama. Through research in the All-American Selections Display Garden at the E. V. Smith Research Center, AAES is able to provide information about annual bedding plants that grow well in South Alabama.

Growers, homeowners, and Master Gardeners can visit the test site any time or attend a field day usually held in July.

**1980s** Closer cooperation was sought between AAES researchers who looked for answers to farmers' problems and Extension specialists who both saw the

problems and delivered the scientists' answers. Efforts began to integrate Extension specialists into the teaching and research programs.



**1990s** The Alabama Agricultural Experiment Station experienced changes, which included the combining of the positions of the Dean of the College of Agriculture and the

Director of the Experiment Station. Other changes included the strengthening of the AAES's partnerships with the Alabama A&M University and with

During the field day they can tour the annual bedding plant garden trials and hear firsthand research information on each variety from AAES scientists.

Master Gardeners are volunteers trained to bring research-based horticultural information and practices to their communities' landscapes and gardens. Their training includes 40 hours of instruction from horticulturists, entomologists, agronomists, Extension specialists, and county Extension agents. Their training also includes field and laboratory work.

▼ Alabama currently ranks second behind Mississippi in catfish production, and the USDA estimates that catfish consumption will triple in the United States by the year 2000. Demand for other types of commercially grown freshwater fish and shellfish is also growing at a record rate.

Through the Southeastern Cooperative Fish Disease Project, AAES researchers in Fisheries and Allied Aquacultures provide the latest research-proven technology in workshops and short courses for people interested in fish health and maintenance. Attending typical workshops are consultants, private farmers, vet students, and personnel from other universities in the Southeast.

In addition, the USDA Fish Disease and Parasites Research Laboratory, located in Auburn, works with scientists in Veterinary Medicine and Fisheries and Allied Aquacultures to eliminate diseases of fish.

▼ With leadership from AAES scientists, Extension specialists, and county Extension agents, Alabama is leading the Cotton Belt in the monitoring of insect resistance to Bt cotton. Although the genetically engineered Bt cotton carries insecticidal properties that make it almost entirely immune to the tobacco budworm, scientists and growers are concerned that the tobacco budworm and the cotton bollworm will develop resistance to Bt cotton.

Alabama Cotton Commission, Cotton Incorporated, Monsanto, and USDA have joined forces with Auburn University researchers and Extension System personnel to determine if and when Bt resistance will occur in Alabama. Scientists and Extension specialists are providing growers with a Resistance Monitoring Kit, which has all the materials necessary for collecting, storing, and shipping samples of tobacco budworms or cotton bollworms gathered in the field. The USDA lab in Stoneville, Mississippi, is testing the samples for Bt resistance. Although other cotton-growing states are also conducting similar programs, Alabama has taken the lead because Alabama cotton growers are planting a larger percentage of cotton acreage in Bt cotton than growers in any other state.



The Alabama Tomato IPM Program helps fresh-market tomato producers compete in this \$18 million industry, and helps Alabama consumers have the pick of the crop.

▼ Alabama produces more than 770,000 pounds of fresh market tomatoes annually with an estimated value of \$18 million. In 1997 with the support of a grant from the Southern Region Integrated Pest Management (IPM) Program, the Alabama Tomato IPM Program was implemented through large scale on-farm demonstrations in both the northern and southern tomato production regions of the state. Tomato growers in the two targeted areas are responsible for more than 90% of the tomato production in Alabama.

The IPM program consisted of a biweekly insect/disease scouting program combined with a weather-based

**the Alabama Cooperative Extension System.**

**1997 An AAES Faculty-Industry Council composed of industry representatives and**

**AAES faculty representatives met to discuss research directions for the Experiment Station. Members included faculty from Alabama A&M University and**

**Auburn University and industry representatives from Alabama Poultry and Egg Association, the Department of Agriculture and Industries, Russell**

**Corporation, Alabama Farmer's Federation, Alabama Forestry Association, and Alabama Cattlemen's Association.**

**Information from A History Of The Alabama Agricultural Experiment Station: 1883-1983, by Norwood Allen Kerr, which is available on request from the Office of Research Information, 2 Comer Hall, Auburn University, AL 36849.**

fungicide spray program, provided by the Agricultural Weather Information Service (AWIS). Fertility recommendations were made periodically based on results of soil and tissue analysis that determined the nutritional requirements of the crop. In addition, research on weed control was conducted at two AAES substations.

Cooperating in the IPM program are scientists from Entomology, Agronomy, Plant Pathology, and Horticulture. County Extension agents and growers are involved as well.

▼ The AAES embryo production research laboratory located at the College of Veterinary Medicine is one of a dozen sites in the United States where clients can bring their cattle for in vitro fertilization (IVF). In vitro fertilization services, which allow fertiliza-

tion of eggs "in the test tube," has been offered at Auburn University for about three years.

These efforts represent a partnership between the AAES and the Large Animal Teaching Hospital at the College of Veterinary Medicine. Cattle owners come from several states, including some from outside the Southeast, to take advantage of the AAES's expertise in IVF technology.

▼ New varieties are constantly being developed and marketed, but not all those varieties are suitable for production in Alabama. Narrowing down the options and learning more about the performance of each variety in each soil and climate region of Alabama can help producers make wiser decisions about the crops they plant.

Each year, AAES scientists test myriad varieties of small grains, corn, ryegrass, forages, peanuts, cotton, soybeans, fruits, vegetables, and ornamentals at sites throughout the state. Variety reports are available annually, as soon as the data from the previous year have been collected and analyzed and in time for producers to use them in their selection process for the coming season. The reports are available from the AAES or from county Extension offices and include yield and performance data from each variety tested in a given year. These reports supply invaluable information for commercial row crop and livestock producers, seed companies, and even home gardeners.



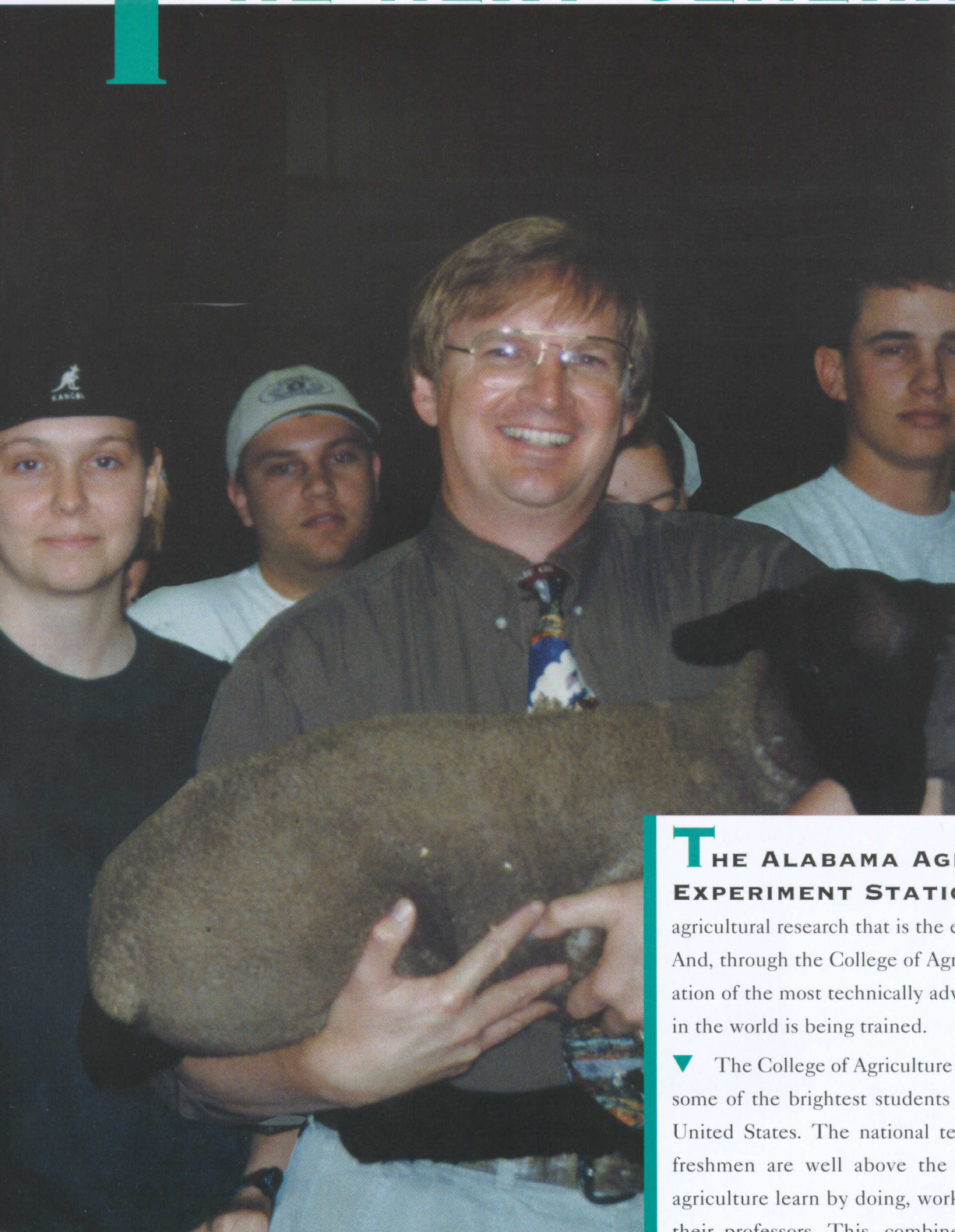
The College of Veterinary Medicine is one of a dozen sites in the United States where clients can bring their cattle for in vitro fertilization.



Many of the teaching staff in the College of Veterinary Medicine are also an extra source of information for their students.

# THE NEXT GENERATION

*forging  
partnerships  
with  
future  
agricultural  
leaders*

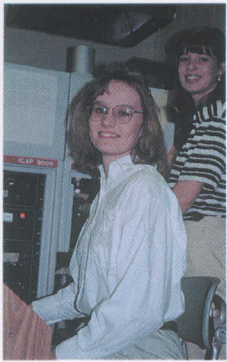


ture have research or extension responsibilities. These dual roles provide an

## **T**HE ALABAMA AGRICULTURAL EXPERIMENT STATION

has a system of agricultural research that is the envy of the world. And, through the College of Agriculture, a new generation of the most technically advanced agriculturalists in the world is being trained.

▼ The College of Agriculture prides itself on having some of the brightest students at Auburn and in the United States. The national test scores of incoming freshmen are well above the average. Students in agriculture learn by doing, working side-by-side with their professors. This, combined with the excellent advisor system and cocurricular opportunities, has



developed leaders who now hold prominent positions with farming operations, and at all levels of agribusiness, including multi-national and

Fortune 500 Companies.

▼ Students come from virtually every state and more than 70 foreign countries. Auburn University has an internationally renown foreign program in freshwater fisheries and aquaculture. In 1997, more than 840 students were enrolled in the College of Agriculture's undergraduate programs while 220 graduate students pursued degrees in nine different departments.

▼ More than \$242,000 in scholarships and awards were given to 177 Auburn University College of Agriculture undergraduate students in 1997. These scholarships and awards are an indication of the strong support by agribusiness, friends, and alumni for the academically talented students in the College of Agriculture.

The scholarship program in the College of Agriculture is the largest, both in number of awards and monetary value, of any on campus. Scholarships range from full tuition scholarships to just as meaningful \$100 to \$1,000 grants from organizations and individuals.

▼ Another advantage enjoyed by the students is the advisor system used by the College of Agriculture. Students are assigned an advisor within a few weeks of registering for their first quarter at Auburn University. Students become well acquainted with their advisor soon after the beginning of their first quarter of enrollment. Advisors help with class scheduling and with any special problems

students may have. As evidenced year after year by the number of former students who return to Auburn to visit their advisors, these faculty members never become "ex-advisors." In addition the College of Agriculture offers a free one-on-one tutoring service for any students in agriculture.

▼ Each of the departments in the College of Agriculture has a specialized teaching staff with more than 95% holding a Ph.D. degree, and many are considered national and international experts in their discipline. Most teachers also have research responsibilities, supported by the Alabama Agricultural Experiment Station as well as outside contracts and grants. Some also work directly with agriculture and agribusiness via joint appointments in the Alabama Cooperative Extension System. These dual roles keep teachers in the College of Agriculture up-to-date on the latest research findings from the scientific community, and provide an extra source of information for their students.

▼ State-of-the-art teaching facilities in Comer Hall Auditorium put it at the forefront of available technologies. Comer



Auditorium has been transformed into a multimedia presentation system with full Internet capacities and VCR, slide projector, laser disc, and cable television access. Each separate element is controlled by touch screen and coordinated by the main computer.

▼ Well over 300 Auburn University College of Agriculture students have participated in supervised internship programs involving nationally known agribusinesses and government agencies. These internships have provided an important opportunity for practical experiences before graduation, plus degree credit and excellent salaries.

More than 95% of the College of Agriculture's domestic students who responded to a survey report that they received good job offers either before or shortly after graduation. The Horticulture Department may hold a national record by placing every graduate for the last 13 years.

▼ In 1997, the College of Agriculture continued to cosponsor and participate in a farmer exchange program with other countries. Faculty members from the College of Agriculture and leaders from the Alabama State Department of Agriculture and Industries and the Alabama Farmer's Federation visited Germany, Hungary, and Austria. A delegation of German farmers from the Havelland Farmers Association—a group of agriculturists from eastern Germany—visited Alabama to learn more about our agricultural system.

In addition, through a continuing Academic Interchange Agreement with Pannon University, the oldest Agricultural University in Hungary, Auburn faculty and Alabama farmers hosted six of Pannon University's honor students. These students lived on farms for five-month internships to learn firsthand about how to manage a business and operate in a market-driven economy.

# THE FUTURE

*developing  
new  
technologies  
with  
our  
partners*



**Precision farming employs new technologies to help farmers make wise decisions about applying nutrients and harvesting crops.**

**P**RECISION FARMING can help farmers make wise choices about where to apply nutrients and how much of a nutrient is needed. These choices are possible because of new technologies that let scientists pinpoint exact locations within fields and determine certain characteristics about these locations. These new technologies include global positioning satellites, farm equipment outfitted with computerized controls and yield monitors, and geographic information software.

Research thus far has focused on nutrients and yields. By looking at which areas of a field have lower yields, scientists can make recommendations about precisely where nutrients are needed. By applying only the nutrients needed and only where they are needed, farmers can save money and protect the environment.

Remote sensing of plant conditions may be the next step. Teaming up with NASA, researchers want to look at satellite photographs of plant color and temperature—two indicators of stress. And plant stress is a good measure of potential yield. AAES researchers, Extension specialists, county Extension agents, growers, industry representatives, and USDA personnel are collaborating. Tests and demonstrations are taking place on about 1,600 acres.

▼ AAES researchers in Fisheries and Allied Aquacultures are working on several new technologies to increase fish production.

Fisheries researchers are working to get approval from the Food and Drug Administration for HCG, a hormone which induces spawning in fish. In a cooperative effort with 12 other states, Alabama fisheries researchers are trying to determine if the drug does what the manufacturer says it will do and if it is safe for fish. By using HCG to induce spawning, fish hatcheries and private aquaculturists can increase their production of fish.

In another project, supported by Gold Kist and Alabama Catfish Producers, AAES researchers in Fisheries and Allied Aquacultures are working to create a genetic map of the catfish. They are locating the genes that control economically important traits like disease resistance, growth rate, feed conversion efficiency, tolerance of low oxygen, and carcass and fillet yield. Ultimately, they hope to produce catfish stocks that grow faster, have better feed conversion efficiencies and higher processing yields, and are more resistant to diseases.

▼ This year marked the birth of the first transgenic pigs produced in Alabama. Transgenic means that these animals carry genes from other species. This gene transfer work was accom-



**Alabama is one of a dozen sites worldwide that can produce transgenic swine.**

plished through a cooperative effort involving AAES scientists in Animal and Dairy Sciences and the College of Veterinary Medicine, and scientists from the University of Alabama at Birmingham.

This recent technical achievement puts Alabama on the map as one of about a dozen sites worldwide that can produce transgenic swine. Through this technology the potential exists to produce animals that are resistant to disease or that could produce substances of value to both human and veterinary medicine.

▼ AAES scientists in Entomology; scientists at the USDA Agricultural Research Service Center for Medical, Agricultural, and Veterinary Entomology; and scientists at Texas A & M University are developing the technology to eavesdrop on soil insect pests. Currently, if scientists want to determine how many insects are in the soil, they have to take a soil sample and count or measure the number of pests.

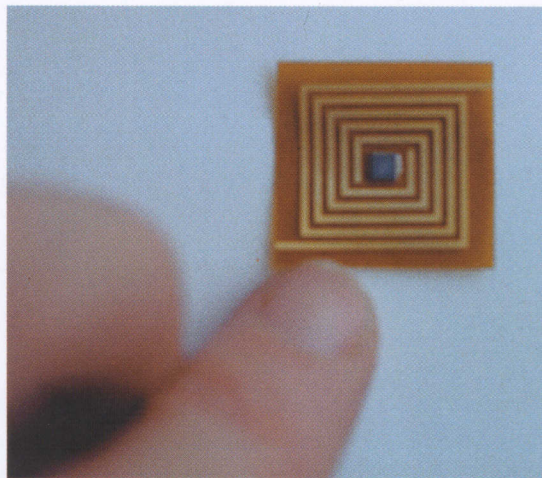
With acoustic monitoring technology, scientists can locate soil insects by using microphones that can detect sound in the soil. If scientists can develop acoustic mapping or sensing technologies and gather data on a variety of soil properties, then they could provide valuable management information about soil insects for the agricultural, landscape, and golf course industries.

▼ In 1997, the first patent to be awarded for a biological product in recent years was awarded to an AAES researcher at Auburn University. The patent covers genetic engineering occurring in the chloroplasts of plants. (The chloroplast is the part of a cell where photosynthesis occurs.)



Genetic engineering in plants is generally aimed at placing a foreign gene in a plant cell nucleus to make that plant toxic to insects or resistant to herbicides. This new ability—placing genetic material in the chloroplast—is significant because it overcomes two of the major concerns with genetic engineering in the plant cell nucleus: the low expression (small amount) of the foreign gene product and outcrossing, the spreading of pollen with the resistance genes to weeds, making them superweeds that are resistant to herbicides and insects.

Alabama producers will potentially benefit from the increasing introduction of herbicide- and insect-resistant cotton and other economically important crops in this region. This technology also has the potential to produce pharmaceutical compounds at a much lower cost than the current technology.



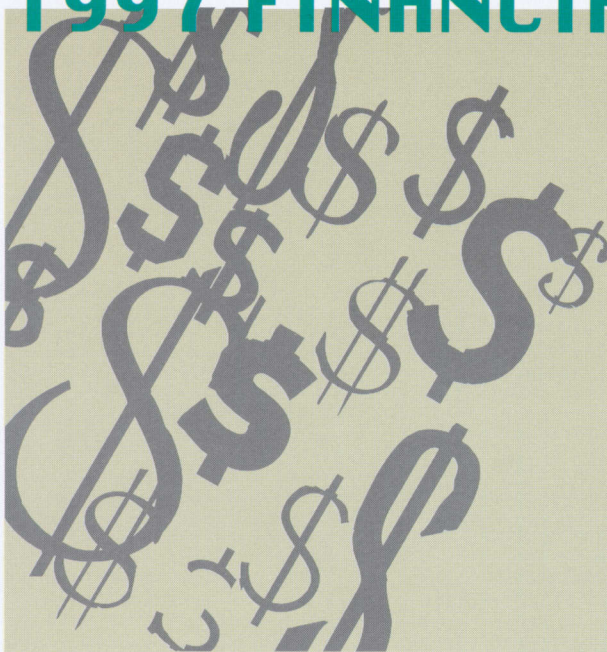
**AAES scientists are developing a stamp-sized sensor that will help consumers determine how safe food is before they buy it.**

▼ In an interdisciplinary program initiative at Auburn University, scientists are developing a stamp-size sensor that will help consumers determine how safe food is before they buy it. Researchers in the College of Veterinary Medicine, the College of Engineering, the College of Sciences and Mathematics, the College of Agriculture, and the School of Human

Sciences are involved in this research program.

By integrating computer technology with molecular biology, scientists plan to develop a computer chip that can be placed in packages of fresh food products to monitor each package for contamination. (Current procedures allow only random packages to be tested.) The chip will store information about the fresh food product such as the farm producing the product, when the product was processed, and the temperature history of the product during shipment and marketing. In addition, a site on the chip will react to specific types of bacteria, indicating if the product were contaminated with, for instance, *Salmonella* or with *Escherichia coli* 0157:H7.

## 1997 FINANCIAL REPORT



<b>Total revenues</b>		<b>\$35,835,431</b>
State		\$20,507,794
Federal		\$ 4,114,629
Contracts and Grants		\$ 8,893,006
	Federal	\$6,227,759
	State	\$ 291,082
	Local	\$ 41,971
	Private	\$2,332,194
<b>Auxiliary</b>		<b>\$ 2,320,002</b>
Sale of Research Products	\$1,145,326	
Indirect Cost Recoveries	\$ 940,118	
Diagnostic Services	\$ 210,160	
Interest and Royalties	\$ 24,398	





