# Annual Report of Accomplishments
## FY 2000-2004

**The University of Georgia**
**College of Agricultural and Environmental Sciences**
Cooperative Extension Service
Agricultural Experiment Stations

**and**

**Fort Valley State University**
**College of Agriculture, Home Economics and Allied Programs**
Cooperative Extension Program
Agricultural Research Station

**May 1, 2002**

Signed certification form to follow by USPS.

# PLANNED PROGRAMS

Impact statements for the 1862 Institution may be found in a searchable data base at

http://oit.caes.uga.edu/impactstmt/search/search_form.cfm

## Goal 1: An agricultural production system that is highly competitive in the global economy

Performance Goal 1-1(1862)

Issue Statement

The Department of Plant Pathology facilitates the development and adaptation of new cultivars that are more tolerant to abiotic and biotic stresses affecting plants, cultural systems that improve production efficiency, promote sustainability, and improve crop utilization. New cultivars and production practices are evaluated under Georgia environmental conditions to keep the industry competitive. New and developing technologies are integrated into effective management strategies such as rapid diagnostic and predictive tools for pest and disease problems to lessen the need for crisis management.

Action

Mycotoxin contamination of foods and feeds has a tremendous impact in agriculture and human health. Georgia's major crops that could be contaminated include peanuts, corn and grain crops like millet. Plant pathologists are working to minimize the production of toxic fungal metabo lites to maintain a safe feed and food supply in Georgia crops and foods. Pearl millet is being developed as part of the poultry ration in Georgia. To make sure that this crop can be effectively used, scientists need to develop storage and mycotoxin management protocols that can be adopted in the industry.

Outcome

Two studies on pearl millet were carried out in 2001 to improve storability and maintain product safety. The scientists found the use of propionic acid or ammonium propionate is effective in mai ntaining a mycotoxin free product in storage. This information will help develop a market for millet in poultry rations.

Resources

David Wilson; Cooperators: Corley Holbrook, Neil Widstrom

Performance Goal 1-1(1862)

Issue Statement

Agriculture remains the single largest segment of Georgia's economy, but many producers are finding it increasingly difficult to remain profitable in today's global economy. Competition from lower cost producers, increasing environmental restrictions, labor shortages, and man y other factors have combined to put pressure on the ability of Georgia farmers and producers to remain competitive in commodity markets. One strategy that has emerged is to add value to commodities in order to gain a higher return for products. Commodity producers need to be made aware of the opportunities that exist for adding value and provided assistance with developing products and services to meet market needs.

Action
The Department of Food Science and Technology organized both an oral and a poster session during a university sponsored "Symposium on Value Added Agriculture" held in Tifton, GA on December 13th and 14th of 2001. Sixteen (16) posters detailing both applied and basic research conducted in the Department of Food Science and Technology at the University of Georgia on adding value to agricultural products were available for viewing by the 200+ attendees to the symposium. An oral session was presented on the afternoon of the 14th entitled "Value-Added Processing" with six different presentations addressing added value opportunities for meat, poultry, and horticultural crops in Georgia. There were approximately 37 individuals who attended the oral session including several farmers and producers who expressed an interest in pursuing value added production systems.

Outcome
The symposium attendees (approximately 225 people) were made aware of the opportunities that exist to add value to agricultural commodities through further processing. Examples of past and present research were presented to illustrate the concept of adding value to agricultural commodities and the attendees were made aware of the resources that exist at the University of Georgia to assist with the evaluation and execution of a value added processing strategy.

Resources
The symposium attendees (approximately 225 people) were made aware of the opportunities that exist to add value to agricultural commodities through further processing. Examples of past and present research were presented to illustrate the concept of adding value to agricultural commodities and the attendees were made aware of the resources that exist at the University of Georgia to assist with the evaluation and execution of a value added processing strategy.

Performance Goal 1-2 (1862)
Issue Statement:
Participation in the Southern Region Small Fruit Consortium. The long term mission of the Consortium is envisioned to involve collaborative efforts at various sites across the region between small fruit growers and grower organizations, industries and service organizations allied with and/or serving small fruit growers, agricultural extension programs and research stations working together to enhance the development of the small fruit industries in the region. Participating states are Georgia, South Carolina, and North Carolina.

Action
Sponsored a blueberry production extension agent training short course across two locations, Wilmington, NC, and Savannah, GA, in January 2001, involving 15 agents from the Carolinas and Georgia.
Revised and expanded the Southern Region Small Fruit Consortium Web page.

Outcome
A survey of blueberry growers suggests the industry is healthy and expanding, and the area planted is expected to increase by 35 percent over the next five years. Our 4,500 acres should be well over 6,000 acres by then. Agents trained via described short course are now prepared to assist this growing industry.

Resources
20% EFT of Dr. Gerard Krewer; $17,869 contribution of funds into SRSFC.

Performance Goal 1-2(1862)
Issue Statement
The Department of Plant Pathology facilitates the development and adaptation of new cultivars that are more tolerant to abiotic and biotic stresses affecting plants, cultural systems that improve production efficiency, promote sustainability, and improve crop utilization. N ew cultivars and production practices are evaluated under Georgia environmental conditions to keep the industry competitive. New and developing technologies are integrated into effective management strategies such as rapid diagnostic and predictive tools for pest and disease problems to lessen the need for crisis management.

Action
Some of the largest nurseries in Georgia have added up to 100 new perennial plants to their inventories each year, and as much as 40 percent of the gross income of the larger, traditionally woody ornamental, container nurseries comes from herbaceous perennial sales. To meet consumer demands, and to satisfy cold dormancy requirements of many perennials, nurseries have resorted to chilling plants for up to 16 weeks in refrigeration facilities or trailers. Chilling perennial plants, especially hosta, in the South results in increased plant growth and flowering, as well as uniform spring emergence, giving southern nurseries an advantage over northern nurseries for earlier spring sales . However, losses of up to 90 percent were seen in some varieties because of a bacterial soft rot disease. Plant pathologists conducted studies to identify the disease-causing organism, as well as to determine the effect of cold storage temperature and duration on bacterial soft rot disease development, how the organism survives and spreads within the nursery, and how best to control the disease.

Outcome
The bacterium causing the soft rot disease in hosta was identified as Erwinia carotovora subsp. carotovora. Disease development was completely dependent upon temperature used to chill plants. It is now recommended to store plants at 2-4 degrees Centigrade to satisfy cold dormancy requirements and avoid disease development. Losses due to bacterial soft rot within the one nursery are less than 5 percent, resulting in a savings of about $2.8 million in gross sales for the nursery.

Resources
Jean Woodward
Performance Goal 1-2(1862)

Issue Statement
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Action
Vidalia onions have a farm gate value in Georgia of nearly $95 million. Growers want to do everything they can to protect against weeds, diseases and insect pests. The 2000 plant disease loss estimate for onions was $13.5 million. The Extension Service plant pathologists conducted fungicide trials to determine the most cost effective fungicides and fungicide programs to control foliar diseases of onion.

Outcome
Data indicated that while all fungicide programs significantly reduced the severity of onion foliar diseases, there were no significant increases in yield of 40-pound boxes of onions per acre. A cost analysis was conducted that used the yield difference between the fungicide treatments and the non-treated control multiplied by $10 per 40-pound box minus the cost of the entire fungicide spray program. If onion growers were to use the optimal fungicide program, it could potentially net a total of nearly $2.6 million over the standard program when averaged across the entire onion acreage.

Resources
David Langston

<u>Performance Goal 1-2(1862)</u>
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Outcome
In the spring of 2001, some 1,190 budwood mother peach trees were tested for viruses. As a result, 152 trees were eliminated from the budwood program due to infection by peach viruses. By pulling these trees, the testing stopped the development of 152,000 virus-infested trees. The virus testing program will also improve tree quality and fruit production. This program has gained national and international recognition, and other regions are interested in implementing similar programs.

Resources
Phillip Brannen
Other Collaborators: Kathy Taylor

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Action
Plum pox virus and other peach viruses can spread long distances through the movement of plant materials from one state to another. Tennessee tree nurseries produce many of the peach trees planted in the eastern United States and Canada and their budwood comes from Georgia and South Carolina. To stop the spread of these diseases, a cooperative program between the University of Georgia, Clemson University and the Tennessee nurseries was formed.

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Action
The financial value of peach sales in Georgia exceeds $24 millio n annually, without consideration of economic impact from regional employment and peripheral industries. Plum pox virus (PPV) is a devastating disease of peaches. Although fruit from PPV infected trees are unattractive, it is not harmful to humans. However, fruit is rendered inedible due to modified sugar production in the fruit. Where PPV is found, trees must be destroyed to limit spread of the disease. The virus can be spread long distances through movement of propagative material, grafted seedlings and b udwood. Subsequent local spread is through aphid insects. Georgia and South Carolina peach orchards serve as a source of propagative material for commercial and homeowner trees for the Southeast and most of eastern North America. It is important to all U.S . peach production to know whether the virus is present in Georgia and South Carolina orchards. If not present, it is an imperative that the virus be excluded from the state.

Outcome
The 2001 Georgia PPV screening program tested 19,417 stone fruit samples from commercial, research and budwood orchards throughout the state. About 163,262 trees were screened, covering 1,554 acres and 15 counties. Extension efforts included PPV educational sessions at numerous regional and state meetings. Radio and newspaper spots were used to educate the public at large on the importance of the issue.

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Other Collaborators: Kathy Taylor

<u>Performance Goal 1-2(1862)</u>
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Action
Georgia pecan growers annually spend $67 -$120/per acre on fungicide for pecan scab control. Because much of the loss is in the upper portion of large trees, growers need information about aircraft application of fungicides. UGA plant pathologists conducted 10 replicated trials from 1998 - 2001 to

compare ground, air and ground plus air applied fungicides to control pecan scab.

Outcome
Consistent results showed that properly calibrated and operated ground equipment can deliver excellent scab control in the tops of very tall trees. Aircraft cannot substitute for ground sprayers for scab control. Aircraft application consistently delivered excellent scab control in the tree tops but only fair to poor disease control in the lower portions of the trees.

Resources
Paul Bertrand
Other Collaborators: Tim Brenneman

Performance Goal 1-2(1862)
Issue Statement
Wheat producers have been able to control annual ryegrass with herbicides. However, ryegrass has developed increased resistance to labeled herbicides. This weed can decrease wheat yields by 60%.

Action
Research and extension efforts were devoted to solving this problem.

Outcome
Research and extension efforts have resulted in alternative methods for controlling annual ryegrass in wheat. New herbicide uses will soon be labeled for this use resulting in effective and efficient control of this troublesome weed.

Resources
Faculty, staff and facilities.

Performance Goal 1-12(1862)
Issue Statement
Costs for peanut production can be very high. Seed, fungicide and herbicide costs can account for $200/A.

Action
UGA Extension Scientists collaborated to provide county agents and growers with production information that could improve yield and profitability.

Outcome
Growers have adapted the TWSV Risk Index, planted TSWV resistant cultivars and planted in a twin-row configuration. These actions have increased peanut production efficiency.

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Resources

Faculty, staff and facilities

Performance Goal 1-2(1862)

Issue Statement

Decreases in funding for publications and the increased use of computers at the farmer level have resulted in the need for less expensive and faster methods of delivering educational materials.

Action

A weed scientist worked with other scientists and a software company to develo p the Weed Science Web-Page.

Outcome

A weed scientist worked with other scientists and a software company to develop the Weed Science Web-Page.

Resources

Faculty, staff and facilities

Performance Goal 1-3(1890)

Issue Statement

Until recently the commercial production and marketing of lamb has been on the decline. With the increased availability and awareness of the merits of hair sheep genetics, renewed interest in low -labor, low-cost, lamb production systems has developed. A need to demonstrate such systems has appeared.

Action

A foundation flock of commercial wool -type ewes was established. Ewes have been bred to Katahdin

or Dorper rams to produced offspring that are various grades of hair sheep genetics. Data on all phases of production are collected and reported to the public. Producers who have an interest in the system are shown the details of management and grazing strategies. They can also observe the kind of market animals that are produced.

Outcome
Over the past five years four new commercial lamb production enterprises have been developed. Flock size is around 300 ewes. Several are lambing during multiple seasons through out the year. The enterprises are adding income to existing enterprises, or in some cases have to tally taken the place of less profitable ones. Local prices are holding at good levels.

Resources
The FVSU flock was established at a cost of about $5,000. Existing pastures and grazing resources are used in association with beef cattle and horses. Much of the equipment has been built from surplus construction material. Collaborators include Georgia Sheep and Wool Growers Association, and University of Georgia-Athens.

Performance Goal 1-4(1862)
Issue Statement
Irrigation scheduling remains as one of the most critical management factors in any agricultural operation. A system can be efficiently designed, but if water is not applied at the proper time and at the proper amount, water will be wasted or crop production will be poor.

Action
In 2001, agricultural engineers introduced growers to the UGA "EASY" Pan Irrigation Scheduler. This scheduler has a simple but effective design, and is made from readily available parts. The EASY pan takes into account the water holding capacity of soil, the crop being grown, and water applied by sprinkler irrigation and rainfall. In addition, the indicator arm for the float system can be read at a distance so the irrigator can determine the water status of the field without exiting a vehicle. Tests have indicated reliable irrigation recommendations as compared to more sophisticated approaches.

Outcome
The pan was introduced during the 2001 growing season. Exposure to the pan has created inquiries from all over the southeast region and from as far away as North Dakota. Several new research and demonstration projects have been developed to evaluate the pan for different crop, soil and climatic conditions. The unit has been discussed in numerous printed press articles and television, and was even mentioned during the Paul Harvey radio show. The EASY Pan is expected to provide an opportunity for many farmers to better schedule their irrigations and use water more efficiently.

Resources
Cooperators: Dan Thomas, Terrell Whitley

Performance Goal 1-4(1862)

Issue Statement

Five years ago, tropical spiderwort infested less than 1% of the cotton acreage in Georgia. Today it infests >8% of Georgia's 1.5M acres. Control of this weed has cost >$30/acre.

Action

Research and extension activities were directed toward the development of an efficient and effective method of control.

Outcome

The method developed will cost growers less than $15/A to control this troublesome weed resulting in a savings of $15/A for those growers.

Resources

Faculty, Staff, and facilities.

Performance Goal 1-4(1862)

Issue Statement

Growers have very few weed control options available for use in vegetables. Obtaining new herbicide uses for these growers is critical but very difficult, primarily due to the concern for crop safety.

Action

In cooperation with IR-4 (Interregional Research Project No. 4) and herbicide manufacturers use permits were supported.

Outcome

The scientists developed the necessary data to support 12 new herbicide uses for growers. These new herbicide uses will give growers more tools to help manage weed problems resulting in increased yields and reduced production costs.

Resources

Faculty, staff, and facilities

Performance Goal 1-4(1862)

Issue Statement

Purchasers of U.S. flue-cured tobacco have demanded that tobacco be cured without the formation of excessive levels of tobacco-specific nitrosamines.

Action

Technology has been developed in the private sector to allow growers to retrofit their direct heat curing furnaces to indirect heat furnaces. Extension specialists transferred the information and assisted growers install the retrofits.

Outcome
More than 4,000 heat exchangers were installed with partial industry reimbursement of the costs. These changes reduced heating costs for the growers and resulted in a reduction in nitrosamine levels to an acceptable level.

Resources
Faculty, staff and facilities

Performance Goal 1-4(1862)
Issue Statement
Research has clearly shown that canola has great potential in the Southeast, but several marketing and production problems have slowed its adoption.

Action
A group of oilseed scientists created the Georgia Oilseed Initiative with the intent of restoring profitability to oilseed production in Georgia.

Outcome
These studies suggested that farmers organize themselves as a closed co operative and build and run an 800-ton per day crushing plant with companion refining and packaging facilities. The economic impact of these facilities on the rural economy of Georgia is projected at $172M/yr.

Resources
Faculty, staff, and facilities

Performance Goal 1-4 (1862)
Issue Statement
Farmers want to make the best use of the fertilizer value in poultry litter for best crop production and protection of water systems.

Action
Funds were requested and received from the state legislature to provide free analyses of poultry litter for nutrient content.
Outcome
Over 2,700 litter samples were analyzed for nutrient content and additional fertilizer were developed around this addition. Crop production effeciency and environmental protection resulted from this project.

Resources
UGA Soil, Plant and Water Laboratory Staff and operating expenses.

Performance Goal 1-4(1890)

Issue Statement
Over the past five years, serious attention has been given to breeding improved goats for meat production. Breeders continue seeking ways for genetic improvement in order to compete with competitors based overseas. In 1998 the Board of the Georgia Meat Goat Association requested us to design and implement a buck performance test program.

Action
We have provided meat goat breeders with a tool that has proven effective in enhancing genetic improvement in other species. That tool is a central buck performance test program for Georgia and the Southeast. Buck performance data are collected in a common environment and the results reported back to breeders and the public in terms of performance ratios. This helps identify bucks to be used in breeder herds, in commercial herds, and those that should be sent to the meat market. The same data helps "prove" their sires too. A diverse steering committee provides guidance and input regarding testing procedures.

Outcome
A total of 38 bucks of two major breeds have been evaluated over the past three years. Participants from four states and other known breeders indicated in a 2001 survey that they consider the program useful. Breeders have become more aware of the need for quantitative information. National organizations are seeking advice and creating data banks.

Resources
Collaborators in the effort include Fort Valley State University, Georgia Cooperative Extension Service, Georgia Agricultural Education, Georgia Meat Goat Association, University of Georgia - Tifton, and the several national breed associations. FVSU has invested nearly $10,000 in basic facilities and continu e to contribute the time of professional and management staff, data processing, and reporting. Participants pay basic costs of feed, medicine, and casual labor at the rate of $100 per buck tested.

Performance Goal 1-4(1862)
Issue Statement
For Georgia's agricultural and food products to remain competitive, they must meet all state and federal regulatory requirements, as well as the expectations of the consumer. Proper and informative labeling is a key element of achieving this goal, but many small to mediu m processors do not have the knowledge or resources to meet all of the legal or market requirements.

Action
The Department of Food Science and Technology provides food processors with nutritional labels and ingredient statements that meet all state and fe deral laws. During the course of providing this service, Food Science faculty frequently provide technical assistance intended to improve a product's nutritional profile, decrease the cost of production, or increase shelf life.

Outcome

138 separate nutritional labels were produced during 2001 for 48 individuals and small companies. The labels produced by the department represent a savings of over $100,000 versus what it would cost producers to obtain the same information from a commercial testing laborator y.

Resources
The nutritional label program requires approximately 1/10th EFT of an extension faculty position, as well as 1/10th EFT of both a paraprofessional and a student technician.

Performance Goal 1-5(1890)
Issue Statement
Production agriculture in Georgia has always been reconized as an important aspect of the state's economy. However, small and part-time limited resource farmers have realized less profit from their farm enterprises than other landowners. Their productivity is essentially limited by the lack of assistance, knowledge, technical information and the marketing network needed to generate additional farm income.

Action
The Small Farmer Outreach Training and Technical Assistance Project throughout the year have worked with a minimum of fifty-five (55) small and part-time farmers. Through training meetings, workshops and field days, small farmers have received help in identifying alternative enterprises. The project provide farmers with information on farming; techn ical assistance, and assistance in overcoming barriers for obtaining credit.

Outcome
Seven hundred-twenty (720) farm visits were made to producers to provide technical assistance such as soil fertilization for farm enterprises and completion of forty-six (46) farm and home plans. Eighteen (18) participants were assisted with completing loan applications which resulted in $1,241,050 used towards operating expenses and the purchasing of farm equipment. Twenty (20) group meetings/workshops/field days/seminars were held on various alternative enterprises with eight hundred-seventy-five (875) attendees. The various group meeting topics included a Small Farm Expo; Women, Infant nd Children (WIC) Farmers Market Programs; and Small and Beginning Farmer Workshops. Eighty-four (84) percent of the farmers participating in the Small Farmer Outreach and Technical Assistance Project are current on their loan payments despite several years of drought and low commodity prices.

Resources
The resources used to carry out the Small Farmer Outreach Training and Technical Assistance Project were estimated at $190,000. The project employs two (2) full-time agents and one half-time agent and a full time project coordinator. Linkages were made with USDA agencies (Farm Service Agency , Risk Management, Natural Resources Conservation Service); Women, Infant, Children Services (WIC); Kroger, Inc.; Florida A&M University; University of Georgia; Tuskegee University; North Carolina A&T University; Kentucky State University.

Performance Goal 1-6(1862)

Issue Statement

Georgia currently has over 11000 poultry houses and adds 300-400 new houses a year. Georgia must utilize the best available technologies and management programs for maximum bird growth and performances. The proper operation of ventilation and cooling systems is critical in georgia due to the severe summer climates.

Action

Extension faculty of the Departments of Poultry Science and Agricultural Engineering have conducted a series of environmental management workshops for Field S ervice Representatives of poultry integrators. The workshops emphasize the appropriate operation and management of ventilation and cooling systems for poultry houses in Georgia. todate, Six workshops have been conducted envolving 240 Service Reps. In addition, more than 24 newsletters related to proper ventilation and cooling techniques have been authored and ditributed to poultry producers.

Outcome

As a result of the educational activities all poultry houses built in the past two years (approx. 600) have been equiped and operated with state of the art ventilation and cooling systems. In addition, many older houses have been converted to modern tunnel ventilated systems. It is estimated that more than 60% of the poultry houses in Georgia utilize these syste ms and management programs. Over 700 million birds are grown in these facilities resulting in an average performance improvement of .2 pounds of live weight per bird. This represents a value of $58 million annually to poultry producers in Georgia.

Resoruces

Departments of Poultry Science and Agricultural Engineering Extention faculty.
Smith Lever Funds= $246,000

Performance Goal 1-7(1862)

Issue Statement

Each year over 1.2 billion broiler hatching eggs are required to support the broiler industry. Developing new management programs are necessary for maintaining production performances.

Action

Extension faculty conducted 5 research projects related to feeding, lighting and male management of breeders. These projects resulted in three scientific publ ications and 15 presentations to industry audiences.

Outcome

Adoption of new managent programs for broiler breeders has kept this industry in Georgia on a competitive basis with hatching egg producers in other areas of the country.

Resources

Extension faculty and staff, the Departments of Poultry Science and Agricultural Engineering and the

U.S. poultry and Egg Association.
Smith Lever, State and matching funds=$203,000

Performance Goal 1-8(1862)

Issue Statement

Feed represents the major item of cost in production of poultry. Increasing the quality of feed ingredients used by poultry producers increases the efficiency and reduces the cost of production.

Action

During 2000 and 2001, the feed services laboratory in the Department of Poultry Science provided a wide range of feed ingredient analsis to poultry companies to enable their nutritionist to formulate more efficient, cost effective diets.

Outcome

Over 400 feed ingredient samples were analized during 2000-20001. In addition, six research projects related to alternative feed grains and feed energy content were conducted. The use of the ingredient analysis and the feed services lab has resulted in an average cost reduction of $5.00 per ton of feed manufactured. This equates to an average annual saving for the industry of $25 million.

Resources

Extension faculty and staff, the Department of Poultry Science.
Smith Lever, State and matching funds= $263,000

Performance Goal 1-9(1862)

Issue Statement

Farmers want to make the best use of the fertilizer value in poultry litter for best crop production and protection of water systems.

Action

Funds were requested and received from the state legislature to provide free analyses of poultry litter for nutrient content.

Outcome

Over 2,700 litter samples were analyzed for nutrient content and additional fertilizer were developed around this addition. Crop production efficiency and environmental protection resulted from this project.

Resources

UGA Soil, Plant and Water Laboratory Staff and operating expenses

Performance Goal 1-9(1862)

Issue Statement
Palmer amaranth is one of the 10 most troublesome and common weeds in Georgia peanut production. During 2000 the normally successful herbicide, imazapi c, began failing to control this weed.

Action
Scientists began to study the troublesome weed populations and found more than a tenfold increase in resistance to imazapec, as well as resistance to similar herbicides.

Outcome
These findings will lead to re newed efforts by Extension Service scientists and county agents to inform growers that they will have to manage weed resistance to maintain these weed-control tools.

Resources
Faculty, staff and facilities

Performance Goal 1-9 (1862)
Issue Statement
Cotton producers are facing ever-increasing production costs along with low prices. They are in need of research examining alternative agronomic practices aimed at reducing production costs.

Action
Crop and Soil Scientists have been conducting research on the effects of different production practices on production costs.

Outcome
Results indicate that a 2-row modified skip pattern of planting may increase profit by as much as 25-$30/A especially in relatively low yielding situations such as dryland situati ons.

Resources
Faculty, staff, and facilities

Performance Goal 1-9(1862)
Issue Statement
Adding value to agricultural commodities offers producers and processors an opportunity to pursue a specific market opportunity ("niche marketing"), assure the econ omic viability of their enterprise, create employment and economic stability for their community, and generate income for themselves and their employees. Adding value to food products can range from relatively simple operations such as grading, sizing, etc. to much more sophisticated forms of further processing. Most small to medium size companies do not have the technical expertise to evaluate or execute value-added processing systems and require appropriate technical expertise and experience to implement such a strategy.

Action
The Department of Food Science and Technology provides food processors with a range of technical assistance designed to facilitate both setting up and operating a food processing business safely and efficiently. This assistance takes the form of training, various technical services, and by serving as a conduit to other resources of the State University system when required. Specific examples of services provided to both new and existing food businesses include:

Product development
Process development
Employee training
Safety and quality audits
Nutrition label development
Plant layout and design
Process approvals
Pilot plant testing
Workshops & shortcourses

Outcome
During 2001 the Food Science Extension faculty responded to over 810 requests for information and/or technical assistance in the categories listed above. Of those 810 contacts, 420 were individuals who attended one of the 9 workshops or short courses conducted during 2001 on topics from developing HACCP plans to training on marination technology. Many of the remaining 390 requests were related to solving or avoiding a problem for an existing company, but approximately 1/3 of the contacts (100) were related to assisting new companies enter the food processing and distribution sector with value added products.

Resources
Activities in this category represent the principle activity of the Food Science Extension faculty and represent approximately ½ of the total time allocated to extension and outreach activities. With a total of 2.5 EFT between the three extension faculty, that would mean 1.25 EFT utilized for this performance goal.

In the course of carrying out the activities in this category, the faculty and staff expend funds for travel, lodging, meals, training materials, consulting services, and other non-research expenses. It is estimated that approximately $85,000 was spent from program funds on these efforts during 2001.

<u>Performance Goal 1-11(1862)</u>
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developing technologies are integrated into effective management strategies such as rapid diagnostic and predictive tools for pest and disease problems to lessen the need for crisis management.

Action
Groundnut viruses cause significant losses worldwide. Groundnut rosette disease is the most important viral disease of groundnut in Africa, res ulting in losses of about $150 million. Tomato spotted wilt virus is now the most important viral pathogen of groundnut (peanuts) in the United States, resulting in losses of about $40 million. Plant pathologists initiated a new program in 1996 and renewed it for five years in 2001 to develop control strategies to manage groundnut rosette disease in Africa and tomato spotted wilt virus in the U.S.

Outcome
Four short-season peanut varieties with resistance to groundnut rosette disease have been developed i n Malawi, Africa, and continue to be evaluated in farmers' plots. The cultivar ICG 12991 was released in 2001. ICG 12991 is being used for a large seed increase for evaluation in Uganda. This cultivar has outstanding performance with excellent resistance t o groundnut rosette disease. Peanut transformation has produced 128 regenerated lines, of which about 65 percent are transformed. The transgenic plants will be analyzed for pathogen-derived resistance to groundnut rosette disease.

Resources
Mike Deom

Performance Goal 1-11(1862)
Issue Statement
Georgia is the second largest cotton producing state in the U.S. with a $450 million farm-gate value of raw fiber in 2000. The long-term health of this industry is threatened by stagnation in varietal improvement.

Action
The University of Georgia has developed a strong team consisting of a breeder, molecular biologist, cotton physiologist, and genomist to improve the yield and quality of cotton cultivars.

Outcome
A new germplasm line has exhibited 10 percent yield increase relative to other varieties in the 2001 variety trials. Continued improvement in cotton germplasm will preserve a threatened industry.

Resources
Faculty, staff and facilities

Performance Goal 1-11(1862)
Issue Statement
Georgia leads the nation in total annual peanut production. New peanut cultivars are needed for

improved disease resistance, yield, and production efficiency.

Action
Georgia leads the nation in total annual peanut production. New peanut cultivars are needed for improved disease resistance, yield, and production efficiency.

Outcome
One new peanut cultivar with 10% yield and dollar return advantage over the current crop value estimate for Georgia would mean an additional $40M increase annually. The new cultivar Georgia Green, with improved TSWV resistance, was found to have a 30-40%increase in yield and 45-60% increase in dollar value.

Resources
Faculty, Staff and facilities.

Performance Goal 1-11(1862)
Issue Statement
New wheat cultivars are needed that are high yielding, have high test weights and are resistant to leaf rust, powdery mildew and Hessian fly.

Action
The UGA Small Grain Breeding Program has developed a regional approach to identify cultivars that are broadly adapted over diverse environments.

Outcome
Two new wheat cultivars have been released that contribute to an increase in state yield from 35 bu/A in 1980s to 52 bushels in 1990a. The estimated value of this increase is ca. $6M for Georgia producers.

Resources
Faculty, staff and facilities

Performance Goal 1-11 (1862)
Issue Statement
By its very nature, cotton has a very narrow germplasm. The lack of genetic variation has hampered the ability for breeders to provide low-cost intrinsic genetic solutions to biot ic and abiotic hazards and quality traits.

Action
A cotton breeding program including a molecular breeder was developed to increase the genetic variation of cotton.

Outcome
Projects are now in progress to introgress genes from Pima and other wild cotton species to increase the genetic variability in cultivated cotton. Utilizing a DNA marker assisted -backcrossing approach, an attempt to breed two fiber-quality genes from Pima cotton into elite Georgia cotton germplasm is being made. If successful, fiber length and fiber length uniformity will be greatly improved.

Resources
Faculty, staff, equipment, and facilities.

Performance Goal 1-11 (1862)
Issue Statement
In the southeastern U.S., weed control in soybeans requires significant managerial and monetary input by the grower.

Action
A backcross breeding program was initiated to introduce the Roundup tolerance gene into the UGA developed soybean varieties Benning (MG VII) and Prichard (MG VII).

Outcome
The application of DNA marker selection hastened the recovery of the yield and pest resistance of Benning and Prichard. In the spring of 2001, soybean growers planted 10,000 acres of each of these Roundup Ready varieties. In 2002 there is adequate seed to plant 160,000 acres of these varieties. The use of DNA markers and winter nurseries in Puerto Rico reduced the duration of varietal development from eight to five years.
Resources
Faculty, staff, and facilities

Performance Goal 1-12 (1862)

Issue Statement
Participation in the Southern Region Small Fruit Consortium. The long term mission of the Consortium is envisioned to involve collaborative efforts at various sites across the region between small fruit growers and grower organizations, industries and service organizations allied with and/or serving small fruit growers, agricultural extension programs and research stations working together to enhance the development of the small fruit industries in the region. Participating states are Georgia, South Carolina, and North Carolina.

Action
Awarded grants in the amount of $47,000 to researchers and extension specialists in the Carolinas and Georgia to fund applied research projects in 2001.

Outcome
Program assisted in the deveopment of 'Alapaha.' 'Alapaha' is a new University of Georgia and U.S. Department of Agriculture rabbiteye introduction, has a later blooming time that greatly reduces its risk of late-winter freeze damage. This new variety blooms 10 days later than Climax, the most popular early-season rabbiteye (thus offering frost avoidanc e), yet it ripens at the same time as their early-season varieties. In early 2002, 20% of the rabbiteye crop was lost to a late frost; no Alapaha was affected.

Resources:
$17,869 contribution to SRSFC; 20% EFT of Dr. Scott NeSmith.

Performance Goal 1-12 (1862)
Issue Statement
Cotton farmers in the flat woods of southeast Georgia have lost yield in thousand of acres due to a malady called Black Root.

Action
Research was developed to determine the causal agent and develop a remedy for the Black Root malady.

Outcome
Scientists determined that high soil chlorides were associated with the problem. Boiler litter applications increased plant growth greatly in all experiments regardless of the fertilization. Now all farmers in the Black Root area of Georgia are seeking broiler litter for application prior to planting the 2002 crop. These findings greatly increase the effeciency for cotton production in this area of Georgia.

Resources
Faculty, staff and facilities.

Performance Goal 1-12 (1862)
Issue Statement
Fertilization with sodium (as common salt) has been shown to improve the digestibility of perennial and annual ryegrass in Europe and the Middle East, and increase grass yield in some instances. Fertilization with manure, also a sodium sour ce, has produced similar results in some cases. No information on the effects of salt fertilization of warm season forages was found.

Action
A plot study was conducted to investigate the response of hybrid bermuda grass to salt fertilization using levels both below and above those reported to positively affect cool season grasses and to simulate the salt supplied by use of dairy manure as the sole supplemental nutrient source. The plots were also overseeded with cereal rye and crimson clover for a cool season forage crop. N, P, and K fertilization,

supplied as commercial fertilizer, was equal for all plots.

Outcome

Forage composition was not consistently affected by salt fertilization. Bermudagrass yields were at least slightly increased by all levels of salt fertilization, with a maximum dry matter yield increase of 30 percent. Rye/clover yields were increased except for the two lowest and the highest once per year salt addition, with yields changes ranging from minus to plus 30 percent. Three salt fertil ization levels increased total yearly dry matter yields by more than 20 percent. If forage yields can be increased by 20 percent using the same quantities of nitrogen, phosphorus, potassium, and water as conventionally produced lower yields, not only will it be possible to feed more cattle on the same acreage, lowering costs, but increased nutrient capture by plants should reduce the chance of nutrients moving to surface and ground water.

Resources
Study was conducted if cooperation with G.J. Gascho, UGA Crop and Soils Dept. and R.N. Gates, USDA-ARS. I have no legal authority to commit any departmental resources or spend any departmental funds regardless of where they came from or how they got to the department.

Performance Goal 1-14 (1862)
Issue Statement
Tall fescue is the predominant pasture grass in the eastern United States occupying more than 35 million acres. Tall fescue contains a fungal endophyte, which enables the plant to persist through drought and grazing but ingestion of endophyte by cattle re sults in fescue toxicosis. Fescue toxicosis greatly reduces animal gains during grazing and costs the beef industry over $600 million annually.

Action
New, non-toxic endophytes have been incorporated into tall fescue cultivars and are available commercially under the brand name Max-Q (Pennington Seed, Madison, GA). Research was conducted to determine the subsequent feedlot performance of cattle that grazed tall fescue pastures infected with either toxic or non-toxic (Max-Q) endophytes.

Outcome
Cattle grazing Max-Q pastures gained 1.2 lb/d more throughout the grazing phase and entered the feedlot over 100 lb heavier than those cattle grazing toxic endophyte-infected tall fescue. Average daily gains in the feedlot were similar between endophyte types and Ma x-Q cattle finished at weights over 100 lb heavier. Carcass value was $108 greater for the steers finished after grazing Max-Q than toxic endophyte-infected tall fescue pasture due to advantages in carcass weight and quality grade. This research illustrates that reduced animal performance from grazing toxic, endophyte-infected tall fescue carries over into the feedlot and reduces profitability for beef producers. Cattle finished after grazing non-toxic endophyte-infected (Max-Q) pastures grossed $100 per head more than those finished after

grazing toxic endophyte-infected pastures.

Resources
Funding source: Private industry
Cooperators: UGA Crop and Soil Science Department

Performance Goal 1-14 (1862)
Issue Statement
Decreased production efficiency during the first 7 to 14 days post weaning is a major problem for swine producers. Decreased growth performance and feed efficiency are costly. Date indicates that part of the decrease in productivity may be related to dietary mineral levels.

Action
A research program has been developed at the University of Georgia to determine optimal mineral levels in post weaning (nursery) diets for swine. Studies have been conducted to evaluate dietary zinc, copper, iron and manganese concentrations on growth performance and efficiency. Several other minerals will also be evaluated in the future. Additional studies are also being conducted to determine the best dietary source of the minerals and ways to decrease mineral excretion into th e environment.

Outcome
Data generated at the University of Georgia has indicated that feeding increased dietary concentrations of copper and zinc will improve the growth performance and feed efficiency of nursery pigs. Pigs fed copper and zinc were also found to be healthier. Combinations of copper sulfate and copper citrate fed at low concentrations were found to be as effective as high concentrations of copper sulfate in improving growth rate. Additional studies have shown that copper influences the youn g pigs ability to utilize dietary fat and may act as a cataylist for specific digestive enzymes. Excretion of zinc and copper into the waste stream has become a serious issue and research to decrease the amount of copper and zinc fed, while maintaining growth performance is underway.

Resources
Hatch fund allocated to the Georgia Experiment Station were used to support this project. Additional funding was secured from industry sources (Prince Agri Product, Griffin LLC, Kocide Chemical). Cooperators involved in this project include Dr. T. Schell and Dr. K Haydon.

Performance Goal 1-16 (1862)
Issue Statement
Pests limit crop growth, reduce crop yields, damage stored products, and destroy aesthetic beauty. Many pests are at sufficient levels to require contro l actions to suppress or avoid negative impacts.

Action
Dollar spot, caused by the fungus Sclerotinia homoeocarpa, is a major disease of turf grass in Georgia

and can be especially damaging to creeping bentgrass golf course greens. Satisfactory control of dollar spot relies heavily on repeated applications of fungicides during the spring and fall. But the pathogen has developed resistance to certain fungicides called demethylation inhibiting (DMI).

Outcome
Plant pathologists conducted research to determine the sensitivity of the pathogen to DMI fungicides in Georgia. Results of these laboratory assays provide evidence of reduced sensitivity in the dollar spot pathogen in Georgia.

Resources
Katherine Stevenson and Lee Burpee

Performance Goal 1-16 (1862)
Issue Statement
Pests limit crop growth, reduce crop yields, damage stored products, and destroy aesthetic beauty. Many pests are at sufficient levels to require control actions to suppress or avoid negative impacts.

Action
The tomato spotted wilt virus is transmitted by thrips. Tomato spotted wilt virus has become a major limiting factor to the production of tobacco, peanut and other crops in Georgia and throughout the Southeast. Losses due to tomato spotted wilt have been as high as $40 million in one year. The thrips Frankliniella fusca and F. occidentalis are the primary vectors of tomato spotted wilt virus.

Outcome
How tomato spotted wilt virus is acquired by F. fusca or F. occidentalis is being determined by UGA plant pathologists to develop management practices for tomato spotted wilt virus based on preventing thrips from acquiring the virus. This information will provide additional insight into the development of means to lessen the impact of this disease.

Resources
John Sherwood
Other Collaborators: C.M. Deom, A. Culbreath

Performance Goal 1-16 (1862)
Issue Statement
Pests limit crop growth, reduce crop yields, damage stored products, and destroy aesthetic beauty. Many pests are at sufficient levels to require control actions to suppress or avoid negative impacts.

Action
Blueberry growers say mummy berry disease is the most important disease they face because fruit loads containing fruit mummies above a nearly-zero tolerance level are unfit for use, resulting in severe economic losses to producers. Most producers can manage the disease through fungicide sprays. But

consumers are demanding more pesticide-free fruit, especially from pick-your-own plantings.

Outcome
Biological control, using a commercially formulated biocontrol product based on the beneficial bacterium Bacillus subtilis, was examined. The biocontrol bacterium grew and multiplied rapidly when applied to blueberry flowers. Application of the biocontrol agent also resulted in substantial reduction of fungal penetration into the pistil. In the field, honey bees readily transmitted the biocontrol agent from hive-based dispensers to blueberry flowers. Caged blueberry bushes containing bees and the biocontrol agent had considerably reduced mummy berry disease levels compared with surrounding bushes that were not caged.

Resoruces
Harald Scherm

Performance Goal 1-16 (1862)
Issue Statement
Pests limit crop growth, reduce crop yields, damage stored products, and destroy aesthetic beauty. Many pests are at sufficient levels to require control actions to suppress or avoid negative impacts.
Action
The use of resistant cultivars is the most cost-effective and sustainable management tactic currently available to manage nematodes and reduce yield losses. Natural resistance is limited to a few crops and nematode species. Molecular breeding or the generation of transgenic plants that show enhanced resistance to nematode infection will become more important in the future. The best pros pects for identifying new targets for bioengineering of nematode resistance lie in nematode genome analysis and gene discovery.

Outcome
The use of resistant cultivars is the most cost-effective and sustainable management tactic currently available to manage nematodes and reduce yield losses. Natural resistance is limited to a few crops and nematode species. Molecular breeding or the generation of transgenic plants that show enhanced resistance to nematode infection will become more important in the future. The best prospects for identifying new targets for bioengineering of nematode resistance lie in nematode genome analysis and gene discovery.

Resources
Richard Hussey

Performance Goal 1-16 (1862)
Issue Statement
Pests limit crop growth, reduce crop yields, damage stored products, and destroy aesthetic beauty. Many pests are at sufficient levels to require control actions to suppress or avoid negative impacts.

Action
Fungi are the most economically important group of plant pathogens and are responsible fo r huge annual losses of marketable food and fiber. The smut fungi as a group constitute an important agricultural problem and, in some crops, are occasionally responsible for local yield losses exceeding 25 percent. Corn is the most economically important crop in the U.S., generating $30 billion annually with about 80 million acres planted. In Georgia the corn crop was worth $160 million in 1997, with nearly 18 percent of the crop lost to diseases, primarily fungal in origin. Ustilago maydis, the corn smut pathogen, is one of the model systems used to elucidate how plant disease develops.

Outcome
Molecular experimentation has elucidated some of the molecules that are required for fungal pathogenesis. It is anticipated that over the next five to 10 years, a fuller understanding of the disease process will yield significant developments toward novel disease control methods

Resources
Scott Gold

Performance Goal 1-16 (1862)
Issue Statement
Pests limit crop growth, reduce crop yields, damage stored products, and destroy aesthetic beauty. Many pests are at sufficient levels to require control actions to suppress or avoid negative impacts.

Action
Pests limit crop growth, reduce crop yields, damage stored products, and destroy aesthetic beauty. Many pests are at sufficient levels to require control actions to suppress or avoid negative impacts.

Outcome
Results of ongoing studies suggest that the disease, tentatively called cream leaf blight, is caused by a fungus similar to Laetisaria fusiforme, the cause of red thread disease. However, differences between L. fusiforme and the cream leaf blight fungus appear sufficient enough to describe the latter fungus as a new species. Cream leaf blight occurs at temperatures as high as 33 C, and fungus is significantly less sensitive to strobilurin (Qo) fungicides than Rhizoctonia solani, the cause of brown patch disease. The incidence of cream leaf blight may increase across Georgia as the use of these fungicides b ecomes more widespread.

Resources
Lee Burpee

Performance Goal 1-16 (1862)
Issue Statement
Pests limit crop growth, reduce crop yields, damage stored products, and destroy aesthetic beauty.

Many pests are at sufficient levels to require control actions to suppress or avoid negative impacts.

Action
The production of ornamental crops is one of the fastest growing segments of agriculture in the United States, with an estimated value of more than $12.1 billion in 1998. The value of the greenhouse and nursery industry in Georgia is more than $300 million dollars and was ranked as the 5th leading agricultural commodity in 1997. Yearly losses to this industry due to plant diseases are estimated to be in excess of 10 percent. Fungicides play a very important role in managing foliar diseases in greenhouse production. However, increasing concern about pesticides in the environment, potential worker safety issues, and the appearance of fungicide resistance in fungal populations all contribute to the need for alternative pest control measures.

Outcome
Using Botrytis cinerea, a common pathogen on many ornamental crops, nutrient management and electrolyzed water are being used to determine their effectiveness in disease management in commercial greenhouses. This research will provide growers with alternatives to fungicides that are both cost effective and better for the environment.

Resources
James Buck
Other Collaborators: Yen-Con Hung, Food Science

Performance Goal 1-16 (1862)
Issue Statement
Management of Tomato Spotted Wilt Virus continues to be a major threat to profitability in peanuts in the Southeastern US. An IPM program based on a risk index for important criteria in Peanut Production was developed in 1996.

Action
The Risk Index IPM bulletin has been further refined and the 7th version was published in 2001.

Outcome
Losses by GA producers reached an estimated $43.3 million in 1997. Following the implementation of the Risk Index in 1996 and subsequent refinement in ensuing years, losses fell back to $4.2 million in 2001.

Resources
The TSWV Index was developed and implemented by a team of Entomologists, Plant Pathologists, and Crop Scientists.

Performance Goal 1-16 (1862)
Issue Statement

Integrated pest management is a ongoing challenge for producers of crops in GA such as peanuts due to the wide array of pests which can often destroy up to one-third of annual production. Biologically based pest management is preferable based on environmental concerns.

Action
Ongoing research activities have identified and continue to identify germplasm in South America which exhibit resistance to insects and TSWV. This research in conjunction with plant breeding research has resulted in varities with much-improved resistance.

Outcome
The impact of resistant germplasm research in conjunction with implementation of the TSWV index has helped bring losses down from a high of $43.3 million in 1997 to levels similar to those experienced in 1991 ($3.5 million).

Resources
Cooperators involved were IPM faculty in Entomology and plant breeders in Crops and Soil Sciences.

Performance Goal 1-16 (1862)
Issue Statement
Cotton aphids are severe pests throughout the Cotton Belt. They remove nutrients from the plant and excrete honeydew onto leaves and open bolls. The fungal pathogen Neozygites fresenii is often effective at reducing aphid populations.

Action
Natural enemies in cotton fields have been investigated over a 3 year period in Georgia and Arkansas. Findings showed that the fungus can satisfactorily control aphids in the event of epidemic.

Outcome
Potential savings on aphicides to growers is $7 per acre and total impact through conserving natural enemies could range up to a savings of $12 per acre.

Resources
Collaborators included 3 scientists from Georgia and 1 from Arkansas.

Performance Goal 1-16 (1862)
Issue Statement
Black flies transmit the causal agent of river blindness over much of continental Africa. In addition, they are serious pests of man and animals throughout most of the world. Livestock, particularly cattle production suffers heavily.

Action
Biological control of black flies and bioassay systems research with Bacillus thuringinesis var. israelensi s

(Bti) to include formulation biotechnology has been underway for several years. The focus of this research is cost-effective biological control prorams and reduced pesticide use in aquatic breeding habitats.

Outcome
Bti is used to successfully control b oth nuisance and vector populations of blackflies throughout the world. Impact on livestock production and human health is enormous and no estimates are published. Likewise, the impacts on environmental quality through reduced pesticide use could amount to hundreds of millions of dollars worldwide.

Resources
One faculty member and 1 technical staff person. Project costs are approx. $75,000 per year.

Performance Goal 1-17 (1862)
Issue Statement
Agricultural and environmental enterprises are increasingly de pendent on sensors, monitors and control devices to increase profitability and effectiveness. Intelligent monitoring and control systems determine product quality, sense plant health and other inputs. Continued advances in sensing, monitoring, and control systems will yield increased profitability, more effective processing systems, and improved sustainability of natural resources.

Action
In 1997, center rot was observed for the first time in commercial plantings of Vidalia onions. This disease, caused by the bacterium Pantoea ananatis, resulted in bleached, necrotic lesions on onion foliage and eventually caused the bulbs to rot. In 1997, yield losses due to initial outbreaks of center rot were estimated at 20 - 25 percent with some fields experiencing 80 - 100 percent loss. The sudden appearance of center rot in Georgia was puzzling to growers and researchers alike.

Outcome
A significant inoculum source for this disease was identified, and a highly sensitive and efficient seed assay was developed that can be used by seed companies and seed testing agencies to ensure that their seedlots a free of P. ananatis. This information has the potential to save commercial onion producers millions of dollars in yield losses and costs associated with center rot managem ent.

Resources
Ron Walcott
Other Collaborators: Ron Gitaitis, David Langston

Peformance Goal 1-17 (1862)
Issue Statement
Agricultural and environmental enterprises are increasingly dependent on sensors, monitors and control devices to increase profitability and effectiveness. Intelligent monitoring and control systems determine

product quality, sense plant health and other inputs. Continued advances in sensing, monitoring, and control systems will yield increased profitability, more effective processing systems, and improved sustainability of natural resources.

Action
The impending withdrawal of methyl bromide from use as an agricultural fumigant in 2005 will leave vegetable growers in Georgia with few options to control weeds, diseases, insects and nematodes. A number of pesticides that can be used effectively in combination as fumigants in much the same way as methyl bromide is used currently have been identified. Application of pesticides by drip irrigation reduces the amount of chemical that is introduced into the environment, and also minimizes the risk of worker exposure.

Outcome
Trials were conducted in Tifton in 2001 to define use patterns for drip-applied alternatives to preplant fumigation with methyl bromide and to determine their effects on soil-borne fungi and nematodes. Preplant application of metam sodium in combination with 1,3-dichloropropene suppressed soilborne fungi such as Pythium and Rhizoctonia, and reduced the amount of nematode damage on cucumbers when compared to methyl bromide. Applying pesticides through drip-irrigation is a relatively safe and cost-effective means of managing soil fungi and nematodes, if transplants are not introduced to treated beds before harmful residues have dissipated (usually 3 weeks).

Resources
Ken Seebold
Other Collaborators: Alex S. Csinos, Richard F. Davis (USDA-ARS)

Performance Goal 1-17 (1862)
Issue Statement
Agricultural and environmental enterprises are increasingly dependent on sensors, monitors and control devices to increase profitability and effectiveness. Intelligent monitoring and control systems determine product quality, sense plant health and other inputs. Continued advances in sensing, monitoring, and control systems will yield increased profitability, more effective processing systems, and improved sustainability of natural resources.

Action
In 2000, Georgia peanut growers spent nearly $42 million to control early and late leaf spot and still lost $3.5 million in yield. Research has shown that growers can better time and often reduce the number of fungicide applications by using the leaf spot disease advisory AU-PNUT. When a grower uses the AU-PNUT advisory, the timing of applications is based upon current and predicted weather conditions and the time since the last application was made.

Outcome
Over a 10-year study at the University of Georgia, it was found that growers could generally reduce the

number of fungicide sprays from 7 to 5.5 during drier years, saving growers at least $4 million. However, the system has not been widely accepted because multiple rain gauges must be monitored daily. Work in Alabama has shown that information from Doppler radar can be used to estimate the amount of rainfall that falls in a grower's field during a rain event and this information can be used to drive the AU- PNUT program without the grower needing to check rain gauges. This Doppler radar information is now available to Georgia's peanut growers, and in conjunction with an internet -based advisory system, field trials were established at multiple sites in the state to verify the effectiveness of the Doppler AU-PNUT program and to insure that rainfall amounts predicted by the radar were consistent with actual rainfall events. Growers concerned about reducing the co st of peanut production on their farm now have an additional management option in the control of leaf spot.

Resources
Robert Kemerait
Other Collaborators: Albert Culbreath, Tim Brenneman, Austin Hagan (Auburn Univ.)

Performance Goal 1-17 (1862)
Issue Statement
Agricultural and environmental enterprises are increasingly dependent on sensors, monitors and control devices to increase profitability and effectiveness. Intelligent monitoring and control systems determine product quality, sense plant he alth and other inputs. Continued advances in sensing, monitoring, and control systems will yield increased profitability, more effective processing systems, and improved sustainability of natural resources.

Action
Georgia is known for its Vidalia onions. Unfortunately, growers are currently fighting three bacterial diseases of their sweet crop.

Outcome
A multidisciplinary approach is being taken to lessen the impact of these diseases. Plant pathologists have studied the ecology of the various plant pathog ens, the epidemiology of the diseases they cause, and management strategies. Agricultural engineers have been working on remote sensing devices to scan onions in the grading line so the bulbs with interior rots can be removed. Horticulturalists has been comparing drip and overhead irrigation, conducting variety trials and fertility trials, and comparing organic and plastic mulches. Entomologists have been examining the effect of controlling thrips with various spray programs and have implemented a trial sco uting IPM program to compare best management strategies with traditional cultural practices.

Resources
Ron Gitaitis
Other Collaborators: David Riley, David Langston, Al Purvis, George Boyhan, Juan Carlos Diaz Perez, Kenny Seebold, Stanley Culpepper, Ron Walcott, Byron Maw , Ernest Tollner, Lenny Wells

Performance Goal 1-17 (1862)

Issue Statement

Agricultural and environmental enterprises are increasingly dependent on sensors, monitors and control devices to increase profitability and effectiveness. Intel ligent monitoring and control systems determine product quality, sense plant health and other inputs. Continued advances in sensing, monitoring, and control systems will yield increased profitability, more effective processing systems, and improved sustainability of natural resources.

Action

Methyl bromide has been the standard fumigant for control of soil pests for more than 50 years, but will be phased out by 2005. Methyl bromide is relatively easy to work with, is very efficacious and was relatively inexpensive prior to the phase-out period. There is no single replacement material for methyl bromide. Although methyl iodide has been proposed as a replacement, the cost is prohibitive. Without a viable soil fumigant replacement, some crops may not be able t o be produced economically in some of the Southern states. Crops such as tomato, pepper, cucurbits and strawberries will be the crops most likely to be effected.

Outcome

Plant pathologists, weed scientists, nematologists and entomologists from UGA have be en working on a replacement fumigant. Over a two-year period, several alternatives were tested separately and in conjunction on major crops. One, metam-sodium, alone and in combination with other fumigants, has proven to be the most efficacious and economi cally viable.

Resources

Alex Csinos

Other Collaborators: Ken Seebold, Ted Webster, Bob McPherson

Performance Goal 1-17 (1862)

Issue Statement

The U.S. agricultural system has more land managed by fewer people on slimmer margins with more regulation than ever before.

Action

Agricultural scientists target precision technologies' development in areas that will decrease operation times and enhance input efficiencies.

Outcome

Development of variable rate and multiple material injection s prayers enable growers to reduce the quantity of chemicals for pest control by 20-70% and decreased time by 10-15% saving labor, equipment, and fuel. Aerial imagery and auto steer tractors are emerging as ways for growers to conduct field operations with g reater ease, precision, and timeliness than before. Precision irrigation

systems will improve water use efficiencies by ca. 20%.

Resources
Faculty, staff and facilities

Performance Goal 1-17 (1862)
Issue statement
To optimize the profitability, farmers must begin to manage within field variability. However, some of the technologies associated with precision farming are too expensive with a lack of proven results for the farmer.

Action
Low cost avenues for implementing a within field management strategy are available. Several farmers are getting aerial photographs of their fields at times where vegetative growth differences are highest. It has been well documented that these variations, caused by soil fertility problems, poor drainage areas, etc., are discernable from aerial photographs taken at the right time. With these photos, farmers can make more informed decisions and begin developing some within-field management strategies.

Outcome
Aerial photographs are becoming a useful tool for many farmers exposed to this program. Several are making management decisions based on what they have seen. It is expected that this program will grow and a large number of farmers will begin using aerial images for management assistance.

Resources
There are about 20 cooperators and about .5 EFT working on this program. Approximately $10,000 is spent to acquire the aerial images for the farmers. The cost is less than $0.50/acre.

Performance Goal 1-17 (1862)
Issue Statement
Proper understanding of variation and statistical control is vital in making business decisions concerning the efficient production, profitability and safety of food products. Many food plants in Georgia do not utilize Statistical Process Control (SPC) techniques in their operations and are therefore at a competitive disadvantage when marketing to customers.

Action
A three-day, hands-on short course on SPC has been designed and implemented for Georgia's food industry. Offered annually, this course is a tool to teach processors how to maximize profit, increase consistent quality and improve the safety of their processed products. An extensive course manual is prepared for the participants.

Outcome
Personnel from ten individual companies or approximately 50% of the poultry processing industry

(valued at $13.1 billion annually) in Georgia have been trained in SPC. One dairy processor has saved his company $125,000 per year in fluid milk give-away by adjusting his fill rates. Based on an extensive evaluation form, participants consistently gave the program an average of 4.4 out of 5.0 rating for overall excellence and importance.

Resources
Program costs: ○$3,500

EFT○○○2000○○2001○○2002

Scientist 1○○0.4○○0.3○○0.3
Scientist 2○○0.1○○0.1○○0.1
Cooperator○○0.1○○0.1○○0.1
Conference Coord. ○0.1○○0.1○○0.1
Technician○○0.3○○0.3○○0.3

Performance Goal 1-18 (1862)
Issue Statement
Agriculture is Georgia's largest industry, but it currently faces many economic, social and policy concerns including low farm income, production adversities from drought and pests, and depressed foreign export markets. In order to be competitive, Georgia producers and processors must improve business efficiency, employ effective risk management strategies, and select appropriate marketing strategies .

Action
Leaf spot diseases caused by Cercospora arachidicola and Cercosporidium personatum can cause devastating yield reduction in peanut. Control depends on frequent applications of fungicides, representing an expensive investment. UGA research indicated that leaf spot epidemics were suppressed in peanuts planted using pure no-till practices. But no comparisons had been made between this tillage system and conventional tillage systems.

Outcome
Use of strip-till may reduce the fungicide applications needed, even on susceptible cultivars, but the level of suppression is not sufficient to prevent the need for fungicides. Small plot and on-farm tests indicate that a combination of strip-till systems with a resistant cultivar such as C-99R provides suppression of leaf spot that may allow use of only four applications of fungicides for leaf spot compared to six or seven often needed on standard cultivars in conventional tillage. This research demonstrates improvement in leaf spot control and potential savings in fungicide costs in addition to time and energy savings and suppression of tomato spotted wilt previously demonstrated with use of strip-till systems.

Resources
Albert Culbreath
Other Collaborators: Scott Monfort, Dr. Sharad Phatak, Dr. Tim Brenneman

Performance Goal 1-19 (1862)

Issue Statement

Soybeans produced in GA are susceptible to attack by several key insect pests that collectively cause an annual loss of $4 million in crop damage and insect control costs.

Action

UGA scientists have been investigating the use of early maturing varieties that can be harvested in mid-august prior to the peak of pest insect populations.

Outcome

The benefits of early maturing varieties include drought avoidance and up to possible annual savings of $2 million in reduced crop damage and reduced pesticide use.

Resources

Cooperators include 2 faculty members from Entomology and 2 from Plant Pathology.

Performance Goal 1-21(1890)

Issue Statement

Developing an integrated program to control gastrointestinal parasites and improve profitability of small ruminant production systems in the southeastern United States.

Action

In order to determine the extent of the problem of anthelmintic resistance of goat GINs in the Southeast, university and on-farm tests of the efficacy of anthelmintics from all 3 major drug classes were completed during 2000-2001. The university tests were completed at the Fort Valley State University and the University of Georgia, while the on-farm experiments were completed in counties throughout the state. In addition, surveys on anthelmintic use and goat production practices were sent to approximately 200 goat producers throughout Georgia. Data from the surveys were used to identify appropriate producers for the on-farm anthelmintic resistance work.<p>

In addition to investigating the current status of anthelmintic use and parasite resistance to these drugs, a promising non-chemical control method, the use of nematode-trapping fungi, has been tested in confinement feeding trials and in a grazing study with goats.

Outcome

This project has established FVSU as a center of information on small ruminant parasitology for Georgia and surrounding states. The greatest impact on producers so far has been to change their decision making on appropriate anthelmintics to use to effectively deworm their animals. University and on-farm tests showed the problem of anthelmintic resistance to be more widespread than previously thought, and farmers have taken great interest in the work. The number of parasite control questions from producers

calling the university has greatly increased since these tests were completed.

Resources
USDA: Capacity Building Program Sustainable Agriculture Research and Education (SARE) Program Scientific Cooperation Program

Performance Goal 1-22(1890)
Issue Statement
A Competitive and Lucrative Animal Production System
Action
The neuroendocrine basis of seasonal reproduction has not been well investigated in the goat. Although previous efforts have indicated that manipulating the photoperiod and exogenously administrating hormones can induce off-season ovulation, such techniques are labor intensive and yield inconsistent results. Our current studies will unravel and describe the role of certain important amino acid neurotransmitters, in the induction and maintenance of seasonal anestrus in the goat. Our study already indicates that there are excitatory amino acid receptors in the goat which may be involved in the seasonal regulation of breeding in the male goat. Also, day length may influence luteinizing hormone, growth hormone, testosterone and other reproductive hormone secretion in the goat.

Outcome
The results are providing a better understanding of the neuroendocrine basis of the goat's seasonal reproduction pattern. They may also, provide basis for the development of a more cost effective technology for controlling stimuli to improve productivity. Data have been presented in regional, national and international professional meetings and abstracts have been published in scientific journals. Some results have been presented at regional Expos and workshops. Some findings have also been published in the Georgia Small Ruminant Research and Extension Center's newsletter that has tremendous regional and national circulation among goat producers and enthusiasts. As a result, enquiries on efficient goat production methods have increased.

Resources
USDA (CSREES) 1890 Institution Research Capacity Building Grants Program.

Performance Goal 1-26(1890)
Issue Statement
Competitive Agriculture Systems In A Global Economy

Action
Herd Health Management Programs has been developed for goats which included herd vaccinations and disease prevention protocol, as well as parasite control measures. These recommendations has helped numerous goat producers to minimize production losses in their herds. Disease surveillance data is being produced and several disease outbreaks has been investigated for treatment, prevention and control

measures.

Outcome
Research and Extension findings has been disseminated through Georgia Extension Service; presentations at local, state, regional, national and international professional meetings/conferences; state and national field days and fairs; publications of findings in referred journals , books and electronic media. The management recommendations has been adopted by several producers which resulted in reduction in herd production losses. Numerous clientele attended exhibits, demonstrations, field days ad requested information.
Resources
Evans-Allen, Federal Extension

Performance Goal 1-28(1890)
Issue Statement
A healthy, well-nourished population

Action
A preliminary study has been completed on the effects of refrigerated storage time on the shelf stability of chevon patties with different proportions of beef fat. Texture profile analysis (TPA) of low-fat chevon, beef, pork, and combination (chevon, beef, pork) sausages were also studied. A consumer acceptance trial was conducted comparing two different recipes of barbecued chevon.

Outcome
The data were presented in scientific meetings. Salient findings will also published in Georgia Small Ruminant Research and Extension Center's News Letter that reaches goat producers and processors in the Southeast US. The barbecued chevon was accepted well by consumers of all ethnic groups.

Resources
USDA 1890 Institutional Capacity building Grants Program

Performance Goal 1-37(1890)
Issue Statement
Studies were conducted to investigate the use of micro-propagation techniques to produce Amaryllis and Daylilies species. The two popular perennial species are slow to multiple using conventional means of vegetative propagation. The time between producing and introducing new cultivars is lengthy, because the usual vegetative propagative by division of crowns gives a net gain of one or two additional plant per year. Research proposed employs micro-propagation to rapidly produce tetraploid Amaryllis and Daylilies species to speed up commercial release of new cultivars by several years.

Action
Studies have been conducted to deter-mine the optimum nutritional requirements of various basal media formulations for culture intitiation, shoot proliferation, shoot multiplication and root induction. Physical factors such as light quality, quantity and duration; container size, explant size and chemical factors which include plant growth regulators have been studied at various stages.

Outcome
Information from these studies have and will be disseminated to growers and producers of Amaryllis and Daylilies on a local, national and international level. It is anticipated that growers and producers will benefit greatly through the rapid availability of new cultivars which will result in increased profitability.

Resources
Agricultural Research farm & greenhouse equipment and personnel.

Performance Goal 1-37(1890)
Issue Statement
Promote Rapid Availability and Profitability for Limited Resource Growers and Producers

Action
Over the past five (5) years (1996-2001) micro-propagation systems have been studied to propagate ornamental species. During this period our main focus has been the daylily species. The spring and summer of 1996 and 1997, micro-propagation studies using anthers and filaments from immature flower buds as explants were conducted. In these studies, Murashige and Skoogg's (MS) medium was the basal medium used, while testing three levels of benzylaminopurine (BAP) at 1.0, 2.0 and 3.0 mg/l. Several experiments were conducted during the spring and summer of 1998 using young flower buds ranging in sizes from 5-20mm as explant sources. During the spring and summer of 1999, studies were conducted to determine the effect of three sugars (glucose, sucrose and maltose at 30 gm/liter) on somatic embryogenesis and regeneration in daylily. Field studies were i nitiated in fall 1999 to determine trueness to type of the tissue culture produced daylily plantlets.

Outcome
Results from the above studies showed that it is possible to micropropagate daylilies via somatic embryogenesis using young filament as explants. Results from the studies showed that flower buds ranging in sizes from 5 - 10 mm provided the best source of explants. Studies conducted to determine the effect of three sugars, showed that sucrose was the best sugar to be used for optimal regeneration in daylily. Results from the field studies showed that after one year of growth and development, 100% of the plantlets survived. The plantlets grew at a reasonable rate, producing 3 to 5 crown divisions/plantlets. Flower production was very limited on all the plantlets tested. Results on flower production suggested that our method of producing plantlets may need to be modified to improve flower production. Further studies are being conducted to refine our system.

Resources

## Goal 2: A safe and secure food and fiber system

Performance Goal 2-1 (1862)

Issue Statement

The reported incidence of food borne illness from pathogenic bacteria is increasing; these illnesses may be life threatening or trigger chronic disease. Changing patterns of co nsumption, an aging population, more persons with chronic illness and wide variation in food handling and preparation practices are some of the factors contributing to increased vulnerability of the population to food borne disease. Food safety and quality concerns often put different groups within society in conflict over perceived and real concerns.

Approximately 97% of documented cases of food borne illness result from the mishandling of foods in food service establishments and in the home. The resulting percentage from food service establishments alone is about 77%. With an increasing number of meals being eaten away from home, there is the potential for an increased incidence of food borne illness. Employee education and certification in the sanitary handling of food is viewed by food protection experts nationally as one strategy for reducing food borne hazards to the consumer.

Action

County Extension Agents conducted group training programs to teach safe food handling for consumers, elementary and high school students, child care providers, personal care home providers, school food service employees, restaurant employees, food processors, and other food service or distribution professional. County educators collaborated with relevant agencies, organizations and individuals who deliver food handling information to the public and food service industry.

Faculty provided technical expertise in food safety to Extension agents and individual or industrial clientele. County Extension educators were trained and updated in food safety issues and recommended food handling practices yearly. Training was offered in use of specific curricula, such as the ServSafe (EFNRA) food service manager certification and employee training programs.

- Over 16,200 educational contact hours in food handler education were provided to over 11,300 program participants.
- Over 1,270 people participated in ServSafer food safety educational program. Nearly 50% of them were commercial or institutional food han dlers. Another 33% of them were school food service

personnel.

○As part of a federally funded food safety program directed by University of Georgia Extension, two new curriculum packages were developed to teach food safety based on the nationwide Fight BAC!TM Food Safety Education Campaign. To date, 1200 children in K-3rd grade and 165 adult consumers in Georgia, Mississippi and North Carolina were reached in the first round of this multi-state program.

○Media was a major strategy for food safety education; food safety articles in newsletters reached over 23,900 people; radio spots were broadcast to a listening audience of over 318,200; newspaper columns went to a circulation of over 1.4 million and television programs were targeted to over 7 million people.

○Almost 96% of participants said that the food safety training program was very helpful to understand food preservation concepts.

○Nearly 78% of child care providers increased their knowledge in safe food handling practices.

○After training, participants in child care Food Safety and Sanitation training programs cited specific food handling behaviors or practices targeted for improvement: 20% specifically planned to improve their handwashing practices; 31% planned to improve cleanliness and sanitation of facilities and equipment; 27% planned to improve temperature control of bacterial growth in foods (e.g. proper thawing, storage temperatures, holding temperatures, cooking temperatures, etc.); and 69% planned to increase the use of food thermometers.

○A total of 940 food handlers received certification this year in ServSafer workshops and employee trainings offered by County Extension educators.

○First and second graders in the Fight BAC!TM program significantly improved knowledge of all four Fight BAC!TM food safety principles, and kindergarteners and third graders improved on two of the four principles.

○Adult consumers in the Fight BAC!TM program significantly improved knowledge of three out of four Fight BAC!TM food safety principles, and 26% indicated improvements in food handling practices related to recommended cooking and cooling practices.

Resources

Smith-Lever, State and USDA CSREES $ 473,621.

Performance Goal 2-1 (1890)

Issue Statement

The Centers for Disease Control and Prevention (CDC) and the Food and Drug Administration (FDA) have estimated that there are as many as 33 million reported cases of foodborne illnesses each year in the United States. ○Estimates of the economic costs of foodborne illness vary from a low of nearly $500 million to a high of $7 billion a year. The consequences of foodborne illness can be serious for many people. In spite of the serious consequences associated with foodborne illness, few consumers have had any food handling education. This lack of education in rural low-income communities has implications both for consumers handling their own food at home and for their ability to assess the safety of food obtained in eating establishments. The benefits of implementing a Food Safety Education Program for audiences with low-income and limited resources are that these families and individuals will improve their food handling practices, and in turn, reduce their risk for foodborne illnesses at the same time reduce the

economic costs associated with foodborne illness.

Action
A Food Safety Education Program for county-based employees to teach and educate their clientele was developed. Major components of the program are food preparation, preservation, storage and handling practices; cooking and storage methods; proper hygiene practices; cooking times and temperatures; food selection techniques; and understanding risks and responsible practices. Curriculums, exhibits, and various resources were written, designed, purchased and adopted.

Outcome
County-based employees reached and currently enrolled nearly 1500 clientele. They reported that almost 900 clientele and program participants increased their adoption of recommended food handling and home food preservation practices that minimize the risk of foodborne illness. In addition over 1300 clientele and program participants improved their understanding of risks and responsible practices in relation to food and health. Overall participants stated that they are making changes in their homes and lives because they are more aware of food safety and preservation practices.

Resources
USDA-CSREES 1890 Funds; regional, statewide and local groups and organizations.

Performance Goal 2-1 (1862)
Issue Statement
The continuing need for safe food processing and clean processing environments provides numerous opportunities to deliver training to employees in the food industry. This training incorporates current technology, preventive measures to minimize the incidence of foodborne illnesses as well as ways to meet current Good Manufacturing Practices (GMPs) as recommended by government regulations.

Action
Workshops designed for meat and poultry industry personnel in sanitation, personal hygiene and an accredited HACCP (Hazard Analysis Critical Control Point) course have been conducted on a statewide basis, as well as for individual plants throughout the state.

Outcome
Nine workshops were conducted during 2001, reaching 67 firms and 437 individuals. Two plant audits were conducted and HACCP plan reviews were done for 12 plants. New cleaning procedures were inaugurated in four plants. Changes in plant procedures following the recommendations from these audits and reviews have resulted in a reduction in lost product at all plants, as well as a savings of over $20,000 per month in eight plants.

Two training manuals were developed for use in training plant personnel. Agent training for ServeSafe

provided a multiplier in getting individual food service establishments to have trained employees working to provide safe food in schools, fast food and restaurants.

Resources
These programs cost an average of $250 per person and were conducted in conjunction with local processors and industry suppliers. Individual training was sponsored by processing firms. Local agents were involved in local training programs.

Performance Goal 2-2 (1862)
Issue Statement
The production of agriculture commodities using integrated pest management techniques and is vital and important part of food safety, resulting in agricultural economic integrity.

Action
The cost in managing plant diseases and direct losses was approximately $572 million in 2000 in crops and commodities value at nearly $4.4 billion. A rapid diagnosis of diseases of these crops allows growers to implement control measures that could reduce losses and make timely and appropriate chemical applications. Plant disease clinics designed to handle samples of crops and commodities provide quick, accurate diagnosis and also aids in education.

Outcome
Plant diseases are diagnosed and University of Georgia Extension Service plant pathologists use the information to make control recommendations. In 2000, the latest complete data, 1,856 physical samples were analyzed in addition to the hundreds that were examined by the digital imaging program. A fast, accurate diagnosis of a problem not only helps reduce a loss in yield, but also allows for selective treatments that can reduce or eliminate unneeded chemical applications.

Resources
Jason Brock, Jan Fowler

Performance Goal 2-2 (1862)
Issue Statement
The production of agriculture commodities using integrated pest management techniques and is vital and important part of food safety, resulting in agricultural economic integrity.

Action
On a per-acre basis, more pesticides are used by the homeowner than by farmers. Integrated Pest Management (IPM) strategies that minimize pesticide use are applicable to home landscape, garden and orchard problems. The Homeowner IPM Clinic is an integral part of the extension education program for disease and insect related problems of noncommercial plant samples. This diagnostic support laboratory handles diagnoses and recommendations for plant disease and insect infested plant samples as well as identification of insect and other arthropod specimens from in and around the home.

Outcome
About 2,000 - 2,500 samples are received and processed annually. Management recommendations focus on diagnosing the problem prior to implementing any control practices.

Resources
Taft Eaker

Performance Goal 2-5 (1862)
Issue Statement
Processing, further processing and value added poultry plants are major components of the poultry industry in Georgia. Over 30 plants are currently operating in Georgia processing more than 5 billion pounds of product annually. It is imperative that these plants operate with the highest level of efficiency while providing food safety and quality control.

Action
During 2000-2001 Extension faculty were involved in 18 in-plant problem solving activities related to food safety issues. In addition, 10 research projects resulting in 35 publications and 20 presentations were completed. As a result of these activities, no processing plants in Georgia experienced any interruption of business due to contamination problems or as a result of failure to comply with Federal regualtions. Shutting down a processing line can cost a plant over $400,000 a day in lost income.

Outcome
Georgia poultry processing plants have operated without interruption of business as a result of the HAACP educational programs, in-plant problem solving activities and research projects conducted. Poultry meat processing represents a $3 billion annual income to the state.

Resources
Departments of Poultry and Food Sciences and Georgia Poultry Federation
Smith Lever, State and matching funding=$407,100.

Performance Goal 2-5 (1862)
Issue Statement
Processors of meat and poultry must continue to improve quality and develop new products and processes in order to compete in the market for consumer use of their product. Acceptance of new processing procedures and methods is necessary to meet the changes in consumer demands for safe, convenient and affordable ready-to-eat foods.

Action
UGA Extension Food Science personnel conducted workshops on poultry and meat marination, cured meat preparation, Statistical Process Control, and HACCP, as well as the Better Process Control School for canners. New products were developed for a number of processors. Quality control

assistance was provided to processors and individuals, to assist in the development, processing and marketing of further processed products.

Outcome
New products were developed for the Georgia Prison System and 14 other processors. Workshop training was provided for 89 personnel and two workshop manuals were published. New products developed for use by the prison system has saved the state of Georgia over $1,000,000 annually. Three new processing plants were established, employing 45 workers.

Resources
Cooperative efforts included the State Prison System, county agents, industry suppliers and major processing firms, all of whom made significant changes in their processes.

Performance Goal 2-7 (1862)
Issue Statement
Fresh-cut fruits and vegetables, valued at $11 billion, represent the fastest growing category of the U.S. produce industry. During the cutting process, the natural barriers (peel, skin, etc.) protecting fresh produce are disrupted, releasing tissue fluids. These accelerate the growth rate of spoilage and allow the influx of human pathogenic microorganisms that are present. Since produce safety is the greatest consumer concern, ways to ensure the safety of these products must be developed. It is generally agreed, both within the scientific community and in the food industry, that a management tool called HACCP (Hazard Analysis Critical Control Point) is the single most cost-effective means of ensuring food safety and reducing product losses due to spoilage.

Action
The first HACCP short course specifically designed for the fresh-cut produce industry was held in May 1999 by UGA Extension Food Science specialists. The program has been held annually since that time. This is the only accredited HACCP program for this industry in the U.S. The two and one half day, hands-on program allows processors to develop and customize a HACCP plan that they can implement in their own plants. An extensive course manual with sample record-keeping forms and current regulations is provided to each participant.
With the current concerns about the possibilities of bioterroristic threat, a new section will be added to the 2002 course addressing the problem of intentional contamination and ways to minimize such risks.

Outcome
Participants representing 26 states and two foreign countries (Canada and New Zealand) have participated in this program, including five fresh-cut firms from Georgia. Based on an extensive evaluation form completed by the participants at the end of the program, this workshop has averaged 4.65 out of 5.0 ratings for excellence in meeting their food safety needs.

Resources
Program costs: ○ $7,000 per year

EFT○○○1999○○2000○○2001○○2002

Scientist 1○○0.4○○0.3○○0.25○○0.4
Scientist 2○○0.1○○0.1○○0.1○○0.1
Conference Coord. ○0.1○○0.1○○0.1○○0.1
Technician○○0.3○○0.3○○0.3○○0.3

Performance Goal 2-8 (1862)

Issue Statement

As Americans eat more fresh fruits and vegetables for health and diet reasons, the number of foodborne illness outbreaks attributed to this increased consumption has steadily increased. The Center for Science in the Public Interest (2001, Washington, D.C.) ranked fresh produce as the third highest cause of all foodborne illnesses in the U.S. since 1990, behind seafood and eggs. This is due partly to the fact that fresh produce receives little or no inspection before consumption, and is usually eaten raw. There is an immediate need to educate fresh produce growers, packers and shippers on sanitary handling procedures as found in the Good Agricultural Practices (GAPs) guidelines, published in 1998 by the FDA, to ensure food safety.

Action

The first nation-wide food safety program based on GAPs and GMPs (Good Manufacturing Practices) for the fresh produce industry was held in 2001 in Atlanta, Georgia. This three-day, hands-on short course was designed to teach growers, packers and shippers of fresh fruits and vegetables how to develop and implement a food safety plan tailored specifically to their own field and packing house operations. An extensive course manual with sample documentation forms and current guidelines and recommendations is provided to all participants.

Outcome

Twenty-five participants, representing 12 states including California, Washington and Idaho, participated in the inaugural program last November. Six of the 25 were representatives from Georgia firms. Georgia ranks fifth in the U.S. in the production of fresh fruits and vegetables. Based on the evaluations filled out by the participants at the end of the short course, they gave the program a 4.5 out of 5.0 rating for excellence in meeting their safety needs. Their only complaint was that the program wasn't long enough! The 2002 workshop will be somewhat longer.

Resources

Program costs: ○$7,500

EFT○○○2001○○2002○○2003

Scientist 1○ ○0.4○ ○0.3○ ○0.3
Scientist 2○ ○0.1○ ○0.1○ ○0.1
Scientist 3 ○ ○0.1○ ○0.1○ ○0.1
Conference Coord. ○0.1○ ○0.1○ ○0.1
Technician○ ○0.3○ ○0.3○ ○0.3

Performance Goal 2-10 (1890)
Issue Statement
Promoting Sustainability of Limited Resource Dairy Goat Farmers

Action
In the first year of planning meeting, the project collaborators recommended that the primary focus of the project should be on the quality evaluation of the actual commercial soft goat cheeses marketed by a recently licensed Georgia dairy goat farmer, rather than testing the experimental hard goat cheeses developed at Fort Valley State University pilot plant as originally planned. This proposed research for the first year will enable the investigators to gather practical and applicable research data, which would be highly useful for dairy goat farmers (producers) as well as consumers. The amended project objectives were: 1) Evaluate food quality and shelf-life of the commercial fresh soft goat milk cheeses produced by the Georgia dairy goat farmers, 2) Compare the same parameters of the frozen-stored soft goat milk cheeses after 3 to 6 months at –20oC with those of the fresh cheeses for off-season marketing, 3) Determine microbiological, rheological, nutritional and physico-chemical changes in fresh and froz en-stored soft goat cheeses in relation to the shelf-life and storage quality of the products.<p>

In order to undertake the objective 1, the soft goat cheeses were purchased from the Georgia dairy goat farmer, and evaluated for their food quality and shel f-life. The study will be repeated three times by testing three batches of cheeses that are manufactured different dates. For objective 2, each batch of the cheese are subdivided into two portions, and assigned them in two treatments (fresh vs. frozen). Th e fresh cheeses have been stored for 0, 7, 14, and 21 days at 4oC, and determined for shelf-life and food quality parameters of different storage periods. The frozen samples have been stored at –20oC for three months, thawed, and then evaluated/to be evalu ated for the extended shelf-life in the same way as the fresh samples. Finally, microbiological, rheological, nutritional, flavor and physico-chemical changes occurred in fresh and frozen-stored soft goat cheeses have been determined in relation to the len gths of shelf-life (objective 3).

Outcome
Total N, % water soluble N (WSN), pH and acid degree values (ADV) were determined, and protein profiles of fresh cheeses were examined using SDS-PAGE and densitometric analysis. The %WSN ranged from 4.4 to 11, and increased with storage time with the concomitant decrease in beta-casein as revealed in the SDS-PAGE and densitometric results. A greater increase in WSN occurred in frozen-stored cheeses than the fresh ones, suggesting that frozen-storage and thawing mig ht have accelerated protein degradation in the frozen thawed cheeses, presumably due to the denaturation of cheese proteins as well as activation of some proteinase enzymes. ADVs were significantly increased with storage period,

and were higher in frozen-stored than fresh cheeses.

We have confirmed that the commercial soft goat cheeses manufactured by licensed goat dairy did not contain detectable levels of pathogenic bacteria including E. coli, coliforms and Staphylococcus aureus, indicating that the soft goat milk cheeses are safe for consumption. Likewise, farmstead manufactured soft goat milk cheeses can be high quality products if processed properly.
The findings are being and will be disseminated through presentations at local, state, regional, natio nal and international meetings/conferences; state and national field days, and exhibits; publications of findings in refereed journals, electronic media and extension newsletters. Many dairy goat farmers and clientele attended workshops, demonstrations, and requested information. Further consumer acceptability, sensory evaluation and economic analysis would be desired.

Resources
Southern Region SARE

## Goal 3: A healthy, more well-nourished population

Performance Goal 3-1 (1862)

Issue Statement

The leading causes of diet-related morbidity and mortality in the United States and in Georgia today include heart disease, cancer, stroke, and diabetes, ranked respectively from most prevalent to least prevalent. Other significant diet-related public health concerns include osteoporosis and obesity. Statistics show that a disproportionate burden of diet-related disease is borne by minority, low income, and educationally disadvantaged persons. These groups have higher rates of hypertension, stroke, diabetes, and other diseases than the general population. Most of these diseases also occur more frequently with advancing age.

Diabetes is a major public health problem in Georgia. Over 350,000 people have diabetes and over half are undiagnosed. It is estimated that $1 billion could be saved in medical care costs due to complications of diabetes if nutrition education were a routine part of diabetes management.

Action

The University of Georgia Cooperative Extension Service offered a comprehensive diabetes education program. This includes intensive training for County Extension Agents in nutrition issues related to diabetes, a quarterly newsletter focusing on diabetes, the Rite Bite Cooking School written by Extension Specialists and conducted by County Extension Agents, and a diabetes management program conducted locally by County Extension Agents and cooperating hospitals, health departments, or physicians. Walk-a-Weigh is a comprehensive social-learning based weight management curriculum written by University of Georgia Extension Specialists and conducted by County Extension Agents. Fitness was emphasized, and walking was an integral part of the program. Recipes which teach lesson concepts were demonstrated and sampled.

During the program year following specific actions were taken:

- Almost 15,300 educational contact hours with 8,000 participants were provided in diabetes education.
- More than 550 people were reached in 29 Right Bite Diabetes Cooking Schools.
- Media was a major strategy for public diabetes education in Georgia: diabetes articles in newsletters reached over 26,000 people; radio spots were broadcast to a listening audience of over 1.6 million

people; newspaper columns went to a circulation of over 1.2 million and television programs were targeted to over 450,000 people; exhibits reached another 2900 people.

○FACS agents organized and facilitated over 204 Diabetes Support Group meetings this year.

○The Diabetes Life Lines Newsletter had a circulation of 11,750 in Georgia.

Outcome

○Most of the Georgians who attended the Right Bite Diabetes Cooking Schools started the habits of using artificial sweeteners in cooking, eating at least 3 vegetables and 2 fruits a day, using reduced or non-fat products, eating more fish and seafood, and using salt substitutes in cooking. These changes help participants achieve the recommended nutrition guidelines for diabetes.

○Nearly 74% of the participants indicated that they are going to read nutrition labels to help make food choices.

○After participating in extension programs, 56% of participants indicated they intend to exercise at least three times a week for 30 minutes at a time.

○Follow up medical data indicate that participants significantly reduced their high bloo d pressure by adopting healthy dietary habits and regular exercises.

Resources

Smith-Lever, State, EFNEP funds

Performance Goal 3-2(1890)

Issue Statement

Leading causes of diet-related morbidity and mortality in the U.S. today include heart disease, cancer, stroke, diabetes, osteoporosis, and obesity. Research has shown strong and consistent patterns of relationship between diet quality such as rich in fruits and vegetables and lowered risk of a number of chronic diseases. The U.S. Dietary Guidelines and the Food Guide Pyramid, as well as other national disease prevention recommendations, advise individuals to consume five or more servings of fruits and vegetables each day. In addition to the positive reports on fruits and vegetables, many clinical and experimental studies support a role for dietary fiber, trace elements, vitamins, and other components of whole grains in reducing risk for chronic
diseases such as cancer and coronary heart disease. As a result of the increase number of chronic diseases, nutrition education programs are needed. The primary benefit of implementing a Nutrition Education Program for clientele with chronic diseases is that the information and resources help to improve their quality of life, while reducing the economic costs as sociated with chronic diseases.

Action

A Nutrition Education Program to address the chronic diseases was
developed. Major components of the program are The Food Guide Pyramid,
Hypertension Resources, Heart Disease Resources, Cancer Resources,
Diabetes Resources, Obesity Resources, Exercise Resources and various
nutrition, diet and health resources. Curriculums were adopted, exhibits were designed and purchased, resources were purchased, and publications were written and published.

Outcome
County-based employees reached over 2000 clientele. They reported that nearly 1100 clientele improved their nutrition behavior to decrease the risk of chronic diseases. Overall participants stated that they are changing their eating habits, learning more about food pre paration and meal planning, buying nutritious foods in season and with coupons, using grocery lists and learning to buy the right foods, and they are saving money.

Resources
USDA-CSREES 1890 Funds; regional, statewide and local groups and organizations.

Performance Goal 3-2 (1862)
Issue Statement
It is also important to recognize that hunger exists in Georgia. Almost 15% of the population is at or below the poverty level. As a result, many people lack the quantity and quality of food for adequate nutrition. There is a growing recognition that hunger and food security do not exist in isolation. Poverty and related problems that affect families and communities cause hunger. The societal conditions which sustain the problems of hunger and jeopardize food sec urity are known globally. However, the relationships among the issues that endanger food security and create hunger in a community are often not understood. Hunger compromises the ability to learn because it reduces the ability of a child to concentrate. Undernutrition during pregnancy can result in low birth-weight infants who are more likely to require intensive medical care after birth and special education services, and infants with neural tube defects resulting from insufficient folic acid.
Nutrition education programs enable families and individuals to make food selection and preparation choices that are consistent with their lifestyle and cultural practices and enhance their health status. These programs enable families with limited resources to get t he most nutritional value for their food dollar. In the long-term, nutrition education programs benefit families and individuals, and therefore society, by improving overall health and well-being.

Action
Under the Expanded Foods and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP) following actions were taken:
- Trained paraprofessionals in low-income communities to teach nutrition to hard-to-reach audiences using culturally-appropriate methods and materials.
- Educated families on planning low cost nutritious meals in order to maximize the nutritional value of their diets and decrease the number of families who run out of food before the end of the month.
- Taught limited resource clients how to modify their diets to decrease the risk of chronic diseases.
- Provided food safety education for limited resource clients.
- Provided nutrition education to teenage mothers in order to increase maternal weight gain and intake of crucial nutrients.
- In FY 2001, through the adult program, EFNEP provided nutrition education to a total of 8,705 adults and 11,050 youths.

○More than 7,400 food stamp and food stamp-eligible Georgians completed a 6-12 hour nutrition class series covering topics such as food safety, meal planning, healthy food choices, nutritious snacks, food budgeting, and healthy cooking techniques. A total of 243 class series were held.

○Over 80,000 Georgians were educated through 4,500 group presentations or one-on-one consultations under the FNP.

○More than 200 people attended the food buying training. Almost 80% of them were food stamp recipients.

○A total of 1,614 people completed the EFNEP nutrition education program in FY 2001.

○After completing the EFNEP program:

o○88% of EFNEP participants had a positive change in the nutritional value of their diets;

o○EFNEP participants' total fruit and vegetable consumption increased by 24%;

o○ 48% showed improvement in one or more food safety practices, such as thawing and storing foo ds properly;

o○63% improved one or more food resource management practices, including planning meals, using grocery lists, comparing prices, and not running out of food;

o○66% improved nutrition practices such as making healthy food choices, preparing fo ods without adding salt, reading nutrition labels, and eating breakfast.

o○Among youth participants, 72% reported that they now eat a variety of foods as a result of participating in EFNEP.

○Most of the Georgians in food buying training learned to buy nut ritious foods with very limited resources. Nearly 60% said that they are going to use the unit price to compare food products.

○62-73% indicated they would choose more low-fat options and increase their consumption of fruits and vegetables and breads, cereals and grains - all strategies which affect their heart health and risks for cancer.

○Almost 80% indicated that they intend to use the Food Guide Pyramid to plan balanced meals.

○Over 1,200 elementary school children significantly increased their know ledge in foods and nutrition.

Resources

Smith-Lever, State and USDA CSREES (EFNEP 2001) $2,080,661.

Performance Goal 3-4 (1890)

Issue Statement

Enhancing food safety in goat meat processing industry and thus making it economically sustainable.

Action

In order to contribute to reduce the health risks through goat meat the present research was proposed. The program contained to detailed components to accomplish the desired objective of devising a method to disinfect the meat in the processing line using el ectricity. It was also an objective observation that while treating the goat meat with electricity as such the meat quality is not affected other wise in color or texture. Therefore, the first part of the research contained to investigate the electrical pr operties of goat meat tissues relating to fiber direction, length and cross sectional area. Along side meat properties,

studies included electrical properties of thin film 0.15 NaCl solution and 2% Acetic acid solutions. To date all the investigations stated above has been completed.

Outcome

During the present period of the project extensive evaluation of electrical properties of goat meat were done. Besides meat, electrical properties of 2% Acetic Acid solution and 15% Sodium Chloride solutions were also evaluated in order to compare the properties with those obtained for meat. The results showed clearly the resistivity of goat meat was higher than both the electrolytic solutions. However, sodium chloride solution had the least resistivity (about 157 ohm.cm ), about one half of that of meat at >15 VAC square wave input at a frequency of 1000 Hz or more. Hence, it is probable that the use of sodium chloride solution as electrolyte over the surface of goat meat would facilitate high current flow rate through it and expected to help kill the harmful bacteria on it. The impact of the research findings would be of enormous importance and influence on the practical application of electricity to disinfect meat in the follow up and future research, and the technology thus generated could be used in the processing line in the meat industry.

Resources

USDA Capacity Building Program

## Goal 4: Greater harmony between agriculture and the environment

Performance Goal 4-1 (1862)

Issue Statement

Over the last two years, the State of Georgia has passed regulations requiring all swine, dairy and poultry operations with liquid waste management systems to develop and implement comprehensive nutrient management plans (CNMP's). These plans had to be developed by certified nutrient management planners. At the time, there was a very poor understanding of what these plans entailed and how they should be developed. The University of Georgia was asked to develop the certification and training program for nutrient management planners and to implement this program in time for producers to comply with the new regulations.

Action

The University established a nutrient management task force which included research and extension scientists as well as external stakeholders and other agency representatives. The task force produced several education tools on nutrient management planning as well as a two day training program to educate and certify nutrient management planners.

Outcome

More than 215 individuals have attended the two day certification program and received over 3,010 contact hours of training on nutrient management. Approximately 85% of these individuals successfully completed an examination to become certified nutrient management planners. As a direct result of this, all the producers were able to comply with State regulations and to date more than 55 plans have been submitted to the State regulatory agency for review. Many of these planners are county extension agents who provide the planning service free of charge. In other states, it commonly costs up to $10,000 to have these plans developed by the private sector representing a savings to date of more than $550,000 and based on the number of producers required to have plans, a potential savings of up to $4,500,000.

Resources

It is estimated that approximately 8 FTE of State staff time and more than 50 FTE of county staff time have been devoted to this effort.

Performance Goal 4-1 (1862)

Issue Statement

The Georgia Environmental Protection Division passed new regulations in 2001 that require all operators of Confined Animal Feeding Operations (CAFO's) to obtain training and certification in safe and environmentally sensitive operation of animal waste handling, storage, and application systems. The rules apply to about 75 swine operations, about 30 poultry operations, and about 175 dairy operations in

Georgia. Each of these operations must have at least one certified operator by October 31, 2002 (December 31, 2001 for swine operations).

Action
Personnel participating in the University of Georgia's AWARE team (faculty involved in animal waste research and extension) worked with the Georgia Department of Agriculture, the EPD, and producer organizations to develop and provide certification training that would both qualify producers as certified operators and make them more aware of environmentally sensitive issues and methods of operating their facilities.

Outcome
Operator training sessions were held in Gainesvill e and Blackshear for poultry operators and in Tifton for Dairy and swine operators. A total of 53 operators were certified at these training sessions, with an additional session planned for February, 2002. Evaluations and comments have been very positive, with most attendees stating that they learned information that will help them meet the new regulations and operate in a more environmentally friendly way.

Resources
Trainings were held with the cooperation of personnel from Crop & Soil Science Dept. as well as the Georgia Department of Agriculture and the USDA/NRCS. Partial funding for the trainings was provided by Georgia Milk Producers. Additional funding was provided by a grant from the Georgia Department of Agriculture ($40,800).

Performance Goal 4-1 (1862)
Issue Statement
The Georgia Environmental Protection Division passed new regulations in 2000 and 2001 that require all Confined Animal Feeding Operations (CAFO's) to develop a Comprehensive Nutrient Management Plan (CNMP) for their operation. These plans have to be certified by a Certified Planner. The problem was there were initially no certified planners or rules developed detailing how someone could get certified.

Action
Personnel participating in the University of Georgia's AWARE team (faculty involved in animal waste research and extension) worked with the Georgia Department of Agriculture and the EPD to develop the requirements for certified planners, develop the train ing program, and provide certification training that would qualify planners to develop and approve CNMP's for agricultural producers.

Outcome
CNMP planner training sessions were held in late 2000 and in August of 2001 to train county extension personnel, professional engineers, and agricultural consultants . A total of 140 planners have been certified so far with additional training sessions slated for April and May of 2002. These sessions have

not only educated more people who have daily contact with farm operations about environmentally sensitive operation of animal waste systems, but they also have made it possible for farms to comply with the new regulations.

Resources
Training Sessions were held with the cooperation of personnel from BAE and Crop & Soil Science Departments, as well as personnel from the Georgia Department of Agriculture and the USDA/NRCS. These trainings were largely self-supported through fees colleted from trainees.

Performance Goal 4-1(1862)
Issue Statement
Over the last two years, the State of Georgia has passed regulations requiring all swine, dairy and poultry operations with liquid waste management systems to develop and implement comprehensive nutrient management plans (CNMP's). Such operations were also required to have a certified operator as part of the farm staff or management. At the time, there was a very poor understanding of what these plans entailed and how they should be developed. The University of Georgia was asked to develop the certification and training program for farmer/operators on nutrient management planning and implementation.

Action
The University established a nutrient management task force which included research and extension scientists as well as external stakeholders and other agency representatives. The task force produced several education tools on nutrient management planning as well as a two day training program to educate and certify farmer/operators on these issues.

Outcome
More than 250 individuals have attended the two day certification program and received over 3,010 contact hours of training on nutrient management. Approximately 95% of these individuals successfully completed an examination to become certified operators. As a direct result of this, all the producers were able to comply with State regulations and to date more than 55 plans have been submitted to the State regulatory agency for review. It is estimated that, another 150 to 200 plans will be submitted by certified operators with the assistance of certified planning specialist trained through a companion program for county agents, as well as federal agency employees and private consultants.

Resources
.5 FTE Extension staff person; cooperated with 4 other departments in College of Agricultural and Environmental Sciences, State Department of Ag, USDA-NRCS and 3 commodity associations.

Performance Goal 4-1 (1862)
Issue Statement
Disposal of spent fowl are a major problem for egg layer operations in that the small layer which has a

limited amount of meat must be slaughtered at the same cost per bird as large broiler laying hens. These costs have resulted in a large percentage of the birds being disposed of by burying and composting just to remove them from the farm.

Action
A new process and product was developed in conjunction with a local slaughter plant to mechanically debone these birds and utilize the meat obtained at a reduced labor cost. The search for new markets for this ground poultry product has resulted in the development of eight new p roducts that effectively compete with ground meat in the marketplace, both in price and quality.

Outcome
These products have been utilized by the State Prison System at a cost saving of over $1,000,000 per year. More importantly, these birds are now utilized for food, are no longer buried, and return about 5¢ per pound to the production (about $500,000 per year). The environmental impact of not having buried animals on the far provides a great advantage t hrough the use of these products and method.

Resources
Cooperation with the State Prison System and local processors.

Performance Goal 4-2 (1862)
Issue Statement
Farms are increasingly being recognized as potential sources of surface and groundwater cont amination in rural areas. Farm facilities can include petroleum tanks, pesticide storage and handling, fertilizer storage and handling, household wastewater treatment systems, livestock waste storage and handling, and many other concentrated sources of mic roorganisms, nutrients, and other pollutants. The concentration of potential contaminates and intensity of activity around farms represent significant pollution sources. Additionally, most farm operations have many pathways to the surrounding environment r eadily available to them. These include drinking water and irrigation wells, abandoned wells, and often access surface water in the form of rivers, streams, ditches, and ponds. This combination of readily available sources in close proximity to drinking wa ter supplies and conduits to the surrounding environment creates a high potential risk for both on-site and off-site contamination and pollution.

Action
To encourage the use of farm practices which protect water quality, the Georgia Farm*A*Syst program works with farmers and rural residents to provide technical assistance, training, workshops, demonstrations, on-site assessments, and self-assessment publications. The Georgia Farm*A*Syst program is an interagency partnership that provides Georgia's farmers a voluntary means to become environmentally pro-active in managing their farms and ultimately protecting groundwater and preventing pollution. The Georgia Farm*A*Syst program has been instrumental in assisting farmers to identify sources of potential contamination, supplying information on corrective actions, and ultimately encouraging farmers to form an action plan to address the concerns.
In addition, the Georgia Farm*A*Syst program has 20 different assessments tools available to farmers

and rural residents that focus on specific environmental and farm practice areas.

Outcome

As a result of the Georgia Farm*A*Syst program, over 28,000 assessments were distributed to farmers and rural residents through requests from individuals, Cooperative Extension Service agents (CES), and/or USDA-Natural Resources Conservation Service(NRCS) representatives. In addition, many of the assessments have been distributed to Georgia's farmers as part of educational Field Days or training activities, booths at Agricultural events or conferences, and through farming organization and association meetings. Some of the assessments have been distributed through larger community efforts to improve the overall water quality of an area.

A total of 78 on-site assessments conducted by the Georgia Farm*A*Syst staff; however, these only represent a small percentage of assessments completed by the farmers. These numbers do not include the many on-site assessments conducted by NRCS professionals and local CES agents.

In a survey, 82% of the farmers who completed a Farm*A*Syst assessment indicated that they would make a change in the management of their farm to reduce the risk of an environmental problem. On average, the cost associated with one change was approximately $1,200. In the same survey, 40% of the farmers stated that they would make two or more changes in the management of their farm to reduce the risk of environmental problems, as a result of the Farm*A*Syst assessments. When considering the contribution of farmers to pollution prevention efforts, one change in their farming practices/management activities equals approximately 16 million dollars provided by farmers towards pollution prevention. Even if only 40% of the 21,000 assessments distributed were completed, 8 million dollars would have gone to pollution prevention efforts.

Resources

1 full-time employee (External Funding, $40,000/year)

Performance Goal 4-2 (1862)

Issue Statement

Water quality and water use are dependent on each other. When the supply of water is reduced, contaminants that find their way into the water become more concentrated and this lowers the quality. Solving water supply problems involves conservation efforts at the household, industrial and agricultural levels. Supplies of water can be contaminated by septic systems, urban runoff, small disposal pits, house and garden chemicals, stream infiltration, deicing salts, landfills, storage lagoons, underground storage tanks, fertilizers, pesticides, animal lots, etc. Toxic doses of chemicals in the drinking water can cause health effects.

In Georgia, many of the existing sanitary landfills are nearing capacity. Energy costs have risen and there is a greater demand as urban sprawl continues in Georgia.

Action

Extension's Role is to create awareness on energy and water conservation and waste management and to provide classes/educational information in water and energy conservation and waste reduction and recycling. Research-based Solutions include:

- Water conservation technology can be used to delay/avoid capital expenditures for new water supplies. The typical consumer uses 60-75 gallons daily inside the home. In some areas of Georgia, the increased water demand threatens to surpass the capacity of the existing water treatment and distribution systems.
- Energy costs in Georgia have risen as more plants are built to increase generating capacity. Sound energy saving techniques and the retrofit of homes built before 1969 - 25% of all homes in Georgia - with weatherization, insulation, heating and cooling will hel p reduce energy costs and protect the environment.
- To maximize landfill capacity, recycling, reusing and reducing are methods, which can aid in waste stream reduction and future landfill management.

Outcome

Extension's Contribution to Solving the Problem

Provided more than 2000 hours of managing household water, energy, and waste education to 1050 Georgians. Approximately 30% of all household water, energy, and waste education program participants are considered low-income or at risk.

Utilized media to reach thousands of Georgians with information related to water, energy, and waste management: newsletters reached 1160 people; radio spots were broadcast to more than 213,800; newspaper columns went to a circulation of more than 960,800 and television programs were targeted to another 14,000 viewers.

Joined with the Alliance for Quality Growth to increase awareness and understanding among policy makers, planners, developers, and the general public to promote efficient land use and natural resource development.

The Georgia Drought Conference was held in 2001 to address the lack of information concerning the public health impacts of major and prolonged droughts on population . T here were experts from 20 states.

It is predicted that approximately 50% of the people reached by Extension adopt a water conservation and protection attitude and save close to 1.2 million gallons of water daily.

Resources

0.2 FTE Extension BAE, 0.8 FTE Family and Cosumer Sciences

Performance Goal 4-2 (1862)

Issue Statement

Water quality in the State of Georgia continues to be of major concern. One reason for the continued concern is the current drought, which has caused surface and groun d water resources to continually decline. Therefore, the management and protection of these resources is and should be one of major importance. All citizens in the State of Georgia are stakeholders in what affects water quality and they are also the causes of and preventers of pollutants entering the streams, wetlands and estuaries of Georgia.

Action

To assist the citizens of Georgia in the causes of pollution and effects on water quality, an overall water quality program has been developed and continues to expand. Some initial parts of the program consist of working with the school system to promote water quality through presentations and hands-on instruction with monitoring kits. Others segments of the program involves the instant on-farm monitoring of streams, and assisting in the coordination of a yearly summit for a South Central Georgia watershed protection organization (Upper Suwannee River Watershed Initiative, USRWI) along with additional workshops sponsored by the USWRI.
A water quality newsletter, "The Water Drop", is published quarterly for all County Extension Agents and other interested persons.

Outcome
Educating today's youth will impact the future through more informed future citizens. By allowing the youth to experience hands-on monitoring of water quality, they better understand where pollution originates and how it can impact our water resources. The same type of education and hands-on monitoring with farmers provides instant feedback to determine what water quality problems are present and how these can be corrected through additional BMPs or the incorporation of BMPs. The association with USRWI provides impacts through the continual education of how activities of citizens, governments, and industries impacts the quality of the water that is shared by all in the watershed and downstream of the watershed.
"The Water Drop" provides various information to keep the agents and others informed in current and future water issues.

Resources
Education of the youth and farmers involves monitoring equipment that is currently available. Funds for the USWRI water summit were made available through registration fees and grant funds from two South Georgia Soil and Water Conservation Districts.
"The Water Drop" is available on the web at http://www.cpes.peachnet.edu/webfiles/gh-web/WQNewsletter.

Performance Goal 4-3 (1862)
Issue Statement
To be sustainable, agriculture must be both economically and environmentally sound and socially acceptable. Extension and other agricultural professionals that work with farmers need an understanding of the principles of sustainable agriculture and need tools to carry these messages to farmers and the local community. Sustainable agriculture encompasses value added enterprises, water quality, profitability, and community development.

Action
As part of the southern region Sustainable Agriculture Research and Education Professional Development Program (SARE-PDP), we have developed a Georgia Sustainable Agriculture Advisory committee which includes representation from research and extension, farmers, other agricultural organizations, and non-government organizations. This group has developed a strategic plan and is

working to implement this plan through annual activities that include newsletters and publications, workshops, field days, web delivery of programs, and farm tours.

Outcome

In the last year, more than 450 contact hours of training on sustainable agriculture topic areas were delivered to agricultural professionals. In addition, more than 350 individuals attended Small and Beginning farmer workshops to learn about sustainable enterprises that could be added to their operations with greater than 50% of them indicating that they would definitely change some part of their farming operation based on what they learned at these workshops. In addition, county extension agents and other professionals have access to more than 150 publications and 1,500 research and extension projects that have been funded through the SARE program at a State and National level.

Resources

The sustainable agriculture program is administered using 1 FTE of staff time from the University of Georgia and Fort Valley State University. In addition, the SARE program allocates $10,000 per year directly to the SARE-PDP program and funds numerous other research and extension projects in the State. The program is highly dependent on volunteers which contributed approximately 250 hours to the program.

Performance Goals 4-2

Issue Statement

The required amount of water in poultry processing results in the treatment and discharge of a significant volume of waste water. This waste water must meet EPA requirements for discharge and may result in significant costs to the poultry industry to remain in compliance.

Action

A research and processor training program has been initiated to characterize the particle size and screening methods needed to reduce the waste discharged to the Dissolved Air Flotation treatment tanks at poultry processing plants. Assistance has been provided to six processors to assess their waste discharge systems.

Outcome

Reduction of 20 percent of the COD and total solids may be achieved by screening procedures to remove suspended solids prior to treatment. This simple procedure has resulted in significant savings to processors, estimated to be over $100,000 per year.

Resources

This study was funded by a U.S. Poultry and Egg grant and Georgia poultry processors.

Performance Goal 4-3 (1862)

Issue Statement

Agricultural water use is based on knowing "when" crops need water and knowing "how much" water to apply. Irrigation scheduling has been an essential component in crop production systems. With over 1.6

million acres of irrigated cropland in Georgia, the need to apply water effectively and efficiently is essential. Technologies have been available for many years to help farmers in their irrigation scheduling activities. However, many farmers still do not schedule irrigations effectively (difficulty in maintaining records or instrumentation, or limited time to manage water). The need for a reliable, effective, and simple irrigation scheduling approach has potential for benefit, especially to farmers who are not currently using any irrigation scheduling approach.

Action

A combined research/extension program was implemented to develop irrigation scheduling technology that was simple to build/install (parts needed to be available locally), understand (settings would be simple), and operate (could be read from a field road). The system needed to be reliable and compare well with other appropriate irrigation scheduling approaches.

The resulting research yielded the UGA EASY Pan. This device uses the relationship between crop water use (evapotranspiration) and evaporation from a free water surface (pan). The pan is made from a washtub, has a covering screen, and a float mechanism that allows it to be read from a field road (within 30 m). The float mechanism and screen materials can be adjusted for crop and soil characteristics. Irrigation scheduling tests with peanut and cotton indicated good agreement with other traditional irrigation scheduling techniques.

Outcome

The UGA EASY pan is experiencing a wide degree of application. The operation characteristics are simple enough to allow adaptation to other crops and physiographic conditions. Farmers and county extension specialists are doing their own tests. Pans are being installed and tested across the southeast region and in other locations around the U.S..

The expectation is that the EASY pan can provide incentive to farmers to better understand their irrigation practices and use water more effectively. In addition, it should also encourage farmers to seek other model-based irrigation scheduling technologies that can provide economically-oriented recommendations (such as when to quit irrigating).

An additional impact of the project has been the startup of a local business in South Georgia to manufacture EASY pans for those who do not wish to create their own.

Resources

The development and implementation of the EASY Pan has required at least 0.3 faculty EFT for several years. In addition, at least 0.2 support EFT were used in developing and implementing the program. The Crop and Soil Sciences Department has been involved in the development aspects. Faculty involved in the program have included Kerry A. Harrison (Engineering) and James E. Hook (Crop and Soil Sciences). Support for the project has been primarily through recurring state and federal funds.

Performance Goal 4-6 (1862)

Issue Statement
Growth of Georgia's poultry industry results in more than 2 million tons of used poultry litter annually. When used appropriately, this litter has a value of $25 - $30 per ton. Poultry operations are being pressured by environmental concerns to be sure of appropriate application methods for the protection of Georgia's water. Proper utilization of dry and liquid poultry manure is critical to the future of this industry.

Action
In 2000 and 2001 a voluntary nutrient management program for poultry producers was implemented. The goals of the program were to educate all poultry producers in the state on the development and implementation of nutrient management plans and to have all producers implement the plans in conjunction with their clean out programs. Training notebooks and slide sets were developed for the presentation of the program to poultry producers in Georgia. To date, 60 training sessions involving more than 3800 (98% of producers) individuals have been conducted. It is estimated that over 50% of the producers in the state have implemented nutrient management plans. Programs will continue until 100% participation is reached.

Outcome

The development and implementation of nutient management plans on Georgia poultry farms has reduced the potential for adverse impacts on the state's waters. In addition, it has increased the average income on poultry farms utilizing these plans by $3000 - $9000 as a result of the increased awareness and nutritive value of the litter material as a fertilizer.

Resources
Faculty of the Departments of Poultry Science, Crop and Soil Science and Agricultural engineering. The Georgia Poultry Federation and the Georgia State Department of Agriculture.
Smith Lever and State funds= $285,500

Performance Goal 4-7 (1862)
Issue Statement
Animal production systems are resulting in concerns for the movement of by products into the environment.

Action
UGA Soil Scientists have undertaken research to develop methods for determining the source of a fecal contamination.

Outcome
These scientists have shown that they can reliably identify the source of a fecal contamination with "ribotyping" allowing them to track the prob lem.

Resources

Faculty and staff in the microbiology laboratory.

Performance Goal 4-7 (1862)
Issue Statement
Fertilizers are added to golf course greens on a biweekly basis during the summer. These nutrients can become a threat to surface water quality.

Action
Greenhouse and field research was conducted to determine the fate of nitrates and phosphates from fertilized sites.

Outcome
These results indicate a potential problem in leaching and emphasize the need for phosphorus and nitrogen management on golf course greens. The lowest possible rates should be used, and controlled - release sources are better choices. The use of this data for the development of BMPs for golf course management will preserve the quality of surface water f rom those land use areas.

Resources
Faculty, staff, and research facilities.

Performance Goal 4-7 (1862)
Issue Statement
Pesticides used on turf often are detected in waterways receiving drainage from urban and suburban environments.

Action
Research was conducted to validate computer models for predicting the concentrations of pesticides in surface water originating from urban and suburban environments.

Outcome
The results of this work will form the basis by which pesticides used on turf in the U.S. wil l be evaluated by EPA.

Resources
Faculty, Staff, and research facilities.

Performance Goal 4-7 (1862)
Issue Statement
The Fort Valley State University has been studying the effects of tillage (no -till, strip till, and chisel till), cover crops (rye, hairy vetch, rye/hairy vetch mixture, and none), and nitrogen fertilization rates (0, 53, and 106 lb N/acre) on soil carbon and nitrogen levels and cotton and sorghum yields. The objective was

to obtain a best management practice that can sustain cotton and sorghum yields, sequester atmospheric carbon and nitrogen in the soil, improve soil quality and productivity, and reduce the rate of nitrogen fertilization for improving groundwater quality.

Action

In 2000, cotton was planted and in 2001, sorghum was planted in the plots. Before these crops were planted, cover crops were planted in the fall and killed in the following spring. Their aboveground biomass sample was collected for determining carbon and nitrogen accumulation. Furthermore, soil samples from 0 to 48 in depth were collected for determining root biomass and carbon and nitrogen concentrations in roots and soils. After cotton and sorghum were harvested in the fall, their yield and biomass were determined and analyzed for carbon and nitrogen concentrations. Soil samples from 0 to 48 in depth were again collected to determine cotton and sorghum root biomass and carbon and nitrogen concentrations in the roots and soils.

Outcome

Biomass yield of cover crops and cotton and lint yields were described in the annual report of 1999-2000. Sorghum yield and dry matter weight in 2000-2001 are being analyzed. Root samples of cotton and sorghum, biomass sample of cover crops and their roots, carbon and nitrogen concentration in the soil samples collected in the spring and fall are being analyzed. Sorghum yield, carbon and nitrogen accumulation in above and belowground biomass of sorghum and cover crops, and carbon and nitrogen concentrations will be reported as analysis are completed.

Resources

The study was conducted in the Fort Valley State University Agricultural Research Station Farm. Facilities regarding land, equipments, headhouse, greenhouse, and laboratory were used for the study.

Performance Goal 4-9 (1862)

Issue Statement

Agricultural water use remains as one of the largest "unknowns" in Georgia as it relates to current and future water planning. Agricultural water users, who can pump at least 100,000 gallons per day, are not required to report their water use. The continued drought has ascerbated the problem, because state-wide restrictions have been implemented to reduce water use, but limited emphasis has been directed toward agriculture. Without improved understanding of agricultural water use, the ability to manage this limited resource is questionable.

The effects of ground water withdrawals on flows within the Flint River is being studied and modeled through a cooperative program with the U.S. and Georgia Geological Survey. Sufficient data is not currently available to fully understand the impacts of agricultural withdrawals on flows in the Flint River due to the extensive spring network along the river.

Action

The University of Georgia embarked on combined research/extension program called "Ag. Water Pumping". This program is designed to monitor at least 2% of the 21,000 permitted agricultural

withdrawals in the state. Using a volunteer approach, field personnel installed monitoring instrumentation and are monitoring agricultural water use across the state. The program is designed to maintain good representation of the withdrawals, crops, and locations across the state.
A separate monitoring program was implemented to better understand ground water withdrawals within the lower Flint River basin. Over 185 additional monitoring sites have been installed that will allow automated collection of pumping data.

In addition to the above, a separate effort is underway to "project" water use for the remaining 98% of the agricultural withdrawals, and for animal water use. This modeling program is anticipated to take into account weather, limitations on water supplies, and other extraneous factors that influence how much water a farmer might use. Understanding the total irrigated area in the state is also a fundamental need that is still being addressed through cooperative programs.

Outcome
The year 2001 was the first complete year of agricultural water monitoring for the Ag. Water Pumping Program. This program is providing the only real data on agricultural water use across the state. Individual reports are being used by farmers for their management, while consolidated reports are being used by different groups in planning water use both now and into the future.

Resources
The combined agricultural water use programs involve several state and federally supported projects (over $500,000) per year. The multi-disciplinary program also includes participation by scientists and specialists in Crop and Soil Sciences and Animal and Dairy Sciences. The primary Ag. Water Use Team includes at least 3.5 EFT of faculty time (includes post-doctoral associates) and 5.0 EFT of support personnel. Faculty team leadership includes James E. Hook, Kerry A. Harrison, Gerrit Hoogenboom, and William I. Segars. County-based extension personnel have been essential in helping implement the monitoring programs.

Additional cooperation has occurred with the Joseph W. Jones Ecological Research Center, the Georgia Geologic Survey and USGS.

<u>Performance Goal 4-9 (1862)</u>
Issue Statement
Drought conditions continue to wreck havoc across the United States. Water supplies remain in jeopardy while water needs increase, even in humid areas like Georgia. Recently implemented water use restrictions have directly targeted outside water use, including irrigation of landscapes. Considering the multi-billion $ landscape industry, alternatives to "shutting off water completely" need to be explored. Landscape irrigation is easy to neglect and ignore. Significant new approaches are needed to maintain the quality of landscapes while saving water.

Action
The University of Georgia, Biological and Agricultural Engineering Program, in cooperation with county

extension specialists, embarked on a pilot study to explore the potential of a "mobile landscape auditing program". This program would be designed to go into a community or town where water supply conditions are limited. Strategic direct audits of landscape irrigation used at homes, municipal buildings, schools, etc. would provide a cross-section of the systems and practices used, with potential for water savings.

Outcome
Preliminary results of the pilot study indicate the potential for significant water savings. In addition, the community based report being developed will provide alternatives for price restructuring to maintain water supply income in the face of water use reductions. Alternatives are available to "reduce" water consumption in landscape systems. The development of appropriate incentive programs to encourage water conservation are also being provided. The best approach for different communities will be based on their interest and how far they wish to work with the citizens.

Resources
This project was implemented with limited additional outside funding (programmer support for a new uniformity analysis program that can work with landscape and agricultural irrigation analysis). At least 0.5 EFT of faculty time, and 0.5 EFT of support time is currently associated with this project. Additional faculty cooperators included Dr. Daniel Thomas, Bio. & Ag. Engineering, and Rick Reed, Coffee County Extension Coordinator.

Performance Goal 4-9 (1862)
Issue Statement
Water quality and quantity problems are of global concern. Turfgrass managers worldwide must look for alternative water resources combined with water conservation principles.

Action
Developed a turf grass breeding program to develop cultivars that conserve water and reduce impacts on water quality.

Outcome
Scientists developed the first drought and heat tolerant tall fescu e and a new salt-tolerant turf species, Seashore Paspalum. Seashore paspalum can withstand any source of alternative irrigation water up to and including short-term use of ocean water and most sources of effluent. Its drought tolerance could mean a 50% reduction in water use on turf compared to other warm season grasses.

Resources
Faculty, staff and facilities

Performance Goal 4-9 (1862)
Issue Statement
Cattle with access to unfenced streams can contaminate stream water with nutrients, sediments, and

pathogens and as a result the streams become impaired.

Action
Research was conducted to determine the impact of cattle on unfenced streams using Global Positioning System collars.

Outcome
Cattle spend up to 11% of their time within 30 ft of the stream center. Shade located near the stream resulted in increased animal time in the stream. This data will be of value in developing the TMDL for impaired streams.

Resources
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Performance Goal 4-11 (1862)
Issue Statement
Current economic conditions mean farmers are looking for ways to cut costs. Low cost fertilizers and soil amendments from agricultural, municipal and industrial by -products are one way to help improve profitability. In addition, society is look ing for ways to reduce the need for landfill space and the associated costs of building new landfills.

Action
The Land Application Program works with farmers using agricultural, municipal and industrial wastes to ensure these are used in ways that are agronomically effective for the farmer and safe for the environment. The use of these wastes can provide low cost inputs for farmers and reduce the need for landfill space for society; however, the wastes must be used properly to ensure environmental safety.

Outcome
The program has made presentations on various aspects of proper land application to over 500 people in the past two years and responded to over 80 requests for technical assistance. Highlights of the program include:

○ An applied research project to evaluate the metals concentrations in soils and forage from fields with long-term use of municipal biosolids. This project was able to reassure as many as 50 cattle producers using biosolids as a pasture and hay fertilizer that the practice was safe. It is estimated that farmers in the program can save up to $100 per in fertilizer and lime costs.

○ An evaluation of a textile sludge as a pasture low -phosphorus fertilizer. Field trials indicated the sludge was effective in growing good quality forage. Thi s may provide an alternative low cost fertilizer for producers in the area whose soils are high in phosphorus due to the use of poultry litter. The project may also provide a lower cost alternative for disposal of the sludge for the company, helping keep n eeded

jobs in this rural area.

○ Evaluation of both the environmental effects and agronomic effectiveness of various poultry litters. The combination of environmental and production data has been effective in helping producers understand the importance of using the poultry litter resource wisely.

Resources

This program uses 1 FTE of state staff and $57,000 funded through several grants over the past two years. The program is primarily funded as part of the Agricultural Pollution Prevention Program funded by the Pollution Prevention Assistance Division of the Georgia Department of Natural Resources.

Performance Goal 4-11 (1862)

Issue Statement

High levels of phosphorus in surface runoff water can lead to high levels of plant nutrients and fertilizers in our state's lakes. To help prevent this, grasslands and cultivated fields should be monitored for high levels of phosphorus.

Action

UGA researchers teamed with their counterparts at USDA to develop a phosphorus index, which estimates the risk of phosphorus by considering the sources and the modes of transportation.

Outcome

The researchers are now training Extension Service agents in the state on how to use the new Georgia Phosphorus index. The use of this index will reduce the potential for high levels of p hosphorus to be transported to streams.

Resources

Faculty, staff, and facilities.

Performance Goal 4-11 (1862)

Issue Statement

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Outcome

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Resources
Faculty, staff, and facilities.
Performance Goal 4-11 (1862)
Issue Statement
Dairying represents a significant, value-added component of the southern agricultural economy (more than $2.9 billion in yearly farm sales). However, the region's estimated 1.7 million dairy cattle excrete more than 30 billion kilograms of waste per year. The management of this, and other, animal manures can cause significant problems.

Action
Both plot and field scale research trials to evaluate the production of three forage crops per year, grown on the same land to investigate feed production, economic, and environmental effects of manure fertilization, compared with commercial fertilizer, under intensive managem ent.

Outcome
Over all crops, forage quality was higher for the sequence including two corn silage harvests, but nutrient losses to the environment have been minimized under the sequence including bermudagrass. The sequence including bermudagrass also produced greater economic returns, primarily a result of lower input costs. As a result of this project, several thousand acres of land under dairy manure irrigation in Georgia and surrounding states is now managed using cropping systems that include planting corn for silage in a bermudagrass sod, followed by overseeding a winter crop, allowing dairies to produce more feed for their cows while protecting the environment.

Resources
The study was conducted if cooperation with G.J. Gascho, UGA Crop and Soils Dept.; George Vellidis, UGA Biological and agricultural Engineering Dept.; John Allison, UGA Agricultural and Consumer Economics Dept., and Robert Hubbard, Roger Gates, and Richard Lowrance, USDA-ARS. I have no legal authority to commit any departmental resour ces or spend any departmental funds regardless of where they came from or how they got to the department.

Performance Goal 4-11 (1862)
Issue Statement
Overland flow of fish production pond water through vegetated filters, primarily grass, has been shown to be effective in removing particulates and reducing nutrient levels before the water is reused or released. There is current interest in the production of saltwater shrimp at inland sites in the state. Renovating saltwater with vegetated filters be fore reuse, if possible, could improve the potential for inland shrimp production.

Action
Salt was applied to bermuda grass plots at levels to simulate no saltwater or the addition of either brackish water or saltwater at lower levels weekly or massive quantities once per year. This procedure

simulated maximum penetration of salt since all the salt went onto the plots as opposed to much of it exiting with the collected runoff, as would be the case in actual practice.

Outcome
Bermuda grass yields increased at least slightly in response to all salt additions, no plant stress was obvious visually, and grass composition was not consistently affected. It appears that overland flow through grass filters could provide an economical means of renovating saltwater s hrimp pond water, and that such filters should function for many years without harming the grass.

Resources
The study was conducted if cooperation with G.J. Gascho, UGA Crop and Soils Dept.; R.N. Gates, USDA-ARS; and G.J. Burtle, UGA Animal and Dairy Science Dept. I have no legal authority to commit any departmental resources or spend any departmental funds regardless of where they came from or how they got to the department.

Performance Goal 4-11(1862)
Issue Statement
Manure management is a major problem for poultry producers. Concerns include odors, transportation costs and nutrient pollution related issues.

Action
Research with the larval stages of the black soldier fly have shown that manure volume, and nutrient levels in poultry manure can be reduced significantly by BSF larvae. Harvested larvae can serve as a significant source of protein and fat for the formulation of animal feeds.

Outcome
Value added potential for the GA layer industry could amount to more than $6 million annually. In addition manure volumes can be reduced by 40% and nutrient levels significantly reduced.

Resources
Collaborators include three faculty members.

Performance Goal 4-15(1890)
Issue Statement
Established and emerging markets interested in environmentally friendly produc tion systems that produce value added vegetables will sale these commodities at higher prices compared to conventionally produced vegetables. Developing alternate cultural practices would enhance Georgia's agricultural industry by reducing initial high inv estment and commercial nitrogen use. In turn, Georgia farmers would improve their income, better protect the environment, and insure farm land usage now and for the future.

Action
In the 2000 growing season a vegetable rotation study was initiated with findings that indicated that

legume cover crops can be an effective N source in supporting plant growth and yield of eggplant while enhancing gas exchange similarly to commercial N ra tes. The following winter - spring fertility treatments were: 1) 0 N winter-0 N spring, 2) 0 N winter-84 kg N/ha spring, 3) 0 N winter-168 kg N/ha spring, 4) 0 N winter+abruzzi rye-0 N spring, 5) 0 N winter+hairy vetch-0 N spring, and 6) 0 N winter+crimson clover-0 N spring. In 2001 bell pepper was grown after cover was incorporated in spring. The effect of cover crops on bell pepper yield, vegetative dry matter and net photosynthesis (Pn) were compared with synthetic N rates. The highest vegetative dry matte r (79.8 g/plant) and total yield (34.2 Mg/ha) was produced by hairy vetch and lowest (22.8 g/plt and 6.3 Mg/ha, respectively) by abruzzi rye, while total yield for full and half N treatments were 30.1 and 28.8 Mg/ha, respectively. We planted cover crops again in 2001 fall to continue this study.

Outcome

The outcome of this study indicate that leguminous cover crops are an effective N source in supporting plant dry matter, total yield and net photosynthesis of bell pepper. Information from this program ha ve been disseminated at an Agricultural Showcase, Expositions, National and International conventions, and publications in peer review journals. Future evaluation is ongoing for appropriate evaluation to suitably impact Georgia farmers.

Resources

Agricultural Research farm greenhouse, land, equipment, and personnel.

## Goal 5: Enhanced economic opportunities and quality of life for Americans

Performance Goal 5-1 (1862)

Issue Statement

During the 12-month period ending Sept. 30, 2001, 1 of every 43 households filed for bankruptcy in Georgia. Georgia ranks the third highest in bankruptcy cases in the nation (American Bankruptcy Institute). The personal saving-rate for the United States is at the lowest level in history, suggesting that Georgians and other citizens are not saving adequately for future needs.

Families need to know how to plan their finances, cope with lack of adequate income effectively, control cash flow, manage credit and debt wisely, insure ad equately, contribute to savings/investments regularly, pay necessary taxes but no more, prepare to retire at current living level, and pass assets to heirs. Limited resource families, particularly, are faced with economic uncertainty, and it is often diffi cult for these families and individuals to make wise consumer choices in the marketplace and meet basic needs

Action

- More than 170 financial management educational programs were held in 2001.
- More than 9,500 hours of financial management education wer e provided to nearly 3,000 Georgians; Thirty-one percent of these participants were low-income.
- Almost 950 professionals, educators, and volunteers received training in money management designed to increase their competence in teaching and advising their low-income clientele.
- Media were a major strategy for public financial management education; articles in newsletters reached more than 30,000 people; radio spots were broadcast to a listening audience of more than one million and newspaper columns went to a circulation of almost 784,000; television programs were broadcast to more than 622,000 viewers.

Outcome

- Participating trainers significantly increased their comfort and confidence levels of teaching money management. Each of these trainers reached about 20 low-income clients per month.
- Nearly 85% of participants said that they were confident about teaching money management and answering related questions after the training.
- Nearly 75% of participants learned to reduce spending when money is in short supply.
- Nearly 79% of participants learned to compare prices and quality when they make decisions for major purchases.
- Almost 80% of participants indicated that they are going to establish at least one financial goal for the next month.

Resources

Smith-Lever, State and Local Funds.

Performance Goal 5-2 (1890)

Issue Statement

There are internal and external social problems impacting families, individuals and communities. Some of these problems are centered around ineffective parenting, communication skills and family life. Parents need to learn how to openly and effectively communicate and share values, attitudes, and knowledge with their children. Society inc reasingly recognizes the critical importance of effective parenting and communication. Unemployment, mobility, divorce, and absent parents, along with related social conditions, combine to aggravate parent-child relations. Adults play critical roles in the physical, emotional and mental development of children. Increasing numbers of youth are growing up without the basic types of support necessary to become capable and responsible adults. This support takes many different forms, including nurturing parentin g, positive school experiences, supportive communities and opportunities to explore career and life options. Extension provides a unique approach to supporting youth and families at-risk through an overall positive youth development focus.

Action

A Family Development/Life Program to address teen pregnancy prevention
youth taking charge), parent education and basic skills was implemented.
Major components of the programs are curriculums and resources that were
adopted from and supplied by both 1862 and 1890 institutions with similar
outreach programs, such as the University of Arkansas at Pine Bluff, Washington State University and Oregon State University. Additional support curriculums and educational resources were purchased.

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Resources

USDA-CSREES 1890 Funds; national, regional, statewide and local groups
and organizations.

Performance Goal 5-2 (1862)

Issue Statement

Self-management skills are the foundation of employee marketability. They begin with setting personal goals which include the enhancement of one's appearance and health. Appropriate work apparel, grooming and hygiene, proper diet and exercise practices all contribute. While initial goals are being

determined and achieved, progress can be made toward developing skills needed to competitively interview for and hold a job.

In Georgia, more than one million persons live below the level of poverty. According to Georgia DHR, 123,671 Georgians received TANF in 2001. Georgia ranked 23rd in the U.S. in per capita income for 1999 at $27,324 and has a higher poverty rate for both individuals (14.7%) and children (22.8%) than the U.S. overall (Source: U.S. Census).

Action

- More than 8,600 hours of work force preparedness education were provided to nearly 4,000 Georgians. Approximately 31% of the participants were low-income or at risk audiences.
- Extension provided life skills education in almost 130 programs.
- The Empowerment for Change program was provided to 35 TANF female recipients in Clayton County.
- Twenty-one Welcome to the State of Poverty simulation workshops were offered, reaching more than 730 community leaders, and decision makers to educate them on issues and problems associated with limited income families.
- Provided work force preparedness education by media to thousands of Georgians; related articles in newsletters reached over 5,700 people; radio spots were broadcast to a listening audience of over 60,000 people; newspaper columns went to a circulation of almost 96,000 and television programs were targeted to almost 12,000 people.

Outcome

- More than 96% of the community leaders and decision makers participating in the poverty simulation workshop felt they had a better understanding of some of the obstacles faced by poverty-level families after the simulation and almost 75% felt more able to develop community plans of action. For instance, after participating in the program, a teacher said that "I think I will look into finding a more flexible way to conduct parent/teacher conferences - it looks like transportation and child care could be a real problem in our community. We could have parent teacher conferences at a community center in the neighborhoods."
- Almost everyone in Empowerment for Change extension program developed job search skills and 46% of them were able to find jobs with an average wage of $8.00/hour.

Resources

Smith-Lever, State, and Local funds.

<u>Performance Goal 5-3 (1862)</u>

Issue Statement

Georgia's senior adult population will nearly triple by the year 2025, with the largest rate of increase among those over 85 years of age (US Census population projections). Many seniors will remain healthy and vital to much older ages resulting in opportunities for volunteering, nontraditional jobs and recreation; there will also be increased demand for specialized services in housing, education, health and nutrition. Seniors are seeking to remain independent as long as possible and frequently choose personal care

homes for assisted living as it becomes necessary.

Action

- Provided more than 20,000 hours of food safety, housing, financial management, and diabetic education for the changing needs of seniors to more than 17,000 senior Georgians.
- Provided more than 3,800 hours of diabetes education to more than 3,000 seniors.
- Provided almost 1,100 hours of DHR certification required continuing education to more than 600 personal care home providers, seeking to insure improved safety and quality of life for residents.

Outcome

- Nearly 63% of the participants indicated that they intend to adopt a regular exercise schedule.
- Senior Georgians who participated in diabetes education programs significantly developed their knowledge about healthy dietary habits.
- Follow up clinical an d medical data showed that participants significantly reduced their body weight.

Resources

Smith-Lever, State, and Local funds.

Performance Goal 5-4 (1862)

Issue Statement

Child care is the third highest household expense for most families of young child ren (after shelter and food). According to DHR, the cost of care ranges from $68 to more than $100 per week per child. Child care that is affordable, accessible, and of high quality is not available to many Georgia parents needing it. Most child care in Georgia and nationwide is only of marginal or poor quality. High staff turnover, poor quality environments, and lack of training and experience in child care staff contribute to low quality care. According to the Center for the Child Care Workforce, the average hourly wage of a Family child care provider, a Child care worker, and a pre school teacher is respectively $4.82, $7.42, and $9.43. Many parents seek the least expensive source of care, not understanding the benefits of high-quality early care and education.

Action

○ Extension is one of the largest single sources of the required community-based education for Georgia child care providers. Extension provided nearly 41,200 educational contact hours to more than 15,775 child care providers in 2001. Extension provides this training at approximately 1/4th the cost of utilizing consultants and other agencies.

○ Over 85 child care providers received over 170 hours of training through child care self-study courses.

○ Media efforts have been undertaken to increase awareness: Newsletter articles have reached more than 1,200 clients; radio spots have been broadcast to a listening audience of 120,000; newspaper columns have gone to a circulation of almost 171,500, and television has targeted 60,000 viewers.

○ Nearly 8,000 Early Brain Development fact sheets and other publications have been distributed.

○ Extension collaborated with numerous other organizations, including child care resources and referral agencies, technical agencies, and the Advancing Careers through Education and Training initiative to ensure that high-quality community-based training is available for child care providers.

○ Extension was a partner in grant projects to support professional development for child care providers.

Outcome

○ Nearly 98% of child care providers who participated in the Child Care Reading program improved their knowledge in reading with children. Most of them indicated that they intend to adopt effective reading practices such as reading aloud to children everyday and choosing age appropriate books for children.

○ Over 90% of the child care providers who participated in the Dare to be Messy training program indicated that they intend to adopt appropriate child development activities such as regular use of different sensory materials and allowing children to use their imagination.

○ Nearly 92% of the child care providers who participated in the Early Brain Development program improved their knowledge.

○ After participating in the Early Brain Development program, child care providers made a commitment to adopt selected practices to enhance early brain development. More than 86% of child care providers planned to expose children to a foreign language.

Resources

Smith-Lever, State, and Local funds.

Performance Goal 5-5 (1862)

Issue Statement

Youth want and need to be engaged members of their communities. Through planning, implementing and participation in citizenship programs, youth gain skills valuable life skills including team work, cooperation, and management skills. Additionally, self esteem is increased through participation in service projects. These skills are in addition to the actual needs of a community being met.

Action

Programs planned on the county, district and state level have provided youth with skills necessary for developing and implementing projects. Additionally, recognition opportunities have been provided for 4-H'ers to receive tangible rewards for their efforts.

State 4-H Council, planned and implemented by a youth-adult team, led participants through activities of exploration in critical community issues and solution development. Centennial Conversations empowered more than 900 youth during Fall Forum in a statewide conversation concerning youth community issues. A Georgia team continued the process with participation in the National Conversation. Through the National Conversations Power of YOUth pledge campaign, youth have pledged hours of service to their communities.

Recognition for youth is provided through the Teen Leader Recognition Program. With youth completing

service projects in areas of youth at risk, agricultural awareness, environmental sciences and other community needs.

Outcome
At the county level, service projects are conducted as a component of the local club. More than 1200 projects were conducted on the local level by youth and volunteers in 4-H programs.

State 4-H Council: Come Together provided educational sessions for 500 youth from 139 counties. Each team created a solution and depicted that plan of action with Lego features. Additionally, the program included a panel presentation with leading educators in the fields of character, youth at risk, the environment, gerantology and kids and voting. Following the program, delegates sited the experience as an opportunity to feel able to make a difference.

The Centennial Conversations program fed Georgia grassroots data into a national system of issues for youth. This identification became a national plan for action presented to President George Bush. More 44,000 hours of service have been pledged as a part of the Power of YOUth program
More than 450 Georgia young people have moved through the demanding requirements of the 4-H Teen Leader program, designed to motivate youths to get involved in their communities as leaders. The teens accept increasing responsibility in each of the three levels of participation. The result? More than 500 community service projects, including 175 projects with at-risk youths, the elderly or people with disabilities and 153 special interest clubs organized for 4-H'ers. One successful graduate says the Teen Leader program let him "live the 4-H pledge of commitment to club, community, country and world."

Resources
35 Extension Agents dedicated an average of 35 hours to State 4-H Council. An additional 45 adults volunteers leaders also dedicated an average of 30 hours to the event. Finally, eight state 4-H faculty members dedicated an average of 55 hours to the event. The total hours involved were 3840 hours.

The State 4-H Centennial Conversations involved 35 agents, 65 volunteers and eight faulty members for a total of 2104. User fees and donor dollars accounted for the $45,000. The national component of the process involved another 13 individuals dedicating approximately 85 hours each.

Performance Goal 5-6 (1862)
Issue Statement
Performing arts is an area that youth have an intense interest in and often do not have the forum or support or present their talents. The stages and opportunities in many cases are available on a limited basis and often targeting high school youth. Research indicates that performance opportunities can enhance self esteem.

Action

4H Youth as part of the Cooperative Extension Service provided performing arts opportunities at the elementary middle and high schools at the local, district and state level. These included project achievement in the arts areas, a state wide performing arts group, and talent reviews at public forums.

Outcome
There were 541 young people involved in the performing Arts contest and programs held in conjunction with project achievement. 35 young people participated in the state wide performing arts group. The audience response to the state wide group has been enthusiastic. In addition to performing at-large state venues the group has been invited to two national forums. When asked to describe their experiences, 95% of the youth involved in the project expressed a sens of growth in their skills as an entertainer. More than 87% expressed that the involved in the project enhanced their sense of self esteem.

Resources
78 County Extension Agents allocated an average of eight hours to the project. 160 hours of state level specialists time was dedicated to the project. Awards and recognition resources were provided by the Georgia 4-h Foundation totaling more than $6000.

Performance Goal 5-6 (1862)
Issue Statement
Employers of young professionals have expressed a concern over the lack of effective communication skills often found in new employees. Further indicative of poor communication skills are the low verbal scores reported as the average in our state.

Action
4H Youth as part of the Cooperative Extension Service provided local workshops in the area of public speaking, oral presentations, portfolio preparation and organizing public presentations. To validate the effectiveness of these workshops, area contest were scheduled in 18 locations across th state 9,200 youth participated in area and district contest where communication skills were evaluated.
A Statewide issues speech contest was scheduled that would allow youth to research prepare a public speech and present the talk in a public forum to a statewide audience.

Outcome
9,200 youth participated in area and distrct contest where communication skills were evaluated. Evaluators scores for the young peoples presentations scored an average of greater than the 90$^{th}$ percentile range in the communication area.

The State wide issue speech contest generated visibility for the 4-H Public Speaking Program involved more than 30 youth.

Resources
117 County Extension Agents allocated an average of 120 hours to the project. 460 hours of state level

specialists time was dedicated to the project. Awards and recognition resources were provided by the Georgia 4-h Foundation totaling more than $92,000.

Performance Goal 5-7 (1862)

Issue Statement

Increasing numbers of youth are growing up without the basic types of support necessary to become capable and responsible adults. This support takes many different forms, including nurturing parenting, positive school experiences, supportive communities and opportunities to explore career and life options. Extension provides a unique approach to supporting youth and f amilies at-risk through an overall positive youth development focus, in addition to targeting specific at-risk groups and behaviors.

Action

○ In Georgia, three community-based CYFAR projects provided focused intervention for three different groups of at-risk children, youth, and their families. The Building Academic and Social Skills (B.A.S.S.) program, in rural Bulloch County, provided after-school care and enrichment activities designed to strengthen academic success and social skills in elementary-age children living in an isolated community in southeast Georgia. The B.A.S.S. project also strived to support the Eldora community by providing information, learning opportunities, and activities for community members. The Learning for success program, in Cobb County, supports the academic growth of elementary-school children at risk of school failure through one-on-one tutoring, enrichment activities, parent education, and encouraging parent involvement in children's learning.

The Youth Collaboration Project (YCP) at Moody Air Force Base implemented to build developmental assets in pre-teens and teens and to increase parental involvement in youth programs through life skills education, enrichment programs, 4-H programs, and Boys/Girls Clubs. Youth in the YCP are children of active-duty, civilian D.O.D., and retired military personnel at Moody Air Force Base.

○ More than 50% of all Family and Consumer Sciences educational programs in 2001 were conducted with audiences estimated to be at risk (low-income, illegal activity, or lack of school success).

Outcome

○ In Bulloch County, participating children increased their social skills and decreased problem behaviors. The parents agreed that their children significantly improved social skills includin g responsibility and social control. Stanford Achievement Test data indicate that participating children developed their math, reading, and language art skills more than those of nonparticipating children.

○ According to report cards, participating children in the Learning for Success program in Cobb County significantly improved their math, science, and health knowledge and skill.

○ At Moody Air Force Base, dependent children of armed forces personnel developed positive decision-making and conflict resolution skills.

Resources

Smith-Lever, State and USDA (CSREES) $195,550.

Performance Goal 5-8 (1862)

Issue Statement

Development of leadership skills continues to serve as a cornerstone of the 4-H educational program. Through the mission of assisting youth in acquiring knowledge, developing lifeskills and forming attitudes, 4-H program activities strive to not only teach leadership but also provide opportunities for youth to put these skills into practice.

Action

Statewide leadership training programs include:

Georgia Youth Summit, held in cooperation with the Georgia Rural Development Council, brought teams of youth and adults together for training in partnerships, leaderships and community building. Each county team planned a local leadership project to enact back home.

Georgia Officer Training for state & district officers offering a weeklong training course in teamwork, leadership, developing programs, donor relations, time management, peer support and ot her issues.

Certified Teen Leader Training - All a'Bout Camp providing 11th grade youth with in depth training in the areas of team work, serving as a teen leader, camp promotion and mentoring skills.

4-H Counselor Training offering nearly 100 hours of tra ining including job specific skills, first aid, mentoring, building relationships and partnerships, leadership with campers, ages and stages.

County officer trainings and teen leadership programs are also offered on the county levels providing youth with local training.

Outcome

The Georgia Youth Summit served as a model for the National 4-H Centennial Conversations. Surveying 3999 youth in middle schools from all over Georgia, the Summit provided a voice for youth to be heard. In turn, 871 youth and adults worked in teams during the Summit's training and program building activities. The follow up activities empowered youth to lead others in making their best better in their home communities.

Georgia Officer Training provided training for 49 district and state officers. The skills developed in the training program are practiced during more than 36 district and statewide events.

35 youth completed the Certified Teen Leader All a'Bout Camp program with 28 of them working in the summer camping program. Their service at four of Georgia's five 4-H camps enhanced the camping program for more than 9,000 youth in the summer camping program. The potential for long-term impact is great as ABC's work in teen leadership settings in their communities.

85 college aged youth participate in the nearly 100 hours of training for camp counselors and in turn work throughout the summer in the camping program at 5 4-H centers. Their work with 9000 youth enables each to practice and develop the skills taught during the training sessions.

Resources
The Georgia Youth Summit involved 5 faculty members dedicating an average of 50 hours time to the project. A project coordinator dedicated .85 FTE to the project. Resources in the form of participants scholarships totaled $57,000.

All About Camp Program involved 7 extension staff members and one volunteer dedicating 312 hours. Each if the program participants paid a $25 registration fee for a total of $775. $800 additional dollars were provided by sponsors. Te regular counselor training program involves one FTE and several volunteers.

Georgia Officer Training: 29 staff members dedicated an average of 52 hours each to the program. The group contributed 1208 hours to the training sessions.

Performance Goal 5-8 (1890)
Issue Statement
Increasing numbers of youth are growing up without the basic types of support necessary to become capable and responsible adults. This support takes many different forms, including nurturing parenti ng, positive school experience, supportive communities and opportunities to explore life, careers and entrepreneurial options.

Action
Instituted a Youth Entreprenurial Program which taught students to think of entrepreneurship as a career option. Participants were enrolled in a 30 hour program learning the skills of working math and understanding Science, English and Social Studies. Parents were involved in supporting their youth in this program through information sheets for parents and a committment con tract to assist, monitor and support their youth during this program. Participants were mentored by college interns. Parent meeting and support group was established to help parents learn to talk with and establish a dialog with their youth.

Outcome
Outcome/Impact:
1. 447 youth in grades 3 - 7 learned innovative math techniques to solve mathematical problems.
2. 358 (78%) of the 447 youth gained new skills in vocabulary, word recognition and decision making.
3. Of 104 parents participating, 84 (81%) indicated they learned new stragteises for communicating with their children.
4. 447 youth learned how to open and run a business.
5. 371 (83%) of youth learned independent life skills through participating in week long residential camp. Each youth was responsible for their cabin cleaning, getting along with their cabin mate and exercising good manners and resolving conflict without arguments and/or fights.

Resources
Dollars Spent:$26,000
Cooperators: Kauffman Foundation, Center for Entreprenurial Leadership, Area Business Leaders, Peach County School System, Doughtery County Extension Service, Mayor of Fort Valley and Area Churches.

# Stakeholder Input Process

The University of Georgia College of Agricultural and Environmental Sciences' (CAES) three components are unified under one Dean. As a result advisory activities often serve for all three functions.

The various stakeholder input methods are described as follows:
The CAES Advisory Council, which includes representatives from across the state and for all programs, has 41 members which meet every 6 months to give input to the dean and Associate deans.

The Ag Leaders is a group made up of the CAES Dean, Georgia's Secretary of Agriculture, the Georgia Farm Bureau President, and other key agricultural leaders. This group meets quarterly to discuss agriculture's successes and directions .

The Ag Round table is a coalition of approximately 50 agricultural commodity groups and agribusinesses which meets quarterly with the Dean to provide discussion and input for the college.

The CAES Dean established a liaison program about five years ago. There are approximately 200 organizations/industries to which a faculty member (tenured or non -tenured) is assigned as a liaison. The faculty member may serve as a resource person, as a board member, attend board meetings or meet individually with members in order to learn what is happening in that organization/industry. The Dean meets with these liaisons once a year for a report, but also asks for input if there are important issues surfacing which need to be considered for action.

The county field staff are very active in gathering input for the college. They do this in a variety of ways: advisory committees, being active with organizations/industries in their county, one -on-one input with clientele and by monitoring phone call and office visit content for any trends. Every county is required to have a committee in place and to meet with that committee at least twice a year. The committee members are based on a matrix so that all members of the community are represented.

Each subject matter department has its own method for staying in touch with the industry with which it works. Some departments have an advisory committee, others are active in the industry's major organization and others rely on one-on-one contact with the industry's representatives.

Stakeholder input processes for The Fort Valley State University Research and Extension Programs employ diverse methodologies which allow for input from end users, including county advisory committees and individual clients, peers and other agricultural professionals, partners and cooperating agencies, including community-based organizations, and university administrators. The College of Agriculture, Home Economics and Allied is cur rently finalizing the establishment of a college -wide advisory board for teaching, research and extension programs.

Annually, county-based professionals and para-professionals complete and submit survey instruments used to measure clientele needs for pro grams and services offered at the local level by the Extension Program. Concurrently, 1890 program clients are included on county -wide advisory boards which provide for development of individual county plans of work. Evaluations of programs conducted are also used to measure value of ongoing programs.

Agricultural researchers and Extension specialists also use feedback gained from clients and others attending workshop and similar events to gather input on current and planned programs. At the same time, these agricultural professionals use peer-to-peer contacts, professional meetings, media reports and other data to gauge emerging issues and evaluate their relative value to identified needs of clientele. Active partnerships with community-based organizations also provide useful perspectives on issues and opportunities which may be integrated into research and extension programs.

University administrators also provide valuable input for program development and implementation as both research and extension programs are evaluated in terms of their relationship to the overall university mission. A major current focus is engaging the total university in the Land-Grant process.

# Program Review Process

There will be no changes in the review process for either the 1862 or 1890 institution

# Evaluation of the Success of Multi and Joint Activities
# Multi-State Extension Activities
# Integrated Research and Extension Activities

There are review comments on these three parts in the body of the Planned Programs section.