Georgia
Annual Report of Accomplishments
FY 2005

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
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The Georgia Annual Report of Accomplishment FY2005

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Signatures required on the cover page and the expenditure reports are not included in the electronic versions of this report. Signatures are on record with original report.

Introduction

The Georgia Annual Report of Accomplishments and Results for 2004-2005 represents a coordinated effort between Georgia's 1890 and 1862 institutions – Fort Valley State University and the University of Georgia, and includes singular and combined results of research and Extension units at both universities.

Within Extension, UGA and FVSU state faculty with Extension appointments coordinate efforts with UGA county faculty housed in 158 of Georgia's 159 counties. FVSU has seven county agents which are housed with UGA Extension faculty. Extension programming is delivered as individual county efforts, multi-county programming, and state-wide programming efforts.

FVSU and UGA research programs are conducted through the agricultural experiment stations system. The Georgia agricultural experiment stations consist of four major campuses located in Athens, Tifton, Griffin and Fort Valley. These four campuses are supported by research and education centers located strategically throughout the state.

Research and Extension faculty have made major accomplishments toward goals identified in the current plan of work. While reduced state funding has greatly impacted the efforts of the faculty, the organizations have been effective and productive during the past year. Many of the documented outcomes within this report demonstrated immediate and prolonged impact on the citizens of Georgia.

This report represents the Extension and research programs of both the University of Georgia and Fort Valley State University as represented in the AREERA plan of work submitted in 1999 and revised in 2003. The accomplishments are recorded according to key themes and state performance goals.

In addition to this report, hundreds of impact statements may be accessed at http://apps.caes.uga.edu/impact/. This impact database Web site contains advanced search capabilities that allow the user to sort by key words and program goals. The impact statement database contains a great deal more information than the limited summaries included in this report.

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

Even as farmland seems to shrink in favor of larger cities, agriculture remains a mainstay of Georgia's economy. In 2004, Georgia agriculture had a total farm gate value of $10,283,536,190.31, up $424 million from 2003's numbers. Although the increase in numbers was not as great as the jump of $1 billion from 2002 to 2003, it was substantial considering the gain from 2001 to 2002 was $111 million, as reported by farm gate surveys.

Of the nearly $10.3 billon in Georgia's 2004 farm gate value, poultry accounted for over 40 percent of the total. The remaining 60 percent was divided among such diverse agricultural products as cotton, nature-based tourism and barley. Georgia's top ten commodities are (in order) broilers, cotton, timber, beef, eggs, horses, peanuts, dairy, greenhouses and container nurseries, with turfgrass following closely at number 11.

As the top commodity, poultry is the centerpiece of Georgia's agricultural economy. Any improvements help the industry, especially improvements in technology and management for maximum bird growth and performance. University of Georgia researchers keep poultry producers at top performance by providing information on the latest technologies, including new tunnel ventilation and cooling systems that are especially needed in Georgia's especially warm climate; information to keep hatcheries leading national standards for egg production, fertility and hatchability; and research on the best poultry feed formulations.

The beef and dairy industries continue to see improvements. And UGA scientists continue stem cell research in relation to such diseases as Alzheimer's, Parkinson's and spinal cord injury. In June 2005, they published the first paper on the derivation of motor neurons from human embryonic stem cells and developed a drug discover assay for spinal muscular atrophy.

But one of largest research focus on animals went to goats, thanks to Fort Valley State University's extensive study on the subject. The chevon commodity grew from a farm gate value of $4.1 million in 1999 to over double that with $10.1 million in 2004. FVSU research is helping Georgia producers take advantage of the increased demand for this low-fat red meat. And although aquaculture is a relatively untapped resource, the potential for this crop's growth in Georgia is tremendous, especially if the prediction holds true that 40 percent of fish eaten in 2020 will have to come from aquaculture.

As Georgia's farm gate value continues to thrive, the state is faced with several diseases that could potentially destroy valuable crops and drive producers out of business. UGA scientists are focusing intensely on finding ways to combat Asian soybean rust, downy mildew, sudden oak death, brown rot, tomato spotted wilt virus, fungi and pests through such control methods as insecticide, fungicide, strip-till practices, testing, integrated pest

management and crop planting time variations. They are teaching farmers the best time to plant peanuts, how to test for tomato spotted wilt virus, which soybean cultivars are the most pest-resistant and why farmers should harvest cotton earlier instead of allowing it to sit in the fields while they finish digging peanuts.

Because Southern land grant universities wanted to get more out of limited resources, they formed the Southern Region Small Fruit Consortium. Through this collaborative effort, UGA researchers developed a blueberry cultivar, Palmetto, more adapted to Southern growing conditions. They've also been able to get plant growth regulator Dormex approved for use on blackberries, which will allow producers in lower south Georgia to enhance their yields.

Demand for exotic fruits continues to grow among health conscious Americans, and imported fruits command prime prices. FVSU researchers are helping Georgia producers take advantage of the boom by developing exotic fruit cultivars that will survive the state's occasionally frosty climate.

Because water continues to be an issue, UGA researchers are helping farmers conserve what little water is available through a wireless real-time smart sensor array for scheduling irrigation. The smart sensor array alerts a grower when a crop needs irrigation so the proper amount of water is provided at the proper time. And because the system uses off-the-shelf components, it keeps prices down for producers on and off the field.

As Georgia's agricultural economy continues to grow, so does its Hispanic population. Landscape companies, greenhouses and nurseries employ nearly 35,000 Hispanic employees, and UGA is leading the way through providing training, awareness and implementation of safety practices among Hispanic landscape workers through the bilingual manual, "Landscape Safety Training Manual for Hispanic Workers."

The previously-mentioned practices are several of the ways UGA and FVSU are helping to provide Georgia with an agricultural production system that is highly competitive in the global economy. This following section of Georgia's accomplishment report highlights these and other ways the state's land grant universities are impacting the quality and quantity of agriculture.

Key Themes: Agricultural competitiveness, agricultural profitability

State Performance Goal: 1-6
Poultry competitiveness

a. Georgia has over 12,000 poultry houses in operation with more being built each year. To be competitive in the U.S. poultry industry, poultry producers in Georgia must use the best available technologies and management programs for maximum bird

growth and performance. The proper operation of ventilation, cooling and brooding systems is particularly critical in Georgia due to severe summer climates.

Faculty in the departments of poultry science and biological and agricultural engineering have provided workshops and training programs for poultry company personnel and poultry farmers relative to the efficient use of ventilation and heating systems in poultry house operation. Each year two poultry house ventilation and heating workshops are held in Athens. In addition, dozens of presentations and publications are offered to industry and poultry producer meetings. A poultry ventilation newsletter is available monthly to poultry grower and industry audiences.

b. As a result of these programs, Georgia poultry producers lead the nation in the adoption of new tunnel ventilation and cooling systems. Growth rates and mortality rates for flocks grown in Georgia are at the top of the national averages, even with climate conditions more severe than many states.

c. Smith Lever, state matching funds

d. State specific

Key Theme: Agricultural competitiveness, agricultural profitability

State Performance Goal: 1-7
Poultry production

a. Each year over 1.4 billion hatching eggs are required to support the broiler industry in Georgia. It is imperative that breeder flocks and hatcheries achieve and exceed industry standards with regard to egg production, fertility and hatchability. Development and application of new management programs for breeder flocks are necessary for maintaining production performances. Hatcheries must maintain highest levels of sanitation and management to achieve maximum production of healthy day-old chicks. Poultry science faculty conduct field studies and research programs to improve breeder flock management and hatchery operation in Georgia. The results of the studies are presented to poultry audiences in workshops, seminars, publications and presentations.

b. Currently, four major research projects are being conducted in this area and have resulted in more than a dozen publications and 20 presentations to industry audiences in 2005. As a result of these programs, breeder flocks in Georgia generally exceed the national standards for egg production, fertility and hatchability levels.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Agricultural competitiveness, agricultural profitability

State Performance Goal: 1-8
Poultry profitability

a. Georgia poultry producers spend over a billion dollars a year on feed. Availability of consistently high quality feed ingredients and alternative ingredients allow producers to formulate feeds more efficiently. Since feed represents over 70 percent of the costs of producing poultry products at the farm level, producers can achieve substantial savings through effective ingredient analysis and use. Poor quality feed ingredients are less digestible and contribute to manure that must be disposed. Poultry science faculty conducts feeding trials and analysis of feed ingredients for digestibility valuations. The results are published and provided to poultry nutritionists for their use in feed formulation.

b. Hundreds of feed ingredient samples have been analyzed and evaluated for digestibility levels in the UGA Feed Service Laboratory. In addition, research projects related to the use of cotton seed meal and pearl millet as poultry feed ingredients are ongoing. As a result of these programs, U.S. poultry nutritionists are able to formulate feeds with the highest levels of performance and efficiencies found anywhere in the world. Conversion of feed nutrients to meat product for poultry is more efficient than any other domestic animal except for fish production.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Agricultural profitability, small farm viability

State Performance Goal: 1-4
Food processing wash for birds

a. Small processors of poultry, beef and hogs often do not have the financing available to incorporate an antimicrobial wash -- used on carcasses to minimize potential fecal or human pathogen contamination -- into complicated spray technology. A less expensive method of delivering an organic acid antimicrobial wash was developed and tested by Estes Reynolds at a Georgia quail processing operation and a beef and hog slaughter operation, funded by two non-assistance cooperative agreement grants from USDA/FSIS Technologies for Small and Very Small Plants program.

   Handheld pump sprayers with fan nozzles, such as can be purchased at most hardware stores, were used to spray organic acid solutions over carcasses to reduce or minimize surface microbial load. Swab tests were taken before and after spraying the solution, then again after the carcasses were chilled to determine the efficacy of

the procedures. Lactic acid and peroxyacetic acid solutions both provided reduction in pathogens, especially on enteric organisms.

b. The results of the testing and recommendations as to solution strengths to be used with various types of livestock were published in the FSIS Technologies for Small and Very Small Plants section of their Web site at www.fsis.usda.gov. A Georgia quail processor has effectively used this method of washing birds to greatly reduce the surface microbial load of the quail carcasses, which helped to ensure food safety and public health protection.

c. Smith Lever, state matching funds

d. Multi-state Extension: Florida

Key Theme: Animal health

State Performance Goal: 1-16
Pest management – beef cattle

a. Because Georgia cattle are attacked by a range of flies, mosquitoes, lice, mites, ticks and other external parasites, beef producers spend over $4 million every year to control these ectoparasites. To effectively manage these pests, cattle producers need information and education about their identification, biology and behavior. UGA's Beef Group and the veterinary entomology program have provided training throughout the state, presenting overviews of common pests and updated control strategy summaries.

b. Over 300 cattle producers updated their pest management practices based on research information provided at Cattlemen's Association meetings and Master Cattlemen classes held around the state. By using the most up-to-date information available, cattlemen can better manage their pests while minimizing pesticide exposure to humans, non-target animals and the environment. Cattlemen are targeting their pest management efforts wisely, treating cattle when pests reach injury thresholds and timing their control strategies for maximal effect. These are the most cost-effective suppression tactics, resulting in savings of time and money as well as providing greater pest population reductions.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Animal production efficiency

State Performance Goal: 1-2

Beef cattle production

a. Cattle producers need a reliable scientific basis for selecting genetically superior bulls that not only have excellent growth performance but will produce offspring with that will excel in carcass characteristics. The Tifton Bull Test has long been recognized as one of the oldest and most respected test stations in the U.S. About 200 bulls are evaluated at the test station annually for growth performance in a 112-day gain test. Additionally, bulls are tested using ultrasound for carcass traits, are framed scored, have scrotal circumference measurements taken and semen tested and are screened for structural and disposition problems. Bulls are then eligible for sale if their weight per day of age plus test average daily gain ratio is in the top two-thirds within each breed being tested.

b. Performance has increased dramatically, rising from a 2.59 pound- per-day gain in 1958 to 4.68 pounds in 2004. The program has given both buyers and breeders the ability to record differences in the ability of bulls to gain in a uniform environment.

c. Smith Lever, state matching funds

d. State specific

Key Theme: Agricultural competitiveness, animal production efficiency

State Performance Goal: 1-2

Dairy budgets

a. Dairy managers need financial and production data to make critical decisions. Similar data is also needed by decision makers to monitor the economic health of the dairy industry in the region, which led to the ongoing cooperative Dairy Business Analysis Project between University of Florida and UGA dairy scientists. In 2003, 27 dairies submitted financial data, with 26 included in the summary results. Of these, 17 were located in Florida and nine in Georgia.

b. The database from the Dairy Business Analysis Project was used to update dairy budgets, which have been used by farm services and commercial banks to evaluate loans and to work with current customers. Comments from the bankers say the budgets allow them to make realistic evaluations for producers.

c. Smith Lever, state matching funds

d. Multi-state Extension: Florida

Key Themes: Animal genomics

State Performance Goal: 1-13
Animal genomics – human health

a. The American Heart Institute estimates that 128 million Americans could be helped today with advances in stem cell therapies. In the U.S., 1.5 million people suffer from Parkinson's disease with no long-term treatment for this fatal malady. Embryonic stem-cell-based therapies hold great promise for curing or discovering new drugs for Alzheimer's, Parkinson's, spinal cord injury, ALS, SMA and other devastating diseases. However, human and primate embryonic stem cells undergo spontaneous differentiation even when cultured on fibroblast feeder layers. Currently, producing large quantities of homogenous stem cells is technically difficult if not impossible. It is essential to obtain scaled-up homogenous populations of stem cells because it's likely tens of millions of starting stem cells are needed to isolate a subpopulation of specialized cells for transplants. Isolating stem cell populations less susceptible to undesirable differentiation cues (non-neuronal) can lead to stable stem cell populations and prevention of spontaneous differentiation. Unstable embryonic stem cells undergoing spontaneous differentiation are not ideal candidates to initiate uniform differentiation towards neural lineages.

b. The goal of UGA animal and dairy scientists is to develop a method of culturing a stable cell line that can be directed homogenously down neural pathways rather than randomly differentiating down lineages that happen to include neural cells. In June 2005, they published the first paper on the derivation of motor neurons from human embryonic stem cells. A drug discover assay for spinal muscular atrophy using stem cells was developed. The hope is that this assay will aid in the discovery of new compounds that affect this terrible disease in children. In addition, these cells are being purified and now being transferred into animal models for neurological diseases and have survived for three weeks in a model for spinal cord injury. These same cells are to be used to test environmental toxins for their effects on the human neural system. Along with a company the scientists established in Athens, they will provide these cells to researchers. They are also actively collaborating with the Department of Defense to develop neuronal network biosensors for chemical threat detection for homeland defense.

c. Hatch Act, state matching funds

d. Multi-state research: MA

Key Themes: Adding value to new and old agriculture products, niche market, small farm viability

State Performance Goal: 1-19
Chevon consumption

a. In recent years, chevon consumption in the U.S. has increased, primarily because of demand among ethnic populations. The purpose of the trials conducted was to determine differences in chevon preferences for different consumer groups.

   Three consumer preference trials were conducted in 2001, 2002 and 2003 during the Sunbelt Expo in Moultrie, Ga. In the first trial, cooked and shredded chevon samples with and without barbecue sauce were evaluated on a nine-point scale by 120 consumers. Chevon with barbecue sauce received higher acceptability scores than chevon with no sauce. Consumers who had previously eaten chevon gave higher scores to the products than those who had not. Consumer race or ethnicity did not influence the scores. In the second trial, low fat chevon and beef sausages were compared for tenderness, juiciness, taste and aroma on a nine-point scale. The scores were not significantly different for the two sausage types. Consumer race, sex, age, education, income or prior experience eating chevon did not influence their perceptions of chevon products. Consumers who were willing to purchase chevon gave higher taste scores for chevon sausages than those not willing. In the third trial, smoked and fresh low fat chevon sausages were compared. Consumers with prior experience eating chevon gave higher aroma scores to both types of chevon sausages compared to those who tasted chevon for the first time. Higher tenderness, juiciness, taste and aroma scores were given by consumers willing to purchase chevon than by those who were not.

b. A paper was presented at the ASAS Southern Section Meetings in Little Rock, AR, and the abstract “Demographic factors influencing consumer preference of chevon products” was published on this study. The results indicated that prior experience and willingness to purchase goat meat from a supermarket are the main factors that influence consumer preference scores for chevon products.

c. NARETPA Funds, Hatch Act, state matching funds

d. Multi-state Research: LA

Key Themes: Agricultural profitability, animal production efficiency, precision agriculture

State Performance Goal: 1-22
Neuroendocrine systems

a. Although previous efforts have indicated that manipulating photoperiod and hormones can induce off-season ovulation, such techniques are labor intensive and yield inconsistent results. Current studies investigating the neuroendocrine basis of seasonal breeding patterns in small ruminants, specifically goats, will facilitate a thorough understanding of their physiology and provide a more cost effective method of controlling and manipulating their breeding cycle. The prospects of earlier age of puberty and increased ovulation rate could potentially increase goat

producers' profit margin and remove seasonal brakes imposed on genetic progress by long generation intervals.

Two proposals were developed to investigate the role of certain important amino acid neurotransmitters in the induction and maintenance of seasonal anestrus in goats. Others were funded to investigate the use of responsiveness of the pituitary to hormone stimulation as a selection tool for age at puberty and rate of ovulation in genetic improvement.

b. Fort Valley State University has an established facility in the veterinary/animal science units for training students and staff in the use of steriotaxic devices to put cannulas in the brain to monitor ventricle hormonal levels. This has enhanced research capabilities and has uniquely placed the institution in a leadership role in reproductive research. The animal science unit can now train graduate students. The labs can assay protein, steroid and fatty acid PG hormones. The project results indicate that neurotransmitters are involved in the regulation of hormone secretion during a goat's breeding and non-breeding seasons. This seems to be exerted in the hypothalamus of the brain. Manipulation of these neurotransmitters may more effectively help regulate breeding patterns and improve the seasonal cycle, as well as puberty, and enhance reproductive efficiency and profitability in goat production.

c. NARETPA , state matching funds

d. Multi-state research: IA, MD

Key Themes: Adding value to new and old agriculture products, agricultural profitability, animal genomics, animal production efficiency

State Performance Goal: 1-23
Animal reproduction efficiency

a. Advances made recently in procedures for genetic engineering, gene mapping and transfer in farm animals have enhanced opportunities for mass production of livestock with specific economic traits. Gene transfer serves as a potentially useful supplementary tool to classical breeding methods. It can also be useful for importing unique germplasm that produce high yields of quality productivity traits and preserve rare germplasm resources at risk of elimination. These advances will have tremendous implications on goat products like cashmere, mohair, morocco skins, lean meat and less allergenic dairy products.

FVSU researches developed proposals on whether goat gene and embryo manipulation and transfer research can accelerate genetic improvement and adapt local breeds for enhanced production. They are currently developing in vitro culture techniques and establishing cell lines for genetic transformation to express genes of economic value.

FVSU researchers produced several scientific and Extension-type publications and workshops resulting from methods of refining procedures for culturing goat oocytes and embryos. They published articles on the effects of freezing on in vitro goat somatic cell growth and achieved successful techniques for establishing caprine cell lines and cryopreserving them. These were done in collaboration with scientists and laboratories of reputable universities and research agencies. Extension-type results have also been presented at regional expos and workshops and in the Georgia Small Ruminant and Extension Center's newsletter.

b. The projects facilitated research capabilities and placed FVSU in a leadership role in cell biology and biotechnology research. Stockholders use the facilities to learn artificial insemination, estrus synchronization and embryo transfer techniques for breeding goats. FVSU labs are culturing and establishing cell lines which will be subjected to genetic transformation for expressing genes of economic value in goats. A facility is planned to routinely produce goat somatic cell lines for site-specific incorporation of economically important genes and add value to goat products.

c. NARETPA, state matching funds

d. Multi-state research: MD, MO

Key Themes: Adding value to new and old agriculture products

State Performance Goal: 1-25
Adding value to chevon

a. There is a developing market for goat meat in the U.S. While goat carcasses are lean with low intramuscular fat, chevon is considered inferior in palatability to lamb, beef or pork primarily due to lower tenderness. Researchers evaluated several methods including electrical stimulation (ES) and aging to improve the meat's tenderness. Data on the effects of ES on chevon quality is limited. Hydrodyne processing, a recently developed technology that involves exposing packaged meat to a supersonic shock wave under water, has been shown to improve tenderness in beef and pork, but its effect on goat meat is not known. FVSU scientists have conducted several studies to improve chevon quality using postmortem technologies including development of value-added products. Experiments were conducted to determine the effects of hydrodyne processing on the quality of chevon and chevon products. Vacuum-packed frozen boneless chevon leg cuts were exposed to hydrodyne treatment and then used in the preparation of strip jerky. Color, proximate composition and sensory attributes were determined. Thiobarbituric acid reactive substances and yeasts, mold and total plate counts were determined every 30 days during the 90-day period. A similar experiment used goat carcasses, and another study was conducted to determine the effects of postmortem ES on meat quality in goats. FVSU researchers also conducted experiments to study the effects of calcium chloride injection on the

palatability of chevon. Several papers were presented in national and regional professional meetings.

b. Results of FVSU research indicate that hydrodyne processing influenced the color of chevon jerky by increasing the lightness and redness. Hydrodyne processing also increased lipid oxidation and cooking losses in chevon steaks. Although the microbial quality of chevon jerky is comparable to beef jerky, the higher lipid oxidation rate in chevon jerky during storage may reduce its shelf life due to changes in organoleptic properties. FVSU studies using electrical stimulation indicated that goat meat tenderness can be improved with proper usage. Panelist scores for tenderness, juiciness and flavor were not significantly different among breed groups injected with calcium chloride; therefore, further studies will be required.

   These studies helped the scientific community better understand the postmortem behavior of goat meat and ways to improve its palatability. These experiments, along with the data FVSU scientist have generated in earlier studies show that development of value-added products would be a viable method to improve perception of chevon and popularize it among the mainstream consumers.

c. NARETPA, state matching funds

d. Multi-state research: MD

Key Themes: Animal production efficiency

State Performance Goal: 1-26
Animal heritability values

a. Most meat goat breeding stock selection is based on show winnings or appearance. For the various breeds to improve economically important characteristics in a sustainable manner, selection needs to be based on a comparative performance evaluation. A Georgia (and Southeast) Meat Goat Buck Performance Evaluation Program was established in order to provide a centralized testing site for breeders. Data were collected during an 84-day period on important traits which characterize utility under a realistic environment. Collaboration with Tennessee State University has enabled the FVSU program to further identify the production merits of various breeds and crosses of meat goats. This collaboration will continue for a period of at least two additional years as performance and carcass data are collected and reported jointly. Six annual reports and summaries of contemporary group and individual performance values have been published. Multiple breeder and producer meetings explaining genetic change were held.

b. Because of these efforts, data is available to more completely characterize breeds and lines of breeding. Sixty-five bucks have been evaluated over a six-year period. Evidence of genetic differences in growth, parasite tolerance, ultrasound muscle

scores and scrotal circumference were reported. At least four other states have established performance evaluation programs based on the Georgia experience.

c. NARETPA, state matching funds

d. Multi-state integrated Extension and research: TN

Key Themes: Small Farm Viability

State Performance Goal: 1-5
Small farm viability

a. Many farms in the Black Belt region of the South have not been actively involved in the newly energized meat goat sector. Lack of information and marketing channels are two of the significant constraints. Demand for goat meat products and live animals remains strong in both rural and urban areas. Production and marketing are not easy, and technical support and experience are needed.

   FVSU has joined with a regional effort to provide essential inputs including animals, basic supplies, hands-on training and a marketing system allowing participants to share in added value after the animal leaves the farm. Five demonstration farmers were identified and supported during this reporting period, and nearly 100 does were distributed to this nucleus group. Basic supplies were purchased and distributed. Personnel time was invested in fence construction advice, equipment and supply use, animal health demonstration and information sharing at project meetings.

b. At the completion of the first year of field action, three herds produced kids which will be marketed. Female kids will be retained by the owners as replacements for older, less productive does. The faculty's efforts have been valuable to creating new opportunities for these small farmers.

c. NARETPA, SARE Funds

d. State specific

Key Themes: Animal health, animal production efficiency

State Performance Goal: 1-25
Herd management

a. Universities have seen an increased need for scientific information and recommendations for goat herd health management practices for increased productivity. Faculty at FVSU have compiled data, developed herd health management, vaccination and disease prevention protocol and parasite control

measures for small ruminants. The faculty has been invited to make special presentations at professional meetings. A goat health handbook has been developed and is currently in production. The faculty also conducts producer programs and answers requests for information on a daily basis.

b. Herd health management recommendations including the FAMACHA parasite control management system and card was purchased by over 2,500 producers and implemented nationally, resulting in reduction in herd production losses. A comprehensive Web site, www.scsrpc.org, was developed and is a valuable resource in this field.

c. NARETPA, state matching funds

d. Multi-state integrated Extension and research

Key Themes: Adding value to new and old agriculture products, agricultural competitiveness, agricultural profitability, new uses for agricultural products, niche markets

State Performance Goal: 1-20
Niche markets - goats

a. Raising goats has been a traditional food animal production practice in the South. In recent years, both production capability and consumer demand for goat meat has increased. Further development may be achievable if remaining issues in supply and demand can be resolved. Also, the number of Southern farms producing goats and meat-type goat production has experienced substantial growth in recent years. Net imports of goat meat also increased dramatically during the last 10 years, and the U.S. has become a net importer of goat meat. These statistics suggest an increased goat meat demand; however, the U.S. Department of Agriculture and some state departments of agriculture only recently started collecting limited statistics on goat as a commodity. Thus, little is known about production statistics, marketing channels used by farmers or the product's characteristics that are influencing demand.

   FVSU faculty recently initiated a study on goat meat markets to include niche markets, consumer preferences and the spatial distribution among markets as critical issues for producers, consumers and the goat meat industry in general. A regional survey on goat meat consumption was conducted to identify niche markets on goat meat and goat meat products. Researches have examined goat meat types and attributes preferred by consumers in the marketplace. A survey and sensory tests were conducted at the annual Sunbelt Agricultural Exposition held in Moultrie, Ga. The objective of this exercise was to identify the characteristics of goat meat and to demographically segment goat meat consumers. Consumption of the goat meat preparations received a favorable response at the Expo, an indication of growth potential of new market channels.

b. FVSU faculty has established a set of econometric models designed to assess demand for goat meat, to include potential demand for meat products, and the consumer's willingness to increase consumption. They have identified product types and attributes that consumers prefer for healthy eating. These potential factors influence consumer preferences. Ten scientific articles have been published throughout this study. Four professional presentations were given at regional and national agricultural economics meetings. The faculty has identified increased demand for goat meat that opens the door for further supply expansion that will lead to the efficient use of previously unusable natural resources such as kudzu and shrubs. They also determined that fresh goat meat is more expensive than frozen; hence with the expansion of domestic supply, the U.S. could reduce goat meat imports. With the cost reduction, fresh goat meat could be sold at a competitive price, therefore potentially capturing a larger share of the goat meat market.

c. NARETPA, state matching funds

d. Multi-state research: FL, LA, TX, AL

Key Themes: Diversified/alternative agriculture

State Performance Goal: 1-41

Aquaculture

a. Fish and seafood continue to be important food sources and play a critical role in global food security, and aquaculture is the world's fastest growing form of food production. Average fish consumption has doubled in less than half a century and is predicted to continue increasing. Thirty percent of U.S. fish populations are over-fished and are being unsustainably used, and globally, 75 percent of fish stocks are depleted in some way. If the prediction that 40 percent of fish eaten in 2020 will have to come from aquaculture, production will need to double in the next two decades from 28.6 million metric tons in 1997 to 53.6 million in 2020. Even with the abundance of resources, producers in Georgia have been slow to embark on aquaculture as an alternative crop.

   Aquaculture demonstration facilities are an important component of on-site training, aquaculture workshops and agricultural field days. At the Georgia Center for Aquaculture Development (GCAD), the demonstration of and research on the use of Recirculating Aquaculture Systems (RAS) with different aquaculture species is an important part of the multifaceted aquaculture program. RAS are excellent aquaculture production systems for research and for teaching aquaculture principles and methodologies. Further development of the aquaculture industry relies on support in the areas of diagnostic services with regard to water quality, fish disease and aquatic weed management. Each year, fish diseases cause the loss of millions of dollars throughout the entire catfish industry. Poor water quality in many cases leads

to disease problems if not corrected. Proper pond management is required to prevent aquatic weed problems both in aquaculture and recreational ponds.

Recirculating aquaculture systems and additional macrophytic and aquaponic tanks were set up and put on line with aquaculture species in two more greenhouses. Five types of recirculating aquaculture systems were available in three different greenhouses with both monoculture and polyculture. A program was initiated to select for fast growth and resistance to disease and low dissolved oxygen in channel catfish, bream and tilapia in RAS.

Several articles were written about various aquaculture topics for two FVSU Aquaculture News newsletters with over 1,500 newsletters distributed each issue. News releases about aquaculture workshops were distributed. A two-page article on the aquaculture program at FVSU was published in the Macon Telegraph in conjunction with interviews and photos taken following the workshop on small scale RASs. FVSU conducted a workshop on the “Introduction to Small Scale Recirculating Aquaculture Systems” which included an onsite visit of aquaculture systems and was attended by 28 participants. Another workshop at FVSU entitled “Opportunities in Aquaculture” presented a variety of important topics including niche marketing, financial aid information, management of RAS and commercial catfish culture. Fifty participants attended. Informational talks and demonstrations about various aquaculture topics were given at 16 field days, seminars and conferences in Georgia involving over 475 clients. Presentations were given at TAG meetings, Plains Field Day, UGA agent training and Winter School, the annual Farm Bureau commodity and Georgia Aquaculture Association meetings and other meetings. Assistance given to the TriState Aquaculture Committee at the Sunbelt Agricultural Expo helped reach 178 individuals. Personal responses were provided to over 300 individual requests for technical information about aquaculture production. Tours of the aquaculture facilities were given to over 950 visitors ranging from kindergartners to producers from Georgia. Over 1,420 Georgians received aquaculture information or training.

Breeding populations of three species and hybrids of tilapia were developed and increased in three greenhouses. All male tilapia honorum populations were maintained and increased to provide demonstration and experimental stock for crossing with T. mossambica to produce all male progeny. A growing population of hybrid red tilapia was maintained to demonstrate growth in different RAS and increased marketability and profitability. Spawning and rearing of all species of tilapia from egg to adult were demonstrated in aquaria, tanks and RAS and were made available for producers and tours during visits and workshops. Different herb species were evaluated with the use of tilapia RAS wastes as the sole nutrient sources in aquaponic units. Of the herbs demonstrated in aquaponic units, positive results were obtained with basil, oregano, rosemary, mint, catnip, chives and tarragon. Improved strains of channel catfish and hybrid blue catfish were reared from fry to 0.51.0 kg or greater in different types of RAS in the three greenhouses. Selected channel catfish and tilapia reared to maturity in RAS that have

demonstrated optimum growth, improved survival to low dissolved oxygen, and disease resistance were chosen as broodstock to begin development for RAS, raceway and cage culture of select channel catfish and tilapia strains. Work began with rearing freshwater prawns in RAS and with aquatic macrophytes. Select koi were acquired to begin a breeding population or production in RAS and also for teaching fish reproduction and hatchery methodology.

b. The impact of FVSU's aquaculture program continues to increase. GCAD provides information to citizens throughout the state, including those who routinely come to workshops now being held in Fort Valley. The number of visitors to the aquaculture facilities has more than doubled over the past year, and the number of diagnostic problems solved and information provided has also increased. The base of clients now routinely served by the aquaculture program through newsletters and other mailings has more than tripled. The available facilities have also grown in the past year from one greenhouse equipped with tanks and RAS to three greenhouses with a variety of RAS, tanks, macrophytes, aquaponics and different aquaculture species. The installation of equipment into the greenhouses and use of the new aquaculture production systems will demonstrate state of the art aquaculture production technologies and have a great impact on increasing the capacity to deliver technology transfer of current aquaculture methodologies.

c. NARETPA, state matching funds

d. Multi-state integrated Extension and research: AK, FL, TX

Key Themes: Agricultural profitability

State Performance Goal: 1-1
Asian soybean rust

a. Asian soybean rust, caused by a fungal pathogen, is one of the most important and devastating soybean diseases in the world today. Currently, no soybean varieties are resistant to the disease, and yield losses can be devastating to growers. In November 2004, Asian soybean rust (SBR) was found in the United States, first in Louisiana and then a week later in Georgia. University of Georgia plant pathology specialists took several approaches to protecting Georgia's soybean crop from SBR. They executed a sentinel plot monitoring program that provided early detection of SBR in 2005 and developed trainings for county UGA Cooperative Extension agents to teach them how to recognize the disease and how to manage the epidemic. Specialists also attended soybean grower meetings to train growers on detection and fungicidal management of SBR. Specialists applied and received Section 18 crisis-exemption labels for eight fungicides to be used to manage SBR and conducted multiple fungicide trials around the state to learn how to best manage this important disease. It is estimated 70 percent of the soybean growers sprayed their crop with fungicides to protect against rust based upon recommendations from the specialists.

b. The results of these trials demonstrated that in the presence of soybean rust, growers can increase yields by 50 percent with an effective fungicide program. As part of the research, the UGA soybean team identified Florida beggarweed (*Desmodium tortuosum*) as an alternate host for SBR. The implications for this find are great, giving growers, agents and specialists the ability to monitor the survival of the pathogen in the absence of a soybean crop.

c. Hatch Act, Smith Lever, state matching funds

d. Integrated Research and Extension

Key Themes: Agricultural competitiveness, agricultural profitability, plant health, risk management

State Performance Goal: 1-1
Downy mildew

a. The 2004 plant disease loss estimates for watermelons, squash, cucumbers and cantaloupe was $15.3 million as a result of direct damage by pathogens and control costs. In the fall of 2004, a serious epidemic of downy mildew occurred. Several fungicides are available for suppressing downy mildew losses, but the most effective had been the strobilurin fungicide Cabrio. In the fall of 2004, in replicated field trials plots receiving strobilurins and other strobilurin-like fungicides failed to suppress downy mildew and were similar to non-treated plots. The UGA Extension plant pathologist, working with BASF, began trying to identify the problem. Infected tissue was shipped to a BASF lab in Germany and tests were conducted to determine if fungicide resistance was to blame for control failures. By April 2005, results of these tests confirmed the tissue sent from Georgia did indeed possess the gene shift that confers resistance to strobilurin fungicides and non-strobilurin fungicides that have the same mode of action. A newsletter issued statewide contained tools to help growers avoid losses to downy mildew not controlled by strobilurin fungicides.

b. Using the new fungicide recommendations, Georgia growers could see greater than 50 percent disease suppression over using strobilurin or strobilurin-like materials applied alone. Potential impact is calculated near $50 million saved if a downy mildew epidemic affected 50 percent of the cucurbit acreage in 2005.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Plant health, risk management

State Performance Goal: 1-1
Sudden oak death

a. The fungus-like plant pathogen, *Phytophthora ramorum*, is the cause of sudden oak death in the western U.S. and continues to be a concern for introduction into eastern forests. Surveys for *P. ramorum* within ornamental plants began in earnest in 2004 when infected plants were shipped to Georgia from a California nursery. Suspect plant samples were brought to the UGA Extension plant pathology's Plant Disease Clinic in Athens for screening for *P. ramorum*. Once the pathogen was detected, additional delineation surveys were conducted to determine survival and potential spread within the nursery. Soil samples from infected plant locals as well as water samples from ponds and streams adjacent to the nursery were collected. More than 2,660 plant, soil and water samples were collected and processed in 2005 in the plant pathology laboratory. About 25 samples were positive for *P. ramorum* and originated from four retail/re-wholesale ornamental nurseries in the metro Atlanta area.

b. As in 2004, Georgia *P. ramorum* survey efforts have identified more *P. ramorum*-positive plants and sites outside of California, Oregon and Washington than any other state in the country. In addition, *P. ramorum* was recovered from soil samples collected at one retail location. The survival of *P. ramorum* within soil has only been previously documented in California. Numerous meetings with Georgia Green Industry Association representatives, county Extension agents, Master Gardeners, professional landscapers and home gardeners were conducted to alert them of the potential of introducing *P. ramorum* into landscapes, how to identify the pathogen's symptoms on host plants and how to submit samples for testing.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Agricultural competitiveness, agricultural profitability, plant health

State Performance Goal: 1-16
Brown rot

a. Brown rot, caused by *Monilinia fructicola*, is a pre- and post-harvest peach problem throughout the Southeast. Currently, very few classes of fungicidal chemistries are available for brown rot control, and the primary ones include demethylation inhibitors (DMIs) and strobilurins. Over the past three to four years, a resistance shift has been documented for the DMI fungicides in populations of *M. fructicola* from Georgia. This shift could result in the widespread failure of current brown rot control programs which rely heavily on the DMIs for pre-harvest disease control. UGA plant pathologists surveyed producer sites in 2004 to determine the range of DMI resistance, and found it was widespread throughout the major peach production

region of middle Georgia. They immediately developed and recommended modified fungicide programs.

b. With the modified program, brown rot epidemics were minimal in 2005, even though it was one of the wettest summers on record for Georgia. Research data also supported the change in spray programs, since the new programs reduced brown-rotted fruit by more than 30 percent in the presence of DMI-insensitive *M. fructicola*. Based on research data, modified programs resulted in substantially greater production in 2005 than would have been otherwise.

c. Smith Lever, state matching funds

e. State specific

Key Themes: Agricultural competitiveness, agricultural profitability, plant germplasm, plant health

State Performance Goal: 1-16
Integrated management of leaf spot on peanut

a. Tomato spotted wilt virus (TSWV) and leaf spot diseases have cost Georgia peanut growers millions of dollars in either direct yield losses or costs associated with control. Previous work has indicated that both leaf spot and spotted wilt epidemics were suppressed in peanuts planted using strip-till practices. New cultivars such as Georgia 01R, Tifrunner, Georgia O3L and C-99R have shown good resistance in tests for leaf spot or TSWV. They have performed well in reduced-fungicide tests in the past and show promise for helping improve control of these diseases and reducing the cost of controlling leaf spot diseases. In 2005, UGA plant pathologists in Tifton conducted an on-farm test comparing field performance of Georgia 01R and Tifrunner under a four-spray fungicide regime with strip-tillage. The combination of conservation tillage practices such as strip-till with new resistant cultivars such as Georgia 01R, Georgia 03L and Tifrunner substantially suppressed both leaf spot and spotted wilt epidemics. The on-farm test with four applications corroborated previous small plot studies; both Georgia 01R and Tifrunner performed well with regard to leaf spot, spotted wilt and yield. No insecticide was applied.

b. This research demonstrates further improvement in leaf spot control; potential savings in fungicide costs, time and energy; and suppression of TSWV previously demonstrated with use of strip-till systems. New cultivars, which have better resistance to tomato spotted wilt virus than Georgia Green and less need for fungicides for leaf spot control, show excellent potential for use in integrated disease management programs for both spotted wilt and leaf spot.

c. Hatch Act, state matching funds

d. Multi-state research: Florida

Key Themes: Agricultural competitiveness, agricultural profitability, plant health, risk management

State Performance Goal: 1-16
Tomato spotted wilt virus

a. Tomato spotted wilt virus continues to be the greatest restraint in growing flue-cured tobacco in Georgia. The levels of disease have averaged 35-40 percent for the past year. Some growers lost the entire crop. In 2005, UGA plant pathologists in Tifton initiated a study to determine if applications of the insecticide imidacloprid and plant activator acibenzolar-S-methyl (ASM) would manage TSWV. The agrichemicals were used in the greenhouse as pre-plant applications and as post-plant applications during the growing period.

b. The combination of greenhouse applications and post transplant applications reduced the disease from 63 percent in the non-treated control to 20 percent for a post application made 42 days post transplant. In addition, yield was increased by 82 percent from 1,539 to 2,804 pounds per acre. This translates into a $1,771 per acre increase for a $75 treatment of agrichemicals, providing a net return of $1,696 for use of imidacloprid and ASM in tobacco.

c. Hatch Act, state matching funds

d. State specific

Key Theme: Plant health

State Performance Goal: 1-16
Molecular genetics of fungus-plant interactions

a. Smut fungi constitute an important agricultural problem and, in some crops, are occasionally responsible for local yield losses exceeding 25 percent. In 2002, Georgia's corn crop was worth $88 million with nearly 15 percent of the crop lost to diseases primarily fungal in origin. UGA plant pathologists have worked for a decade on understanding how fungi cause both plant and animal diseases. Most of this work has been accomplished using a few model organisms. *Ustilago maydis*, the corn smut pathogen, is one of these models.

b. A UGA group has identified a number of pathogen genes required to complete the disease cycle of *U. maydis* on corn. Some of these genes appear to be universally important in disease development of all fungal diseases. The group was involved in supporting a public effort to sequence the genome of this fungal pathogen and is also

involved in studying the plant's reaction to infection by *U. maydis*. They have identified a number of genes expressed specifically in the interaction. Through collaboration with Pioneer Hi-Bred they may be able to identify maize lines that have mutations in these genes to determine their role in disease development. Based on UGA results, new methods of disease control will likely be suggested.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Agricultural competitiveness, agricultural profitability, plant health, risk management

State Performance Goal: 1-17
Integrated pest management

a. Clientele are increasingly aware and concerned about environmental issues regarding pesticide use but still desire the benefits of a healthy, beautiful landscape. This is where integrated pest management (IPM) strategies that minimize pesticide use are applicable to landscapes, garden and orchard problems. County Extension agents are required to assist and initiate these principles to a rapidly growing population with a decreasing support system.

   The IPM Disease Clinic is an established diagnostic and consulting resource for Georgia citizens and is located at the Griffin campus. The clinic is an integral part of the Extension program for disease-related problems of noncommercial and commercially maintained plant samples. The laboratory handles diagnosis and recommendations for plant disease samples from home and urban landscapes, with about 1,500 samples received and processed in 2005. Management recommendations focus on diagnosing the problem prior to implementing any control practices. Controls for disease problems are based on IPM strategies so that the client can have an attractive landscape, productive garden and fruitful orchard. Often no pesticide applications are required, and the problem can be solved through cultural practices and/or manipulation of the environment.

   With the implementation of the Distance Diagnostics through Digital Imaging project, the response time to the client through county faculty is being reduced. This facilitates educating the client in a timely manner and helps make sure an appropriate management method is used.

b. The IPM Disease Clinic solidifies the county delivery system, provides useful educational information for problem management around the home and urban landscape and results in a healthier environment by reducing haphazard and non-targeted pesticide use. A summary of samples received from the IPM Disease Clinic is published annually and serves as a valuable diagnostic reference tool for all crop

areas. These responses reinforce UGA's commitment to environmental quality and agriculture sustainability in Georgia.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Plant health

State Performance Goal: 1-17
Testing of imported seeds

a. Planting seeds are routinely shipped across geopolitical boundaries and used in crop production. Unfortunately, seeds can be infested with plant pathogens that can transmit costly diseases to seedlings after germination. To guard against the introduction of phytopathogens, it is necessary to test samples of imported seeds. With the introduction of real time polymerase chain reaction (PCR), the prospect of developing seed health assays applicable for all pathogen types has become more attainable. Additionally, there is great potential for detecting multiple pathogens simultaneously. Unfortunately, PCR can be limited by inhibitory compounds present in seed extracts. The inability to eliminate these compounds results in inaccurate and unreliable test results. Using the fungal and bacterial causal agents of gummy stem blight and bacterial fruit blotch of watermelon, UGA plant pathologists developed a seed health assay based on magnetic capture hybridization (MCH) and multiplex real time PCR. These data indicate MCH and multiplex real time PCR is a rapid technique that can be easily developed and applicable for the simultaneous detection of multiple plant pathogens in seeds.

b. This technique can be a universal assay that can facilitate the detection and subsequent exclusion of all seed-borne phytopathogens. The adoption and implementation of this assay might improve the effectiveness of plant disease management through exclusion for high value crops.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Agricultural competitiveness, agricultural profitability, plant health, risk management

State Performance Goal: 1-1
Reduction of fungicide use in turfgrass

a. The approximately 1.8 million acres of turf in Georgia have a maintenance value of $1.85 billion. Due to the increase of population, use and popularity of turf species, disease losses and control costs are significant, accounting for over $250 million annually. Golf course superintendents and commercial landscape managers use fungicides as the main control strategy. The fungicides are cost-prohibiting, and overuse can be detrimental to the environment. Additionally, fungicide resistance is now an important issue in Georgia. Thus, there is a significant need to educate producers, managers and landscape company personnel on disease etiology and epidemiology. It is most important to address and implement disease surveillance strategies as well as to present disease trends and dynamics prior to its appearance.

   A series of statewide and local training programs and materials on turf disease surveillance and disease avoidance have been developed with emphasis given in pathogen etiology, trends, emergence, correlation with weather patterns and historical occurrence of the diseases. This in turn will result in timely disease identification, translating into a more judicious use and application of fungicides.

b. To date, 10 educational sessions have been delivered across the state and 357 individuals have been contacted and trained. Quarterly publications in Through the Green (Georgia Golf Course Superintendents Association, circulation of 500 copies to four states), GTA Today (Georgia Turfgrass Association, 800 copies to eight states) and GGIA Journal (Georgia Green Industry Association, 1,000 copies reaching 12 states) have been published. Information on disease identification, surveillance, weather patterns and potential incidence are presented prior to actual disease occurrence. County faculty, producers, golf course superintendents, landscape company personnel and park and grounds maintenance government personnel have benefited with this information. Clients have expressed the value of timely information, and they appreciate “the act, don’t react” on disease occurrence. A more judicious and timely application of fungicides have resulted from these practices.

c. Smith Lever, state matching funds

d. State specific

State Performance Goal: 1-2
Methyl bromide alternatives

a. In vegetables, methyl bromide is the primary means of managing many pests, including weeds, nematodes, soil-borne pathogens and insects. Nutsedge, Georgia’s most troublesome vegetable-infecting weed, is the most difficult pest to manage in the absence of methyl bromide. As methyl bromide production was expected to cease in 2004, the Georgia Fruit and Vegetable Growers Association submitted six Critical Use Exemption packages, prepared by the University of Georgia Vegetable Team, to the United Nations to request an extension for use of methyl bromide in vegetable

production beyond 2004. In the meantime, UGA crop and soil scientists conducted replicated field trails on more than 100 acres of research and growers' farms across Georgia during 2005. Research efforts focused on finding effective and economical alternatives to methyl bromide using various fumigants and mulches and finding ways to reduce the rate of methyl bromide needed to manage weeds.

b. Research showed methyl bromide alternatives do not currently exist for managing weeds in vegetables produced on plasticulture. Data generated from this work is the primary source of data supporting Georgia's CUE packages, which were successful for 2006, allowing growers to purchase methyl bromide in 2006. The estimated value of these CUE packages exceeds $50 million per year for Georgia. Although the research results did not discover alternatives that could be immediately adopted by growers, results offer the possibility for several of these alternatives to be adopted by growers between 2008 and 2010.

c. Hatch Act, state matching funds

d. Intergraded research and Extension

Key Themes: Agricultural profitability

State Performance Goal: 1-2
Herbicide and fungicide compatibility

a. Changes in the recent farm bill, which resulted in lower peanut prices, have challenged growers to lower production costs without sacrificing yields. One of the ways growers prefer to reduce inputs is through combining pesticide applications such as herbicides and fungicides. However, little information is known about the possible risks/benefits of the various combinations that could potentially occur. From 2002 to 2005, field trials were conducted to evaluate the effectiveness of several herbicide/fungicide combinations. The results of these tests have been presented locally and regionally to growers and other interested agricultural professionals.

b. Test findings, in combination with research from other states, have resulted in the development of a regional publication entitled “Tank-mixing chemicals applied to peanut crops: Are the chemicals compatible?” This publication is maintained at North Carolina State University and is available online at http://www.peanut.ncsu.edu/ag653.pdf. In 2005, if only one pesticide application was reduced by tank-mixing an herbicide with a fungicide, peanut farmers in Georgia saved an estimated $3.04 million in production costs.

c. Hatch Act, Smith Lever, state matching funds

d. Multi-state integrated Extension and research: NC, TX, FL

Key Themes: Agricultural profitability

State Performance Goal: 1-2
Tropical spiderwort

a. UGA crop and soil scientists conducted studies to see if the date cotton is planted can affect the competitive balance between cotton and tropical spiderwort, which will help quantify when control programs need to be initiated. At a point in the growing season, cotton will have enough of a head start that late emerging weeds will not have significant influence on growth and yield. The studies' results provided an interval of when post-emergence weed control need to be initiated and the length of soil residual control required.

b. When cotton was planted in May, spiderwort interference duration did not have an apparent effect on cotton canopy width. In contrast, the aggressiveness of spiderwort is apparent with late-planted cotton. June-planted cotton was very susceptible to yield loss due to spiderwort interference, with 45 percent yield loss in the weedy-all season treatment.

c. Hatch Act, Smith Lever, state matching funds

d. Integrated Extension and research

Key Themes: Agricultural profitability

State Performance Goal: 1-2
Watermelon production

a. For years, watermelon producers have struggled to control several weeds including Palmer amaranth and morningglory. Available mechanical and chemical control methods were often unsuccessful in managing these pests. Searching for alternative methods to manage morningglory and Palmer amaranth has been underway for several years in Georgia. Sinbar (terbacil), an herbicide from DuPont, has proven effective in managing both weeds without negatively impacting watermelon development. Using research results, in 2005 UGA submitted a Section 18 request for the use of Sinbar in watermelon production to the Georgia Department of Agriculture and the Environmental Protection Agency.

b. The Section 18 request was granted. The use of Sinbar was estimated to increase grower returns by $1.8 million in 2005. More importantly, growers were able to manage two troublesome weeds in watermelon.

c. Hatch Act, Smith Lever, state matching funds

d. Integrated Extension and research

Key Themes: Agricultural competitiveness

State Performance Goal: 1-2
Double-cropped corn

a. Georgia growers looking for alternatives for summer crop production behind onions, winter grains, vegetables and watermelons have had trouble finding profitable crops that would fit into yearly rotations. Corn has been a poor alternative in recent years due to the lack of disease and insect resistance in temperate hybrids. Studies were conducted to compare current temperate corn hybrids with adapted tropical hybrids and other grains including pearl millet and grain sorghum to find out if any grain crop would be suitable for production under late season conditions.

b. The four-year study revealed disease-resistant temperate hybrids planted up to late May outperformed the tropical hybrids by 25 bushels per acre. However, if the temperate hybrids were susceptible to southern leaf blight and/or southern leaf rust, then the tropical hybrids were significantly better. In all cases, the insect resistant versions of each hybrid out-yielded the non-resistant type by 12 bushels per acre. In very late planted conditions (late June and early July), tropical hybrids out-performed disease-resistant temperates by nearly 50 bushels per acre. Three times more grain was harvested in tropical hybrids than grain sorghum or pearl millet. Today, depending on when the corn is double-cropped, corn can successfully be used as an alternative in late-planted conditions.

c. Smith Lever, state matching funds

d. State specific

Key Theme: Agricultural competitiveness

State Performance Goal: 1-2
Bermudagrass hay

a. Of Georgia hay crops, bermudagrass is grown on the greatest acreage. However, many of these acres are heavily infested with johnsongrass. Under some environmental conditions, johnsongrass can be toxic to grazing animals. Additionally, the presence of johnsongrass greatly reduces the quality and value of bermudagrass hay. Research conducted by UGA and other Southern universities shows that sulfosulfuron (Maverick) herbicide would effectively and selectively control johnsongrass in forage bermudagrass systems. In January 2005, UGA's crop and soil sciences department submitted a Section 18 Emergency Use Exemption

petition through the Georgia Department of Agriculture to the EPA for the use of Maverick to control johnsongrass in forage bermudagrass.

b. EPA agreed with UGA scientists that the lack of an herbicide registered for johnsongrass control in forage bermudagrass constituted an emergency situation and granted the Section 18 petition in September 2005. The use of Maverick herbicide will provide an annual net gain of about $2.6 million to Georgia hay producers.

c. Hatch Act, Smith Lever, state matching funds

d. Integrated Extension and research

Key Themes: Plant genomics

State Performance Goal: 1-11
Molecular cotton breeding

a. The cotton industry has benefited tremendously from transgenic cultivars, yet cotton is one of the most difficult species on which to perform gene transformation. The current strategy for cotton gene transformation, which uses plant regeneration via somatic embryogenesis, is successful only in a handful of cultivars. Consequently, all commercial cultivars in the market to date were developed by first transforming the transgene into a highly regenerable but obsolete Coker 312 cultivar and then reintroducing the transgene into other cultivars using backcross breeding. With more than 85 percent of Georgia's 1.4 million acres of cotton planted to transgenic cultivars, the demand for improved transgenic cotton cultivars drives the search for a more efficient strategy for their development. UGA crop and soil scientists have evaluated the elite breeding lines developed by the UGA cotton breeding program for somatic embryogenesis. The results showed that somatic embryogenic ability is present in several elite lines. The one with the greatest embryo production, GA98033, was released as a public germplasm line in 2004. Furthermore, they have recently transformed a green fluorescent protein gene into GA98033 via biolostic bombardment of embryonic callus.

b. This result demonstrates it is feasible to use GA98033 as a donor parent for transgenic cotton cultivar development. GA98033 has an acceptable fiber length, micronaire and superior strength and outperformed many of the leading commercial cultivars, including many transgenics currently in production. The release of GA98033 represents an important step toward expanding the number of elite Upland cotton lines that can be directly transformed, thus improving many shortfalls associated with the current transgenic cultivar development strategy.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Agricultural competitiveness

State Performance Goal: 1-4
Narrow row spacing

a. As costs continue to rise and commodity prices fall, corn producers look to improve production efficiency and yields. A UGA crop and soil scientist investigated the impact of row width on corn yields to determine if producers could justify changing to benefit either yield or production efficiency. Research confirms that producers can shift to narrow row production in corn with confidence.

b. A five-year study completed in 2005 demonstrated that narrow row spacing (20-inch rows) outperforms wider 36-inch row spacing by an average of 20 bushels per acre. This same study over the past two years has also shown 20-inch row corn out-yields twin row and 30-inch row corn. Given the average corn receipts of the past four years, this would represent an additional revenue gain of $50 per acre.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Agricultural competitiveness

State Performance Goal 1-4
Peanut management

a. In 2005, peanut acreage in Georgia increased to 750,000 planted acres. A large percentage of the acreage increase occurred in seven counties in southeast Georgia. In these counties, many producers are only in their second or third year of producing peanuts. For first-time or relatively new producers, it can be a monumental challenge to make the right decisions and implement them on a timely basis in order to maximize yield and grade potential. The UGA Peanut Team coordinated efforts to deliver timely peanut production information on managing acreage increase. A combination of monthly newsletter articles, press articles, radio and TV programs and field visits helped deliver this information. A series of harvest clinics demonstrated the Hull-Scrape Maturity Profile Method for determining the optimal time for harvesting each peanut field. At these harvest clinics, they also demonstrated proper harvest equipment setup to maximize yield potential. Earlier in the year, production meetings were conducted in each peanut-producing county.

b. A very high percentage of producers utilized the Hull-Scrape Maturity Profile Method for determining when to initiate harvest. The majority of producers also followed the Tomato Spotted Wilt Virus Risk Index for reducing their TSWV risk.

There was also widespread adoption of any new peanut cultivars with more resistance to TSWV than long-time standard Georgia Green.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Agricultural competitiveness

State Performance Goal: 1-4
Aflatoxin

a. Aflatoxin is a mycotoxin produced when toxic strains of the fungus, *Aspergillus flavus*, invade and feed on crops such as corn, peanuts, tree nuts and cotton seed. In Georgia, this carcinogen can be a very serious problem in corn when the crop is stressed during grain development and after harvest in storage. It has become a serious hindrance to growers marketing their corn crop to the food and feed industry.

   Studies began three years ago on a specific biological approach to reduce or eliminate aflatoxin in corn. A non-toxigenic strain of *A. flavus* found by USDA-ARS has been successfully studied in peanuts and is currently being used on some Georgia farms. In peanuts, a reduction in aflatoxin occurs when the non-toxic strain is applied directly to the field on a carrier, in this case, barley seed. This strain then grows when conditions are right for sporulation and out-performs the native toxic strain, thus competing for food source and reducing the toxic strain invasion of the peanut.

b. Two years of studies were conducted on corn at several locations in Georgia where aflatoxin has been a continuous problem. Unfortunately, the results were disappointing and unlike results in other states. When the non-toxic strains were applied to fields under corn production, the strains failed to grow in sufficient quantity to compete with indigenous strains. However, when corn was grown in fields where the non-toxic strains had been previously applied in peanuts, aflatoxin levels were lower than the control. This study demonstrated a potential to follow peanuts with corn where the non-toxic strains have been applied and successfully established and expect some reduction in aflatoxin levels in corn.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Agricultural profitability

State Performance Goal: 1-12
Cotton production

a. Cotton and peanuts are a common combination for many producers in south Georgia. Unfortunately, cotton and peanuts both require approximately the same number of days to mature. As a result, cotton harvest is generally initiated following the completion of peanut harvest. Data from the Georgia Agricultural Statistics Service shows that across the past five years, the cotton crop is 50 percent open the first week in September. The Georgia cotton crop has only 50 percent harvested, however, during the first week in November, a time when the peanut harvest is greater than 90 percent complete. Due to excessive weathering, this delay in cotton harvest may cause significant losses in lint yield and quality.

   Studies were conducted to determine the physiology of cotton fiber development and the extent of losses incurred in lint yield, fiber quality and profitability when cotton harvest is delayed. Controlled experiments were conducted such that cotton was harvested at 13 different timings during the fiber development stage.

b. Results from this study showed that a two-week harvest delay reduced the adjusted gross income $20.61 per acre. These losses were incurred from reductions in lint yield and price discounts for unacceptable fiber quality. An additional two-week harvest delay reduced income an additional $61.84 per acre, $82.45 per acre total, while a six-week delay resulted in an additional $103.06 per acre loss, $185.51 per acre total. The rate of loss increased exponentially with continued harvest delays.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Agricultural competitiveness

State Performance Goal: 1-11
Soybean cultivars

a. Development of high-yielding insect-resistant soybean cultivars could have substantial economic benefits for farmers by reducing the need for insecticides. A insecticidal transgenic soybean was first developed at UGA in 1995, and the first insect-resistant pyramided soybean breeding lines were developed and tested in 2002. A collaborative effort between a UGA entomologist, a soybean breeder and a molecular biologist characterized an insect-resistant pyramided soybean. Using marker-assisted selection technology, four quantitative trait loci (QTL) for resistance to insects were identified from Asian soybean line PI 229358 and incorporated individually or collectively in near-isogenic breeding lines with Benning (an elite variety) background. They also did backcrossing with a Benning-Bt soybean line resulting in generation of near-isogenic breeding lines with Bt, and Bt with one or more native resistant genes. Using the automated equipment at the Center for Applied Genetics Technology Research Laboratory for characterization of molecular

markers, they identified backcrossed breeding lines possessing one or a combination of the resistance QTLs. They further characterized insect responses to the resistant QTLs using laboratory and greenhouse testing on whole plants.

b. Field tests verified certain pyramided lines had sustained resistance to the soybean looper, corn earworm and lesser cornstalk borer. Identifying insect resistance QTLs using SSR markers in soybean will allow selection of insect resistance breeding lines in a variety of plant breeding programs aimed at developing high-yielding insect-resistant cultivars. Pyramiding soybean with insecticidal transgenes (Bt) with native resistant genes not only provides solid risk-adverse pest management for soybeans but could provide a critical component for preventing pests from developing resistance to other Bt crops such as cotton and corn.

c. Hatch Act, state matching funds

d. State specific

Key Theme: Plant genomics

State Performance Goal: 1-11
Peanut cultivars

a. Georgia leads the nation with nearly half of the total annual peanut production, and average state peanut yields have more than tripled in the latter half of the 20th Century. Publicly developed cultivars have played a major role in this overall process, and the quality of this vital commodity has likewise been enhanced. The Georgia Peanut Breeding Program is actively involved in the development of improved cultivars with desirable traits for increasing dollar value, yield, grade, better shelling characteristics, longer shelf-life, enhanced flavor and nutritional qualities as well as disease, insect, virus, nematode, aflatoxin and drought resistance. Possibly no other single research effort can benefit the whole peanut industry as much as an improved cultivar.

b. Georgia-04S is a new high-oleic Spanish-type peanut variety released in 2004 by the Georgia Agricultural Experiment Stations. Georgia Browne is a similar Spanish-type variety without the high-oleic trait and was released by the Georgia Agricultural Experiment Stations in 1993. Both Georgia-04S and Georgia Browne are intended for the same confectionary or candy market as other Spanish types. However, Georgia-04S and Georgia Browne would also be excellent for the roasted or peanut butter trade as well. Each have pod and seed size similar to other Spanish market type varieties. Both Georgia-04S and Georgia Browne have shown a significantly higher yield, TSMK grade and dollar value return per acre compared to all other leading Spanish varieties from 2000 to 2004 in Georgia, and they also have better tomato spotted wilt virus resistance than these other Spanish varieties.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Agricultural competitiveness, agricultural profitability

State Performance Goal: 1-2
Peanut production

a. Tomato spotted wilt virus continues to be a yield-limiting factor in peanut production in Georgia. Severity of the insect-vectored disease varies from year to year with losses ranging from $2 to $43 million annually. Disease epidemiology is extremely complex and the gap between research results and management practices requires considerable education effort. Management requires multiple changes in production practices, and the positive results from those changes must be demonstrated before they are adopted by growers.

   A multi-disciplinary team of Extension faculty has conducted numerous educational meetings with growers, including county-level as well as larger state and national commodity group meetings. Demonstration projects have been conducted on experiment stations and on grower fields, and management plan UGA Tomato Spotted Wilt Risk Index has been developed, validated and periodically modified. Grower meetings and publications are used to educate growers on how to effectively use the index.

b. Surveys provide evidence that the risk index has mediated major changes in peanut production practices in Georgia. Growers have completely shifted their variety selection in favor of partially resistant varieties. Planting dates have shifted later, with less than five percent of the 2005 crop being planted in April compared to over 50 percent prior to release of the index. Over 50 percent of the 2005 crop was planted in twin rows compared to less than 10 percent prior to release of the index. Surveys indicate other index-mediated changes such as increased use of phorate and strip tillage and increased seeding rates.

c. Smith Lever, state matching funds

d. Multi-state Extension: AL, FL

Key Themes: Agricultural competitiveness, agricultural profitability

State Performance Goal: 1-2
Peach production

a. Peach production is important in Georgia and the Southeast. Growers must protect fruit and trees from heavy, season-long pest pressures while providing the marketplace with increasing assurances of food safety, worker safety and environmental stewardship. Fruit quality and tree longevity can only be achieved if pests are managed wisely. Southeastern peach growers and pest management practitioners need up-to-date information on pest biology and pest management technologies to manage pests safely and cost-effectively. Scientists from southeastern land grant institutions and USDA-ARS collaborated to provide outreach education tools for peach growers across the Southeast.

b. Research scientists currently produce the Southern Peach Growers Handbook, the online reference site http://www.ent.uga.edu/fruit.htm and the Southeastern Peach, Nectarine and Plum Pest Management and Culture Guide. These annual updates provide a daily reference for peach growers and pest management practitioners from at least 11 southeastern states. Peach growers across the Southeast are able to make safer, better informed and more cost-effective use of pesticides.

c. Smith Lever, state matching funds

d. Multi-state Extension: AL, SC, NC, AK, FL, TN

Key Themes: Agricultural competitiveness, agricultural profitability, diversified/alternative agriculture, plant germplasm, plant health, small farm viability

State Performance Goal: 12
Southern Region Small Fruit Consortium

a. Limited resources do not allow each state to duplicate efforts and programs even though industries and clientele groups may be rapidly expanding. This is the case in the Southeast with small fruit production and makes participation in the Southern Region Small Fruit Consortium vital to small fruit crops.

   It is far more cost effective to meet the demands for small fruit crop information and research with a regional approach that capitalizes on the individual strengths of each cooperating land grant university. This is the basic premise on which the consortium is founded. It originally involved Clemson University, UGA and North Carolina State University and was established as the Southeastern Small Fruit Center in January 1999. In March 2000, the name was changed to the Southern Region Small Fruit Consortium to include all Southern universities, not just those in the Southeast. In 2002 the University of Tennessee joined the consortium, followed by Virginia Tech in 2005. The consortium's long-term mission 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 small fruit industries in the region.

There are 42 regional experts from the five cooperating states involved in the Southern Region Small Fruit Consortium. This collaborative effort is allowing impact with limited resources.

b. UGA's Blueberry Breeding Program has targeted improvements in blueberry cultivars for several decades. After more than 15 years of testing, the southern highbush cultivar Palmetto was released to offer growers a well-adapted cultivar for their growing conditions. The primary attributes of Palmetto are that it ripens in late April to early May and has robust plant vigor and good berry firmness suitable for storage and shipping. In south Georgia, Palmetto yield exceeded that of Georgiagem by more than 50 percent over a five-year period, and berry quality has been superior as well. Palmetto ripens more than 75 percent of its fruit in the first two weeks of May, compared to only 35 percent for Georgiagem and 50 percent for Sharpblue. Palmetto has shown adaptability across south Georgia and southern Mississippi similar to the Florida cultivar Star. The new release is recommended for trial by growers interested in an early season southern highbush cultivar.

   Georgia faces a number of challenges in blackberry production. Some of the best cultivars for distant shipping, such as Navaho, require about 800 hours of winter chilling for normal development in the spring. However, the average winter chilling in lower south Georgia is only about 750 hours, meaning inadequate winter chilling on some cultivars will occur about 50 percent of the time. The plant growth regulator Dormex has been very effective for improving spring foliar development of blueberries. UGA horticulturists tested it on blackberries for two years. Based on this research, they were able to obtain a state label for the use of Dormex on Georgia blackberries. In 2004 many Georgia blackberry growers applied Dormex to enhance their yields with good results.

c. Hatch Act, Smith Lever, state matching funds

d. Multi-state integrated research and Extension: NC, SC, TN, VA

Key Themes: Agricultural competitiveness, plant health

State Performance Goal 1-2
Blueberry production

a. Blueberry has been a rapidly expanding specialty crop for Georgia over the past decade. It holds one of food's highest antioxidant ratings. Its 2003 farm gate value totaled nearly $27 million and can be expected to increase, driven largely by the health-conscious Atlanta metropolitan market. A significant detriment to successful production of high-quality berries in Georgia is the fungus *Monilinia vaccinii-corymbosi*, which transmits infection through the stigma-style route of entering open flowers, causing mummy berry disease in the developing fruit. Laboratory studies have shown the bacterial biocontrol agent *Bacillus subtilis* to effectively control this

plant disease if deposited directly on the stigmatic surface of the flower. Using conventional spray-application methods, however, it has not been possible in the field to accomplish adequate deposition of the agent onto small diameter stigmas (less than one millimeter).

b. UGA scientists have successfully incorporated electrostatic forces of attraction to increase the mass-transfer of sprays carrying the viable bacterial biocontrol agent onto stigmatic surfaces of blueberry for field spraying. Experiments showed one-eighth to one-fourth-rate electrostatic-spray applications deposited at least as many colony-forming units as did conventional full-rate application of *B. subtilis*. The electrostatic method additionally provided improved biofungicide delivery with a concomitant benefit of requiring only an eighth of the spray volume. Recent experiments have confirmed no detrimental effects upon viability of the bacterial biocontrol agents possibly caused by the method's high electric field exposure and near-sonic air shear during spray atomization and intense droplet charging.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Agricultural competitiveness, agricultural profitability, diversified/alternative agriculture, new uses for agricultural products, niche market, plant germplasm, small farm viability

State Performance Goal 1-34
Exotic fruit

a. Exotic fruits are nutritionally rich and in demand by health conscious Americans. Many imported exotic specialties sell at prime prices. Domestic production to meet consumer demand necessitates technology development for growing exotic fruits locally. The papaya is high in vitamins and minerals, has no starch and is low in sodium, fat and calories. Papain, an enzyme extracted from papaya latex, is extensively used as a meat tenderizer and in beer, leather, wool and rayon industries. The guava is the richest source of vitamin C and dietary fiber among all edible fruits. Similarly, phalsa, aonla, carambola and bael are rich sources of vitamins and minerals. These fruits are consumed in various ways and have many industrial uses. Introduction, developing production technology and marketing are prerequisites before exotic fruits can be cultivated on a commercial scale in the Southeast. Since they are traditionally grown in warm climates, plant regeneration and crop improvement for local tolerance need to be addressed.

   FVSU researchers evaluated selected germplasm of papaya, guava, aonla, phalsa and other exotic species, formulated and refined production technology for papaya, guava and phalsa in Georgia under protected conditions, developed in vitro protocols for plant regeneration and genetic improvement of these species, and devised

environmentally agreeable cultural practices for specialty plants. They developed production technology for papaya, guava and phalsa and evaluated papaya and guava for pest tolerance. They determined yield and fruit quality of papaya, guava and phalsa nutraceutical fruits, identified traits for value-added guava products, and developed environment-friendly production technology for papaya and guava.

b. These activities enhanced knowledge and expertise regarding botany, cultivation, and improvement of papaya, guava and phalsa. The work defined profit potential for farmers growing exotic fruit and enhanced knowledge on nutritious value-added items available to the American consumer. FVSU has encouraged grower and consumer interest for new exotic commodities and developed innovative cultivation to create new opportunities for fruit growers.

c. NARETPA, state matching funds

d. State specific

Key Themes: Agricultural competitiveness, agricultural profitability, diversified/alternative agriculture, new uses for agricultural products, niche market, plant germplasm, small farm viability

State Performance Goal: 1-35
Papaya research

a. The papaya is popular in tropical and subtropical countries because of its easy cultivation, rapid growth, high yield, multiple uses, quick returns and adaptation to diverse conditions. However, it cannot be grown in frost prone areas like the southeastern U.S. Also, the dioecious papaya reveals sex at bloom, and only the female plants produce marketable fruit. These problems can be solved by using tissue culture for multiplication of desirable female plants and biotechnology for developing cold-hardy papaya genotypes.

b. The FVSU program emphasizes interspecific hybridization and embryo rescue, in vitro testing for cold hardiness and other plant stresses, plant regeneration, genetic transformation and germplasm preservation. Scientists formulated optimized in vitro plant regeneration and germplasm preservation techniques, devised in vitro regeneration protocols for mature vegetative tissues of papaya and developed gene transfer protocols for cold hardiness in papaya germplasm.

   The work on in vitro protocol development for papaya plant regeneration, genetic transformation and production of transgenic papaya plants has enhanced knowledge on the biological diversity of papaya.

c. NARETPA, state matching funds

d. State specific

Key Themes: Agricultural profitability, diversified/alternative agriculture, new uses for agricultural products, niche market, plant germplasm, small farm viability

State Performance Goal: 1-33
Medicinal germplasm

a. American agriculture is capital intensive and technology based with the tendency towards larger farms. Many farmers have deserted farm operations due to structural changes in agriculture and economic constraints, greatly harming the very fabric of agriculture and related services in rural communities. Thus, it is crucial to revitalize rural communities by introducing potential new enterprises to create avenues for employment and continued stability. Agriculture provides food and fiber for humans, fodder for animals and raw material for industry. Furthermore, there is a growing demand for a various plant metabolites like phytochemicals, pharmaceuticals and food additives. The FDA approval of medicinal herb extracts as dietary supplements has boosted herbal products in the market. Lack of production technology and adapted genotypes limit production of medicinal herbs in the U.S. The phytopharmaceutical industry is highly organized in other countries. In the U.S., this area of research can provide important leads to help small farmers develop niche markets in plant-based pharmaceuticals.

b. FVSU researchers identified domestic and exotic sources of medicinal plant germplasm. They collected available scutellaria species from domestic and overseas sources. Consequently, they have 13 scutellaria species in collection at FVSU being grown, in vitro multiplied and phytochemically evaluated in the laboratory for their bioactivity using human cell lines. Researchers have developed in vitro plant regeneration protocols for several scutellaria species, many of them threatened. Work continues on devising techniques for genetic transformation. The scientists have also phytochemically evaluated and selected scutellaria species/genotypes for cultivation through in vitro culture, developed plant regeneration protocols and tissue culture system in a lab rocking bioreactor and worked on molecular markers using AFLP analysis. FVSU continues to work with local growers in this new enterprise.

c. NARETPA, state matching funds

d. State specific

Key Themes: Adding value to new and old agriculture products, agricultural competitiveness, agricultural profitability, plant Genomics, plant germplasm

State Performance Goal: 1-37
Daylilies

a. The daylily, a popular perennial, has been use extensively in home and commercial landscapes because of its form, ability to provide seasonal color and ease of culture. Nearly 60,000 varieties have been registered and many are available commercially. Unfortunately, typical daylily propagation is very slow. Vegetative propagation by division of the crown gives a net gain of one or two additional plants a year. With this in mind, FVSU researches have employed tissue culture techniques to rapidly propagate new varieties of daylilies and to speed up commercial release by several years.

   Over the past five years, daylily plantlets have been produced from tissue culture protocols developed at FVSU's Agricultural Research Station Laboratory. During the spring and summer of 2000, preliminary field studies were initiated to determine true-to-type tissue culture daylily plantlets. Results from this study suggested that explant sources could influence the plantlets ability to be true-to-type. With this in mind, studies were conducted to determine the effect of different explant sources for maximum flower production in daylily tissue cultured plantlets. During the spring and summer of 2004 and 2005, field studies were initiated to determine the effect of different explant sources on flower production in daylily tissue culture plantlets. Explants from immature seeds, immature and mature embryos, young inflorescences, ovary sections and daylily flower bud filaments were investigated as the explant sources. Tissue culture plantlets of the immature and mature embryos and filaments from young bud treatments were tested in field studies. True-to-type was measured by determining survivability, growth rate, multiplication of crowns and the numbers of flowers produced by tissue culture produced plantlets. Results from these studies showed that 100 percent of the plantlets survived for each treatment. For both years, the plantlets grew at a reasonable rate, producing two to four crown divisions. Flower production was limited on all plantlets the first year while there was a considerable improvement in flower production for all the plantlets the second year.

b. Information from this study has been disseminated at Agricultural Showcase, Sunbelt Expos, field days, national and international conferences and meetings. It is anticipated that the daylily results will greatly enhance the goal of making varieties more readily available to the public. Research results from these evaluations will be available to daylily growers and producers on all levels.

c. NARETPA, state matching funds

d. State specific

Key Themes: Agricultural competitiveness, risk management

State Performance Goal: 1-18
Automated irrigation control

a. Efficient water use is critical for the development of both rural and urban communities. In many rural regions, agricultural water use is estimated at 50 percent of total water consumed. In the Flint River Basin, the state has purchased surface water irrigation rights from farmers. If drought returns, this scenario may be repeated in other river basins as well. The impact of this economic policy is devastating to agricultural communities as the ripple effect moves through an economy that revolves around farming. Improved agricultural water-use efficiency can be achieved by developing drought-tolerant and water-efficient crops and by developing new water-management tools.

   Researchers developed a wireless real-time smart sensor array for scheduling irrigation. The purpose of the smart sensor array is to alert a grower when a crop needs irrigation so the proper amount of water is provided at the proper time. To make it cheap and reliable, the sensor array mostly uses off-the-shelf components including Watermark® soil moisture sensors, thermocouples for measuring soil or canopy temperature and RFID (Radio Frequency Identification) tags for transmitting data. RFID tags are the same technology supermarkets and other large retailers use to track shelf inventory. Consequently they are mass-produced and cheap.

b. The best method for scheduling irrigation is to measure soil moisture in many locations within a field and respond to those measurements. Because the smart sensor array is wireless, inexpensive and fully automated, it can be installed at high densities anywhere in a field without interrupting field operations. Projected costs for a commercialized system are $1,400 for a field with 10 sensor locations and $1,800 for a field with 20 sensor locations. The smart sensor array was field tested and used to schedule irrigation in peanuts and cotton during 2005. Irrigation protocols were developed. The sensor array matched or surpassed other scheduling techniques and is now ready for commercialization.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Agricultural profitability

State Performance Goal: 1-4
Conservation tillage

a. Interest in conservation tillage for peanuts is growing in Georgia. Conventional tillage in peanut production includes disking and plowing before planting seed. Conservation tillage involves minimizing soil disturbance. UGA has conducted research into different tillage systems including no-till, para-till and strip-till. The majority of peanuts are grown by conventional tillage methods using a moldboard plow or in a cotton system of rip and hip. Strip-till, however, has been found to be a popular conservation tillage system for cotton and peanuts. By 2003, conservation

tillage is estimated to have included over 20 percent of Georgia peanut acres. The row pattern for peanuts has been shown to affect the yield and grade of peanuts. Research has also shown planting peanuts in a twin row pattern increases yield by 400 pounds per acre. Many peanut producers have adopted the twin row pattern with an estimated 40 percent of Georgia's 2003 peanut acreage planted in twin rows.

Production research was started in 1999 to investigate the benefits of a combination of the twin row pattern and conservation tillage (strip-till) in peanuts. An economic analysis was conducted using the results from strip tillage peanut research in 12 locations during 1999 to 2001 for single and twin row patterns. The results were compared to the traditional conventional tillage system.

b. The economic benefit from the twin row pattern for peanuts was estimated at $70.98 per acre for conventional tillage. Conservation tillage was shown to increase net returns by $45.69 per acre in a single row pattern. Net return under a combination of twin rows and conservation tillage is shown to increase by $27.32 per acre, but is not statistically different than single row with conservation tillage. Based on these trials, switching to a twin row pattern is the optimal production strategy. Conservation tillage should be considered for single row patterns. Strip tillage shows positive returns but investment in equipment may not be financially feasible.

c. Hatch Act, state matching funds

d. State specific

Key Theme: Agricultural profitability

State Performance Goal: 1-18
Soil improvements

a. Sustained market growth for organically grown foods in the U.S. has stimulated new national, state and private research initiatives to understand the key factors driving expansion. Profitability and long-term economic viability, as well as environmental benefits, are indicators that can guide farmer decisions to initiate or expand organic operations. UGA agricultural and applied economists developed a production function approach to assess the agri-environmental efficiency of organic farming. The model highlights soil quality enhancing inputs in the production process, recognizing productivity impacts when organic farmers execute a plan for improving soil quality and testing the assumption that self-sufficiency in these inputs is desirable. The approach is used to assess productivity drivers and efficiency achieved by organic producers in Georgia and the U.S. with respect to efforts to improve soil quality and identify factors that influence farm economic performance. Farmers can maintain efficiency in their organic operations and can improve their management skills with a targeted adoption of these soil improving inputs.

b. Research and Extension efforts to increase farm self-sufficiency in soil improving inputs and provide systematic information on matching these inputs to farm needs should generate more uniform productivity gains, thereby raising technical efficiency for the entire organic crop production sector. Management specialization, crop diversification and acreage flexibility have all been shown to have significant positive effects on the value of organic production.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Agricultural profitability, plant health, risk management

State Performance Goal: 1-1
Educating Hispanic landscape workers

a. Eighty percent of the landscape companies, greenhouses and nurseries employ Hispanics workers, a number that totals nearly 35,000 employees. Language and cultural barriers hamper productivity, efficiency and safety in the industry. The routine use of pesticides, heavy equipment and tools in daily activities makes this group particularly prone to mismanagement of products and misuse of tools, giving rise to work-related accidents. To train, create awareness and implement sustainable safety practices among Hispanic landscape workers, UGA plant pathologists received a $105,000 grant from the Occupational Safety and Health Administration Susan Hardwood Training Program.

b. To date a 100-page, bilingual manual entitled “Landscape Safety Training Manual for Hispanic Workers” has been developed. A total of 323 participants have been trained throughout the state. In all the training venues there was a 100 percent improvement in the knowledge and application of safety practices, according to comparisons between pre and post tests. One landscape company wrote, “The safety precautions instructed and addressed … have made such an impact to not only the employees but to the entire company.”

c. Smith Lever, state matching funds

d. State specific

Key Themes: Agricultural profitability

State Performance Goal: 1-4
Income tax of farm business

a. Farmers receive separate treatment from other classes of taxpayers with respect to many aspects of the Internal Revenue Code of the U.S. Department of the Treasury. Farmers' understanding of the Internal Revenue Code is limited due to the code's complexity. Maintenance of current understanding of the code as it applies to farmers by income tax return preparers is difficult due to the limited number of professional education offerings which include analysis and explanation of farm income tax issues. An Extension agricultural economist serves as subject matter specialist in the area of taxation, with emphasis on income taxation. The economist has developed extensive knowledge of income tax issues specific to farm business.

b. The economist conducted or participated in 16 meetings between November 2004 and September 2005, providing information on income tax issues related to the tobacco termination payments program to more than 650 tobacco quota holders, producers, USDA Farm Service Agency employees and lenders. The economist also provided general income, gift and estate tax education to 25 cattle producers in Hall County and explained the income taxation of cooperatives to participants in a state-wide cooperative workshop developed by the Center for Agribusiness and Economic Development. The economist also serves as co-chair of the National Farm Income Tax Extension Committee, which works with employees of the Internal Revenue Service in the production of IRS Publication 225, the "Farmers Tax Guide."

c. Smith Lever, state matching funds

d. State specific

Key Theme: Agricultural profitability

State Performance Goal: 1-18
Federal funding on peanuts

a. The Farm Security and Rural Investment Act (FSRIA) of 2002 abolished the decades-old peanut quota program and established a marketing loan program for peanuts similar to other commodities produced in the U.S. It also established that the storage, handling and other associated costs for peanuts meeting Commodity Credit Cooperation standards and voluntarily placed in the marketing loan program be paid by the CCC through the end of the 2006 crop marketing year. As the FSRIA of 2002 was written, these costs for peanuts placed in the marketing loan were not federally funded for the 2007 crop year and beyond. The lack of federal funding for storage, handling and other associated cost beyond the 2006 crop marketing year is poised to have a negative impact on peanut farms in the Southeast. In response to industry speculation and interest, UGA's National Center for Peanut Competitiveness carried out a preliminary study to determine the economic impact of storage, handling and other associated costs for peanuts placed in the marketing loan. Using the Texas A&M Ag and Food Policy Center's FLIPSIM model and the August 2005 baseline,

the economic viability from 2005 to 2010 for the southeastern representative peanut farms was analyzed with and without federal funding of these costs for peanuts.

b. The overall economic viability of a farm is based on the probabilities of a farm having negative ending cash reserves and losing net worth. For the benchmark analysis of 11 southeastern representative peanut farms, two are projected to have good overall economic viability, one moderate, and eight poor from 2005 to 2010.The benchmark analysis has a composite average net cash farm income (NCFI) for all farms of $21,591 per year from 2005 to 2010. The average NCFI for the alternate scenario, which funds storage, handling and associated cost beyond the 2006 crop year, was $46,851 per year. The economic impact averages $25,260 per year per southeastern representative peanut farm. Considering the farms on an individual basis, this impact ranges from a maximum average NCFI of $75,283 per year on one farm to a minimum of $3,365 per year on another.

c. Hatch Act, state matching funds

d. State specific

Goal Two:
A safe and secure food and fiber system

From sterile meat processing plants to basic individual knowledge, food safety is a serious concern in any state. In fact, as the following pages show, both the CDC and FDA estimate that there are as many as 33 million reported cases of foodborne illnesses each year in the United States. That doesn't include cases that go unreported.

With so many incidents, food safety education continues to be an essential part of programs for the University of Georgia and Fort Valley State University. In 2005, FVSU campus and county-based employees implemented programs in schools, churches, homes and other sites. These programs covered everything from food preparation to hand washing. At UGA, Extension agents conducted group training programs for consumers, elementary and high school students, child care providers, personal care home providers, school food service employees, restaurant employees, food processors and others. Together, the universities reached 17,831 people with food safety education. These included the ServSafe® manager training, Smart Kids Fight BAC! ® and other programs.

As goat dairy production grows, the demand for goods year-round is also increasing. Goat milk production's seasonality has been the greatest inherent limitation to dairy goat industry growth. Researchers at Fort Valley State are finding ways to keep dairy items such as fresh plain soft and Monterey Jack goat milk cheeses on the shelves.

In goat meat production, a daunting task facing researchers has been the challenge of keeping the meat contaminate-free without significant increases in costs. They have found that a seaweed extract as well as a chlorinated skin wash can effectively control contamination. Poultry scientists, also worried about the same microbiological problem, are conducting research related to sanitizing and bacterial reduction methods for poultry processing plants.

Foodborne illnesses often start on particular produce. For instance, cantaloupe has been involved in 14 outbreaks of foodborne illnesses in the past 13 years. Inadequate chlorination and pH monitoring of wash waters and other issues factor into contamination. Through training, UGA is teaching safe handling practices.

Contamination doesn't just come from dirty water or hands, and terrorism doesn't just involve someone blowing up a building. Seemingly obscure agroterrorism problems, such as the intentional contamination of fresh produce, affects everyone from the producer to the grocer to the consumer. UGA Extension food science specialists continue to help packinghouses and fresh-cut processing operations strengthen their security through audits and various training programs.

Key Themes: Food handling, food safety

State Performance Goal: 2-1
Foodborne illnesses

a. The Centers for Disease Control and Prevention and the Food and Drug Administration have estimated as many as 33 million reported cases of foodborne illnesses each year in the U.S. The economic costs of foodborne illnesses estimate from a low of nearly $500 million to a high of $7 billion a year. In spite of the serious consequences associated with foodborne illness, few consumers have any food handling education. This lack of education in rural low-income communities has implications both for consumers handling their own food and for their ability to assess the safety of food obtained in eating establishments. The benefits of implementing a food safety program for audiences with low incomes and limited resources are that these families and individuals will improve their food handling practices, reduce their risk for foodborne illnesses and lower the economic costs associated with foodborne illnesses.

   A food safety program for county-based employees designed to teach and educate their clients was continued. The program's major components 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.

   One county agent and six program assistants attended 65 trainings; worked with 138 volunteers, 1,530 families, 1,782 adults and 1,786 children; made 3,389 home visits; distributed 15,375 publications; and conducted 251 group programs and activities. The specialist distributed nearly 3,000 handouts.

b. Campus and county-based employees reached a reported 7,234 clients. Programs were implemented in schools, churches, homes and other sites on food safety, food preparation, hand washing, thawing foods and stopping bacterial growth. A reported 14 percent (1,057) of clients increased their knowledge of foodborne illness, 13 percent (963) are cooking and storing foods better, 18 percent (1,293) are using proper hand washing practices, 10 percent (752) are using thermometers and 13 percent (990) are better understanding the relation of food safety to better health. In addition, county-based employees regularly work with 1,998 clients and have identified seven food safety and health issues in their counties that they are working to address. County-based employees indicated that they implemented 10 food safety programs and activities in their counties in 2005.

c. NARETPA, state matching funds

d. State specific

Key Themes: Food handling, food quality, food safety, foodborne illness, foodborne pathogen protection

State Performance Goal: 2-1
Foodborne illness

a. The reported incidence of foodborne illness from pathogenic bacteria is increasing. These illnesses may be life threatening or trigger chronic disease. Changing consumption patterns, an aging population, increased chronic illness and wide variations in food handling and preparation practices are some factors contributing to increased vulnerability to foodborne disease. Food safety and quality concerns often put different groups within society in conflict over perceived and real concerns. Approximately 97 percent of documented foodborne illness cases result from mishandling foods in food service establishments and in the home. The resulting percentage from food service establishments alone is about 77 percent. With an increasing number of meals being eaten away from home, there is the potential for an increased incidence of foodborne illness. Employee education and certification in the sanitary handling of food is viewed by food protection experts nationally as one strategy for reducing foodborne hazards to the consumer.

   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 professionals. 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 industry clientele. Extension educators were trained and updated in food safety issues and recommended food handling practices yearly. Training was offered in specific curricula use, such as the ServSafe® (EFNRA) food service manager certification and employee training programs and the Smart Kids Fight BAC!®

   More than 19,600 educational contact hours in food handler education were provided to 2,408 foodservice personnel, including 9,162 educational contact hours provided to 741 foodservice managers who received the ServSafe® manager training and 5,939 educational contact hours provided to 736 foodservice workers who received ServSafe® employee training. Nearly 6,765 educational contact hours of food safety education were provided to 10,597 consumers, families and youths. Fifty-seven percent of them were at risk or low income Georgians. Nearly 550 educational contact hours in home food preservation were provided to 755 program participants.

   Almost 1,600 food safety education contact hours were provided to 336 child care providers and more than 8,300 contact hours were provided to 1,331 school food service employees. The Smart Kids Fight BAC! ® food safety program provided nearly 1,000 contact hours to 2,122 elementary school children. Media was also a

major strategy for food safety education with 274 exhibits, five radio spots, 56 newspaper columns and web materials reaching over 1.7 million users.

b. Of the foodservice employees who participated in the ServSafe® food safety education program, 97 percent improved their knowledge in recognizing hazardous food situations, receiving and storing food safely, preparing and serving food safely, preventing contamination and personal hygiene.

The ServSafe® employee training program provided certificates to 651 foodservice workers in fiscal year 2005. After training, more than 98 percent expressed their preparedness to follow recommended food safety practices such as washing their hands with warm running water and soap for at least 20 seconds before working with foods. Additionally, the participants who completed the ServSafe® employee food safety program emphasized their preparedness to secure food's safety.

The ServSafe® manager training program certified 484 food service managers in 2005. More than 95 percent of food service managers who completed the ServSafe® training planned to implement recommended food handling practices in their food establishments. At the end of the training, participants emphasized their preparedness to apply gained knowledge to train others. One manager said, "I plan to teach my staff about the different kinds of bacteria and viruses, to correctly wash their hands, correct time and temperature of foods, and how to prevent cross-contamination."

Child care providers who participated in the Smart CareGivers Fight BAC! ® food safety education program significantly improved their knowledge and learned to follow recommended food handling practices. Of the child care providers who participated in the program, 92 percent improved their food-handling knowledge and 83 percent improved food safety practices. Comparison of pre- and post-test evaluations indicates that the elementary school children who participated in the Smart Kids Fight BAC!® program significantly improved their food safety knowledge related to cleaning, preventing cross contamination, cooking and chilling. Most of the children learned recommended food safety practices. For example, 95 percent learned the correct method to clean their hands before touching foods.

Of the general public who participated in food safety education programs, 92 percent said it was helpful to learn about food safety practices. More than 90 percent of participants said they intend to follow recommended food safety practices. For example, 91 percent said they intend to use a food thermometer to decide whether meat is done when they cook meat, poultry or fish; and 94 percent said they intend to thaw food either in the refrigerator, in cold running water or in the microwave right before cooking.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Food handling, food quality, food safety

State Performance Goal: 2-10
Goat milk supply

a. The enhancement of the dairy goat industry's profitability and sustainability is of paramount importance for the industry's survival, especially for the underserved limited resource dairy goat farmers. The seasonality of milk production has been the greatest inherent limitation to dairy goat industry growth, which prevents dairy goat farmers from uniform production and product supply. It would be essential to develop quality goat milk products year-round through an innovative technological approach to processing surplus milk produced during the peak season and store the products for later marketing during off season.

   In order to investigate the stated problems, goals have been set to develop technologically innovative frozen-stored cheddar and/or Monterey Jack goat milk cheeses; evaluate microbiological, rheological, flavor and sensory properties of the developed goat cheeses in comparison with a commercial soft goat cheese; and perform economic/financial analysis to determine the viability of a future enterprise of commercial goat cheeses.

   Research outcomes were reported and disseminated through dairy goat producer workshops, Extension newsletters, presentations at many professional scientific conferences and publications in several scientific journals.

b. Freezing fresh plain soft and Monterey Jack goat milk cheeses for up to six months did not impact overall sensory quality. These results indicate frozen storage of soft and Monterey Jack goat cheeses up to six months is feasible for later marketing during the off season of milk production. These outcomes will make a tremendous positive impact on the profitability and sustainability of the dairy goat industry as well as the limited resource goat farmers. Marketing these developed and frozen stored goat products for year-round uniform marketing will improve the industry.

c. NARETPA, Hatch Act, state matching funds

d. Multi-state research: NC, TX, UT, OH

Key Themes: Food quality, food safety, foodborne pathogen protection

State Performance Goal: 2-9
Goat processing

a. Appropriate pre- and post-slaughter methodologies are essential to obtain meat products of superior palatability and shelf life. Since the meat goat industry is still in

infancy in the U.S., methodologies suitable for meat goats and goat carcasses are not fully understood. Currently, researchers are focusing more on pre-slaughter intervention strategies to prevent pathogen contamination of carcasses and meat. For example, dietary supplementation of brown seaweed extract has been reported to reduce E. coli counts in beef cattle, although the mechanism of action is not clear. Developing value-added products using chevon is expected to widen the existing market and increase the number of consumers benefiting from this low-fat red meat.

FVSU scientists have conducted studies in relation to product development and food safety -- from chevon jerky's shelf life, seaweed extract supplementation effects and chlorinated skin wash on skin to carcass microbial contamination in goats.

b. The microbial quality of chevon jerky is very good, and contamination of goat carcasses and meat can be effectively controlled by pre-slaughter intervention strategies. These technologies can be easily implemented in even very small operations without significant increases in costs. Information gathered from these projects will be further disseminated to the producers and processors via workshops and training programs conducted in collaboration with FVSU Extension personnel. FVSU faculty have published numerous scientific publications in this area.

c. NARETPA, state matching funds

d. Multi-state research: LA, MD

Key Themes: Food handling, food quality, food safety

State Performance Goal: 2-5
Poultry processing

a. Processing, further processing and value-added poultry plants are major components of Georgia's poultry industry. Over 30 plants are currently in operation, processing more than six 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 to ensure profitability and compliance with government regulations.

Faculty in the departments of poultry science and food science are working collaboratively to reduce microbiological contamination levels in poultry processing plants. Field studies and research projects are being conducted related to sanitizing and bacterial reduction methods for poultry processing plants.

b. Results of research and field study programs have been presented at scientific and industry meetings. Several workshops and more than 15 presentations have been made to industry audiences on these subjects. As a result, poultry processors in Georgia have been able to meet government-mandated requirements for HACCP

programs and FSIS-mandated requirements for reduced bacterial contamination levels in poultry plants.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Food handling, food safety, foodborne illness, foodborne pathogen protection

State Performance Goal: 2-1
Handling Georgia's Cantaloupe Produce Safely

a. Cantaloupe has been involved in 14 reported outbreaks of foodborne illness in the past 13 years, particularly from cut melons not consumed quickly enough. Scientific documentation and validation of methods used to reduce naturally occurring microflora on cantaloupes during post-harvest handling, especially E. coli, shigella and salmonella, were carried out both in the field and in simulation during recent studies by UGA faculty.

   Testing at four Georgia cantaloupe grower/packer facilities revealed inadequate chlorination and pH monitoring of wash waters could allow cross-contamination of aerobic bacteria, E. coli and other coliforms. Improper employee hygiene, poor conveyor and packing equipment sanitation and warmer temperatures could also contribute to an increase in contamination during packing. Microbial testing of 870 cantaloupe samples collected in the field, at the dump tank and at packaging revealed that E. coli and coliform contamination was greater after washing and packing than in the field. Only one salmonella positive was found.

b. The importance of proper wash water, equipment sanitation and employee hygiene cannot be stressed enough. Recommendations have been made to the participating facilities on methods to reduce the contamination potential of cantaloupes during post-harvest handling and packing. Results and recommendations were incorporated into the UGA Fresh Produce workshop materials. Articles have been submitted to trade magazines in support of this educational effort.

c. Hatch Act, Smith Lever, state matching funds

d. Integrated Extension and research

Key Themes: Food handling, food safety, food security, foodborne pathogen protection

State Performance Goal: 2-11
Agrosecurity

a. Intentional contamination of fresh produce will always be a risk for Georgia growers and packers. UGA Extension food science specialists in conjunction with their counterparts at Clemson University and the University of Florida have developed a standardized biosecurity audit to gauge the preparedness level that fresh produce growers and processors have implemented since the Biosecurity Act of 2002 was issued.

   During 2004's harvest season, 25 farms, 25 packinghouse and six fresh-cut processing operations in Georgia, Florida and South Carolina were surveyed. Initial findings indicate practically all of the fresh-cut processors have a written security plan, conduct security training for their employees and have restricted access to their facilities. However, only about half of the farm and/or packinghouse operations provide employee security training, and only 24 percent of packinghouses surveyed have written security plans. About half of the packinghouses surveyed have perimeter fencing and only half have locks on their cooler doors. Documentation of any sort of security practice is lacking among both growers and packers. Survey data indicates that while fresh-cut processing facilities are dealing with current security challenges, farm and packing operations in the tri-state region are lagging behind. The open nature of farm and packing operations would seem to preclude them from increased security, however measures could be put in place to raise the security level.

b. Written recommendations were made for security improvements at the end of each audit. County faculties have been trained, and evaluation reports were created for use with local clientele. County faculty are currently using this information in local programs to address issues and concerns.

c. Smith Lever, state matching funds

d. Multi-state Extension: FL, SC

Goal Three:
A healthy, more well nourished population

Hypertension, heart disease, cancer, stroke, diabetes, osteoporosis and obesity are all leading causes of diet-related mortality and morbidity in the United States. Because, as mentioned, they are related to a person's diet, each disease can be, in part, controlled through what a person eats and how a person exercises.

Nutrition programs are vital in Georgia. Research has shown strong and consistent patterns between a diet rich in fruits and vegetables and a lowered risk of a number of chronic disease. The 2005 Dietary Guidelines provides information from choosing a nutritious diet to maintaining a health weight. These guidelines and other resources provided the foundation for programs that reached 8,050 people in 2005.

All the programs in the world won't help if they don't reach the people who need help the most. With almost 15 percent of Georgia's population at or below the poverty level, many lack food quantity and quality for adequate nutrition. Because of this, a program was developed to teach hard-to-reach audiences about nutrition. In 2005, it taught 3,310 families on topics ranging from food budgeting to healthy food choices.

Diabetes, mentioned previously as one of the leading causes of diet-related deaths, is especially prevalent among minority, low income and educationally disadvantaged audiences. To combat this disease, UGA Extension formulated a comprehensive diabetes education program which reached 2,792 individuals in 2005 through a "Focus on Diabetes" CD, Walk-A-Weigh and other programs.

Obesity, another leading cause of diet-related deaths, is a growing problem among children. The major concern about childhood obesity is that the condition is likely to continue into adulthood, seriously increasing the risks of related chronic conditions. UGA researchers are studying the causes behind childhood obesity and looking for solutions.

The following section highlights these and other ways the state's land grant universities are working to give Georgia a healthy, more well-nourished population.

Key Themes: Human health, human nutrition

Chronic diseases

a. Research has shown strong and consistent patterns of relationships between diet quality rich in fruits and vegetables and lowered risk of a number of chronic diseases. Based on the latest scientific evidence, the 2005 Dietary Guidelines provides information and advice from choosing a nutritious diet to maintaining a healthy weight and achieving adequate exercise. 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.

The primary benefit of implementing a nutrition program for clients with chronic diseases is that it helps improve their quality of life while reducing associated economic costs. Therefore, FVSU continued a nutrition program to address chronic diseases. Major components of the program are the 2005 Dietary Guidelines for Americans and various hypertension, heart disease, cancer, diabetes, obesity, exercise, nutrition, diet and health resources. Various curriculums and exhibits were used, resources were purchased, and publications were written and distributed.

b. One county agent and six program assistants attended 80 trainings; worked with 161 volunteers, 2,103 families, 2,498 adults and 3,088 children; made 3,301 home visits, distributed 22,055 publications and handouts, and conducted 310 group programs and activities. The specialist reached over 200 individuals in group meetings and distributed nearly 30,000 publications and handouts.

   Campus and county-based employees reached a reported 8,050 clients. Programs on basic nutrition, diet, exercise and chronic disease were implemented at schools, churches, home and other sites. All of the programs focused on improving nutrition and health. A reported 14 percent (1,132) of clients improved their nutrition behavior, 13 percent (1,097) changed their eating habits and exercise more and 15 percent (1,239) are practicing healthy lifestyles. In addition, county-based employees regularly work with 3,068 clients. Through these clients, employees have identified 13 current nutrition and health-related issues and concerns in their counties they are working to address. They have also implemented 10 nutrition programs and activities in their counties this year.

c. NARETPA, state matching funds

d. State specific

Key Themes: Human health, human nutrition

State Performance Goal: 3-2
Poverty and nutrition

a. Almost 15 percent of Georgia's population is at or below the poverty level. As a result, many people lack the quantity and quality of food for adequate nutrition. The impact of hunger is that it compromises the ability to learn because it reduces the ability of a child to concentrate. Under nutrition during pregnancy can result in infants with low birth rates who are more likely to require intensive medical care and special education services. Plus, a mother's insufficient folic acid intake can result in infants with neural tube defects. Nutrition education programs enable families and

individuals to make food selection and preparation choices consistent with their lifestyle and cultural practices that enhance their health status. These programs enable families with limited resources to get the most nutritional value for their food dollar. In the long-term, nutrition education programs benefit families, individuals and society by improving overall health and wellbeing.

Under the Expanded Foods and Nutrition Education Program (EFNEP) and the Family Nutrition Program (FNP), UGA faculty has trained paraprofessionals in low-income communities to teach nutrition to hard-to-reach audiences using culturally appropriate methods and materials. Faculty and staff 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. Additionally, limited resource clients were taught how to modify their diets to decrease the risk of chronic diseases and the importance of food safety. Faculty also provided nutrition education to teenage mothers in order to increase maternal weight gain and intake of crucial nutrients. Through the adult program, EFNEP reached a total of 3,310 families in fiscal year 2005, of which 67 percent were black, 18 percent white, 13 percent Hispanic and one percent Asian. Of the participants, 97 percent were female. In 2005, eight percent of EFNEP clients were pregnant at the time they were enrolled in the program, and seven percent were under 20 and pregnant and/or nursing, for a total of 217 women. A total of 9,559 youth were reached through EFNEP. The Family Nutrition Program provided 30,400 hours of education to 33,705 individuals. Nearly 85 percent of participants were low-income Georgians. The FNP presented nearly 1,000 nutrition education sessions for food stamp eligible audiences in FY05. These lessons covered such topics as meal planning, food budgeting, making healthy food choices and food safety. The Building Healthy Bodies youth programs reached over 9,400 children in 2005. The Family Nutrition Program used media outlets as a strategy for nutrition education and outreach. Extension events such as health fairs, exhibits, TV presentations, radio broadcasts, newspaper articles and newsletters reached over 3.3 million Georgians.

b. A total of 2,129 people graduated from the EFNEP program in 2005. When they entered EFNEP, 81 percent of the clients were enrolled in one or more food assistance programs, and 54 percent reported receiving Food Stamps. As a result of EFNEP, 14 percent of participating families enrolled in the Food Stamp program. In addition, nine percent enrolled in WIC and five percent began participating in the child nutrition program.

   After completing the EFNEP program, 91 percent of EFNEP graduates had a positive change in the nutritional value of their diets and saved an average of $36.66 per family per month on food. Sixty-three percent of graduates showed improvement in one or more food safety practices, such as thawing and storing foods properly; and 77 percent improved one or more food resource management practices, including planning meals, using grocery lists and comparing prices. Eighty-three percent improved nutrition practices such as making healthy food choices, preparing foods without adding salt, reading nutrition labels and eating breakfast.

Among youth participants, 58 percent reported that they eat a wider variety of foods as a result of EFNEP. Of 125 youth, 90 percent reported improved practices in food preparation and safety and 63 percent increased their knowledge of nutrition.

Ninety-four percent of the participants in FNP programs said those training sessions helped them learn healthy meal planning and dietary guidelines. More than 75 percent indicated they intended to adopt one or more healthy food and nutrition practices. More than 75 percent of the children who participated in the Building Healthy Bodies nutrition education program learned to identify foods from five groups of the food guide pyramid.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Human health, human nutrition

State Performance Goal: 3-1

Diabetes

a. Diabetes, a diet-related disease, is a major public health problem in Georgia. It and other diseases such as hypertension and stroke affect minority, low income and educationally disadvantaged individuals at a disproportionately higher rate than the general population. Approximately 6.9 percent of Georgia's adult population had diagnosed diabetes in 2001. For every two persons diagnosed with diabetes, another has not yet been diagnosed. It is estimated $1 billion could be saved in medical care costs due to complications of diabetes if nutrition education were a routine part of diabetes management.

UGA's Cooperative Extension 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 agents, and a diabetes management program conducted locally by county agents, cooperating hospitals, health departments and/or physicians. Faculty provided the "Focus on Diabetes" CD to teach the basics of diabetes self-management. Specialists wrote and agents conducted Walk-a-Weigh, a comprehensive social learning-based weight management curriculum. Fitness was emphasized, and walking was an integral part of the program. Recipes which teach lesson concepts were demonstrated and sampled as a part of this effort.

Diabetes education programs provided nearly 2,500 hours of diabetes control and prevention instruction to 2,792 Georgians in 2005. The Walk-A-Weigh program reached 847 Georgians and provided 930 hours of nutrition and exercise education in

2005. During the last programming year, Extension nutrition programs provided over 50,000 hours of education to 51,640 individuals. Nearly 67 percent were low income Georgians, who along with minority and educationally disadvantaged carry a disproportionate burden of diet-related disease, according to statistics. Extension nutrition and chronic disease prevention programs provided over 7,000 hours of education to 13,625 Georgians of which 46 percent were low income. Media was a major strategy for educating Georgians on controlling and preventing diabetes. For example, the Diabetes Life Lines Newsletter reached over 13,450 readers; four radio spots were broadcast to over 67,000 people; 19 newspaper columns went to a circulation of 229,000-plus readers; two television programs targeted over 20,500 viewers and 10 exhibits reached over 1,400 people.

b. The comparison of pre- and post-evaluation data shows most participants who completed the Walk-A-Weigh nutrition and exercise program significantly improved their dietary and exercise habits. For example, 77 percent improved their exercise habits; 60 percent started eating at least two servings of fruit every day; 63 percent modified recipes by using low-fat ingredients; 60 percent started reading nutrition labels to make healthy food choices; and 58 percent started eating at least two servings of low-fat or nonfat dairy products everyday. Comparison of pre- and post-evaluations shows that 95 percent of participants who completed the Walk-a-Weigh program improved their overall dietary and exercise habits and adopted a healthy lifestyle. The lifestyle changes helped participants reach weight loss goals and reduce risk factors. This is confirmed by the clinical and medical data of Walk-A-Weigh participants. Seventy-eight percent of the participants reduced their excess body weight by an average of four pounds during six weeks, 50 percent reduced high blood pressure and 81 percent decreased their total cholesterol level.

   Of Georgians who participated in diabetes education programs, 94 percent said those sessions helped them learn how to control diabetes by practicing healthy habits. Most of the participants improved their diabetes management knowledge and planned to follow healthy practices. For example, 64 percent planned to be physically active five or more days a week; 88 percent planned to keep written records of their blood glucose values, food intake, medicine doses and physical activity; and 65 percent planned to eat at lease three vegetables every day.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Human Nutrition

State Performance Goal: 3-3
Obesity among children

a. The growing prevalence of overweight and obesity and their occurrence at early ages is a serious concern to public health officials in the U.S. Furthermore, the economic costs due to obesity are estimated to exceed $120 billion per year. A major concern about childhood obesity is the condition is likely to continue in adulthood with serious risks of related chronic conditions. Studies have shown that good predictions of adults who will be overweight at age 35 could be obtained based on childhood weight status at 13 years old. Despite growing awareness, many eating behaviors observed in U.S. children show serious departure from the recommendations of the Dietary Guidelines for Americans or the Food Guide Pyramid. On average, children and adolescents tend to consume too much fat, saturated fat and sodium and not enough fruits, vegetables and calcium. Many studies have examined the relationship between childhood overweight and dietary factors. However, past studies tended to focus on specific foods or nutrients.

   A comprehensive analysis was conducted to investigate and establish the potential connection between food and nutrient consumption patterns and children's weight status defined by body mass index. The study examines an array of social, economic, demographic, lifestyle and dietary factors that may affect the likelihood of children becoming overweight. Survey data from the USDA 1994-96 and 1998 Continuing Survey of Food Intakes by Individuals were used in this study. The sample included only school children ages 5-18. These children were subdivided into two groups, one with children ages 5-11 and the other with older children ages 12-18, to account for distinctive characteristics in both age groups and differences in survey design.

b. In general, survey data showed a greater proportion of younger school-age children live in the northeastern region of the U.S. than that of older school-age children over 11 years of age. In contrast, a higher proportion of older children live in the Midwest region and non-metropolitan areas. In terms of physical activities or sedentary behaviors, older children reported they exercise about four times per week. Older school-age children, on average, spent slightly more time per day watching television and playing video games than their younger counterparts. With respect to food intakes or dietary habits, older children also consume substantially higher amount of grains, vegetables, legumes, soft drinks, cholesterol and sodium than younger children do. Results obtained from the regression model show that Hispanic and African-American children seem to associate more with the risk of being overweight. Poverty is another major variable associated with being overweight among school-age children. Sedentary behavior was associated with overweight among children 12-18, while frequency of physical exercises was found to be associated with normal weight. Consumption of low fat milk, other dairy products, fruits and legumes are not associated with the probabilities of being at risk for overweight among school-age children. In contrast, increasing consumption of soft drinks, fats, oils and sodium appear to be major dietary factors associated with childhood overweight.

c. Hatch Act, state matching funds

d. State specific

Goal Four:
Greater harmony between agriculture and the environment

From wood waste to proper poultry manure application, harmony between agriculture and the environment becomes more important every year. University researchers work continuously to find environmentally-friendly and agriculturally-sound practices.

As the population in Georgia shifts and certain towns continue to expand their boundaries, university faculty must take residential areas into consideration at a much greater level on such issues as wood waste, carbon dioxide and golf course water use. With each new 2,000-square-foot home built, another 1.7 tons of wood waste must be disposed of. UGA scientists conducted studies to see if some of this waste can be recycled directly onto the home site.

Community growth in Georgia brings increased energy production and consumption that releases increased amounts of carbon dioxide. Researchers are finding natural ways to take carbon dioxide out of the environment at rates 50 times greater than that of organisms previously depended on to do this work.

Water use continues to be an issue in Georgia. A state agency is trying to avoid restrictive language by allowing Georgia Golf Course Superintendents Association members to develop their own water management guidelines. Through this, courses are learning to use best management practices to individually conserve water. And in the field, researchers are assessing streams, rivers and water tables in the Floridian aquifer under the Dougherty Plain as they measure agricultural water use in wet and dry years.

Nitrogen can come from something as simple as a leguminous cover crop. And planting such a crop in a field of corn, for example, can add value to the corn. Conversely, weeds left to grow in a sweet potato field can deeply hurt a crop. FVSU scientists are developing a sweet potato that is genetically engineered to have a tolerance to a certain environmentally-friendly herbicide, allowing the producer to kill weeds without harming the crop.

Poultry manure can greatly benefit farms, and therefore the general public, as a fertilizer when it’s applied properly. Researchers are working with poultry producers to implement nutrient management plans for their flocks, learning the best way to apply poultry litter with the least amount of phosphorus runoff and developing easier ways for poultry producers to collect and compost manure.

Finally, Georgia Extension agents worked to develop a recycling day to safely dispose of unwanted pesticides. These topics are covered in deeper detail in the following pages as Georgia universities work to create greater harmony between agriculture and the environment.

Key Themes: Water quality

State Performance Goal: 4-2
Reuse of wood waste

a. Due to tremendous population growth, residential construction in Georgia is a thriving industry. According to the National Association of Homebuilders Research Center, a 2,000-square-foot residential home produces four tons of construction waste of which 1.7 tons is wood waste. Currently most construction waste is put in dumpsters and taken to a construction and demolition landfill. However, several residential construction waste materials can be recycled or reused as part of a "green" building practice. These include cardboard, metals, scrap wallboard and wood waste. Ground wood waste can be reused as mulch, erosion and sediment control or heavy use areas. Different types of wood used in home construction include dimensional lumber, finger-jointed studs, engineered wood products such as plywood or oriented strand board and treated lumber. Dimensional lumber can be ground and reused onsite because its only component is wood. Treated lumber is unsuitable for reuse due to preservatives. Regulators at the Georgia Department of Natural Resources were unsure if engineered wood products and finger-jointed studs that contain adhesives with organic chemicals could be safely ground and reused onsite. Builders are unlikely to separate several wood types, so the potential environmental impacts of ground engineered wood products needed to be evaluated.

   With funding from the Solid Waste Trust Fund through the Pollution Prevention Assistance Division, UGA conducted a study to evaluate environmental risks of using ground engineered wood products onsite. The study tested runoff from ground engineered wood product mulches for organic chemicals, tested soils underneath the mulch for changes in soil chemistry and looked at the mulch's effects on common landscaping plant growth. No adverse effects were found. The results of the study were shared with state regulators and published in Transactions of the American Society of Agricultural Engineers. Based on this information, the regulators agreed that scrap engineered wood products from residential construction could be ground and reused on site. They requested an Extension bulletin outlining guidelines for use. The bulletin is in review and should be published shortly.

b. The 1.7 tons of wood waste is equivalent to about 11 cubic yards of waste. Beneficial reuse of this waste onsite can potentially remove 30,600 tons or 198,000 cubic yards of wood waste from construction and demolition landfills in the Atlanta area alone. Beneficial reuse also can save builders money by reducing tipping fees, reducing erosion and sediment control costs, providing a clean delivery pad for construction materials and providing free mulch for landscaping beds. An Indiana study indicated cost savings on waste management only ranged from $60 to $180 per house. The work has been used in Wisconsin and Tennessee to develop construction materials

recycling guidelines, the subject of a technical topics release by APA - The Engineered Wood Association and posted on a number of national Web sites.

c. Smith Lever, Hatch Act

d. Integrated Extension and research

Key Themes: Biological control, global change, climate change

State Performance Goal: 4-7
Carbon dioxide in the environment

a. Energy production and consumption releases a phenomenal amount of carbon dioxide that then accumulates in the environment. Many experts believe carbon dioxide will significantly impact the climate, and society must find ways to reduce or reverse its accumulation. Biological processes have some unique advantages over other processes to reduce carbon dioxide. With the assistance of sunlight, plants convert this gas into biomass. Unfortunately, photosynthetic sequestration is extremely slow, does not generate any saleable product other than the biomass itself and poses several other technical challenges for implementation on a large scale.

   UGA researchers are using a new approach to incorporate a natural enzyme into living cells. This enzyme is able to add carbon dioxide into the carbon backbone of organic chemicals, thereby sequestering this gas and simultaneously building molecules that can be used to synthesize useful products. This approach avoids the need for light to drive the sequestration and has the economic benefit of generating a product whose sale can make the process viable.

b. The system has been able to sequester carbon dioxide at rates 50 times greater than the highest rate reported in photosynthetic organisms. The model compound, succinic acid, has been generated at the highest concentration reported for a biological process. The results provide hope that biological sequestration of carbon dioxide could be a useful component for reducing carbon dioxide accumulation in the environment.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Water quality

State Performance Goal 4-2
Water management by local communities

a. Local communities struggle to meet environmental regulations related to protecting the quality of surface and ground water. In some areas of Georgia, water quality and quantity issues are critical to agricultural production and protecting human health. The Southern Region Water Quality Coordinators use a team approach to develop proactive programming around nine major themes in water resources management. A complete description of these programs is located at www.srwqis.tamu.edu.

b. This regional team produced more than 30 publications, provided 80 training events to more than 500 individuals and responded to more than 1,200 requests for information in 2005. It also fostered interagency and regional coordination to insure improved water resource management. This effort's impacts are numerous throughout the region.

c. Hatch Act, Smith Lever, state matching funds

d. Multi-state research and Extension: Southern region

Key Themes: Water Quality

State Performance Goal 4-2
Water use on golf courses

a. If 75 percent of Georgia Golf Course Superintendents Association member courses develop site-specific best management practices (BMPs) for outdoor water use by May 2007, the Georgia Department of Natural Resources Environmental Protection Division will allow water restriction language in outdoor water use guidelines for golf courses to be eliminated. UGA turfgrass scientists have been integral in providing information to both GGCSA and DNR-EPD on the positive aspects of implementing the BMP approach to water conservation as opposed to rigid regulations. Scientists lead the educational efforts on developing and writing BMPs to meet the DNR-EPD's deadline and have conducted full-day workshops for more than 150 golf course superintendents and assistant superintendents.

b. This innovative approach, in which a state regulatory agency is allowing an industry to develop its own water management guidelines, encourages water conservation. This agreement could only occur through communication and collaboration among regulatory agencies, industry and scientists. Adoption of a BMP approach has the potential to transcend golf courses and move into other segments of turfgrass industry, further improving water conservation. BMPs are the best means to address water conservation on a long-term, sustainable basis.

c. Smith Lever, Hatch Act, state matching funds

d. Integrated Extension and research

Key Themes: Agricultural waste management

State Performance Goal: 4-9
State water management

a. In November 1999, Georgia's Environmental Protection Division suspended agricultural water withdrawal permit issuance in southwest Georgia. The permits, required before farmers can take water from streams or aquifers, are mostly used for irrigation. EPD froze more than 1,500 applications and stopped accepting new applications for withdrawals from the Floridian aquifer under the Dougherty Plain and from streams in the Flint River Basin. They initiated a River Basin Water Development and Conservation Planning process, seeking an assessment of the flow behavior of area streams, rivers and water tables in the predominant aquifer during drought seasons. UGA agricultural engineers and Extension specialists teamed up with 680 Georgia farmers who volunteered to let UGA personnel visit their fields and record irrigation. Traveling more than 500,000 miles to make almost 40,000 field visits to 860 fields, team members accumulated an accurate picture of agricultural water use in wet years as well as during the most severe drought in half a century. To get an accurate measure of the area, location of irrigation and location of surface and groundwater withdrawals, UGA specialists developed a GIS-based permit management system for EPD and worked with permit holders in southwest Georgia mapping their irrigation systems.

b. Scientists assimilated the data for USGS and EPD modelers who were predicting the behavior of the watershed to irrigation and other water uses. Typical and drought-year irrigation scenarios were developed for each month, each water source and each sub-basin, taking into account the regional mix of crops already in place. A draft study and an action plan, representing the state's most ambitious plan for agricultural water management, has been completed. These provide area farmers and state water planners a rationale for water management for a sustainable agricultural economy.

c. Hatch Act, Smith Lever, state matching funds

d. Integrated Extension and research

Key Themes: Sustainable agriculture

State Performance Goal: 4-15
Leguminous cover crops

a. Developing cultural practices that protect, improve and sustain the environment now and for the future will provide farmers with a reduction in initial investments and commercial nitrogen use. Established and emerging markets interested in environmentally-friendly production systems that produce value-added vegetables

will sell these commodities at higher prices compared to conventionally-produced vegetables. In turn, Georgia farmers would improve their income, better protect the environment and insure farm land use now and for the future.

In the 2004 spring growing season, results indicate that the leguminous cover crop is an effective nitrogen source in supporting aboveground biomass, fruit number, yield and leaf area index (LAI). A series of fertility treatments were applied using randomized complete block design. Various combinations of rye, vetch and nitrogen applications were used prior to corn planting. Total un-husked ear yield and ear number were harvested 74 days after planting.

b. Results of this study indicate that hairy vetch supplemented with nitrogen is most effective in supporting ear number, yield, LAI and above-ground biomass (AGB) at each growth stage of this corn variety. Information from this program has been disseminated at agricultural showcases, expositions, field days, national and international conventions and publications in peer review journals.

   The outcome of this study indicates that leguminous cover crop supplemented with nitrogen was most effective in supporting ear number, yield, LAI and AGB in sweet corn. Overall results from the research program indicate that hairy vetch can supply adequate amounts of nitrogen to some vegetables while in other vegetables a half recommended nitrogen rate needs to be added to the leguminous cover crop green manure for obtaining satisfactory plant growth and yields.

c. NARETPA, state matching funds

d. State specific

Key Themes: Diversified/alternative agriculture

State Performance Goal: 4-16
Genetic engineering sweet potato

a. Sweet potato, a long-season crop, is considered the sixth most important food crop in the world and a popular Georgia vegetable and cash crop. Since controlling weeds during its production is difficult, controlling weed growth during its early growing season is critical. Previous research indicated only one preemergence residual herbicide was being used to provide weed control. To raise a successful sweet potato, growers must plan a total weed control program that integrates both mechanical and cultural control methods with effective herbicide use. Plant biotechnology has recently offered farmers an alternative for weed control with herbicide-tolerant crops. Herbicide glufosinate marketed by AgrEvo is a nonselective, wide-spectrum herbicide. It is considered environment friendly due to no residual effect on soil. The aim of the current research program is to use plant genetic engineering to develop

glufosinate herbicide-tolerant sweet potatoes. This would allow a farmer to spray weed killer all over a field and destroy the weeds without harming the crop.

FVSU scientists investigated crucial factors effecting in vitro plant regeneration in sweet potatoes. They evaluated the applicability of sweet potato somatic embryos as transformation target material via agrobacterium. The scientists were able to develop an herbicide glufosinate tolerance in putative transgenic sweet potato plants. They then investigated fresh weight and dry weight of tubes, plants and roots of the transgenic sweet potato plants in the field. The scientists then planted vine cuttings of the surviving cell lines in pots filled with field soil, which were kept in a greenhouse for the next year's field trial.

b. The faculty was able to develop reliable and efficient in vitro plant regeneration protocols for important sweet potato cultivars. They established a new genetic transformation protocol for sweet potato genetic transformation via agrobacterium-mediated technique with somatic embryos as transformation target material. They produced the herbicide glufosinate tolerance of transgenic sweet potato plants using the new genetic transformation protocol. Over 90 percent of transgenic sweet potato cell lines survived from the higher tested dosages of herbicide glufosinate than the threshold dosage which was able to kill nontransgenic plants and weeds.

   The established new sweet potato genetic transformation protocol can be used for inserting new genes like Bt gene into sweet potato. The value-added herbicide glufosinate-tolerant transgenic sweet potato will lower production costs and be more environmentally friendly.

c. NARETPA, state matching funds

d. Multi-state research: NE

Key Themes: Agricultural waste management

State Performance Goal: 4-6
Poultry waste management

a. Proper use of dry and liquid poultry manure is critical to the future of Georgia's poultry industry. As the number one poultry producing state, Georgia produces more than 1.4 billion broilers, 13 million breeder hens, 12 million commercial layers, 12 million replacement pullets and two million tons of poultry manure annually. Fortunately, poultry manure has value as a fertilizer when used properly. The implementation of nutrient management plans by poultry producers can reduce the potential for adverse effects of poultry manure application on the environment.

Faculty in the departments of poultry science and biological and agricultural engineering are working collaboratively to have every poultry producer in Georgia implement nutrient management plans.

b. This ongoing program has resulted in more than 100 training programs, reaching more than 4,000 individuals across Georgia. Training materials including computerized programs for developing site-specific nutrient management plans have been conducted. Phosphorous assessment tools have also been provided to support this effort. As a result of this program, over 80 percent of Georgia poultry producers have implemented nutrient management plans on their farms.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Soil quality

State Performance Goal: 4-11
Poultry waste management

a. Most of Georgia's two million tons of poultry litter is surface applied to as fertilizer to grasslands. Surface application is of concern because it can contaminate surface runoff with phosphorus, which can potentially accelerate surface water eutrophication. UGA scientists conducted rainfall simulation studies in which they compared the effectiveness of three mechanical aeration treatments -- disking perpendicular to the slope, aeration by spikes and aeration by cylindrical cores -- in reducing the loss of phosphorus in surface runoff from grassed plots on Cecil soil fertilized with broiler litter.

b. The results showed that core aeration reduced losses of inorganic phosphorus in surface runoff by 62 percent and reduced losses of total phosphorus in surface runoff by 46 percent. Because Cecil soil is common in Georgia grasslands receiving broiler litter, these results suggest that the use of core aeration could have a significant impact on water quality in the southern piedmont region.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Agricultural waste management, integrated pest management

State Performance Goal: 4-11
Composting of poultry waste

a. In agriculture, poultry manure is often considered to be an unwanted byproduct of production and processing. These materials are often considered to have little or no economic value in Georgia even though they contain an annual nutrient value of more than $60 million. However, producers do not receive this. And while intensive animal production systems provide the farmer with an easier way of collecting and storing manure, the problem of disposal is amplified. Therefore, alternative waste management systems are needed to alleviate this problem.

   UGA scientists developed an alternative manure management system for caged layer systems which allows for composting of deep stacked manure within the house. In-house composting is an alternative manure management technique in which layers at commercial densities deposit their manure onto stacked litter materials located directly beneath the cages. Regular turning of the materials facilitates composting within the layer house. In previous tests only sections of the house were used to test this concept in manure handling. Over the last year, tests were conducted in which an entire manure pit was littered with a carbon source and composting of the manure within an entire house was studied.

b. At the end of the 331-day test period, the volume of manure within the test house was about 60 percent that of an adjacent house in which composting had not been performed. In previous tests a rotary compost turner was used that was not able to completely turn the total pile and so incomplete turning and mixing of the compost occurred. In these experiments a commercial turner was used which picks up the entire pile during turning. A more complete mixing of the material produced better compost. Carbon sources of both sawdust and yard trash were used during these experiments with very little difference. Ammonia concentrations were measured over the length of the house both in the manure pit and upstairs within the cage areas. During turning a significant amount of ammonia is generated from the compost. However, this ammonia flux does not last long. In three hours the ammonia concentration had decreased back down to almost that of normal background concentrations. In between turning operations, the ammonia concentrations within both the manure pit and rows of cages upstairs were lower than those measured in an adjacent house in which in-house composting was not being performed. Temperatures in the compost of over 60 degrees C were measured regularly after turning events. Because of these high temperatures the operator used parts of the pit to dispose of their dead birds by composting. While the compost temperatures are high, this process did not appear to affect the internal temperatures of the layer house. Based on the volume and bulk density measurements, the total weight of compost estimated to be in the house was 500 tons. The composted material was dryer, had better handling characteristics and less odor than raw manure.

c. Hatch Act, state matching funds

d. State specific

Key Themes: Agricultural waste management

State Performance Goal: 4-1
Recycling day for pesticides

a. Thousands of Georgians have unwanted pesticides. Because pesticides are classified as hazardous wastes, conventional landfills will not accept large amounts of pesticides. It is illegal to burn, bury or dump pesticides. Some companies will dispose of hazardous wastes for a fee, but the expense is often prohibitive for individuals. As a result, unwanted pesticides are often disposed of illegally or abandoned in storage until the contents leak. In either case, there is tremendous potential for injury to human health or the environment. Extension collaborated with the Georgia Department of Agriculture to establish a program to safely dispose of unwanted pesticides.

b. The program, Georgia Clean Day, is an outstanding example of cooperation between UGA, local Extension personnel across Georgia, state legislature, the Georgia Department of Agriculture and private enterprise. Since its inception, Georgia Clean Day has collected more than one million pounds of unwanted pesticides. Nearly all of these pesticides were collected as concentrates. The pesticides were safely disposed of through an agreement with a hazardous waste company.

   In Quitman County, the county agent worked with the Georgia Department of Agriculture to establish a Pesticide Container Recycling Day. Specialized spray nozzles were dispersed to producers in the county along with fliers that described how to properly rinse containers. More than 2,000 pounds of pesticide containers were recycled, which amounted to 6,000 pesticide containers, during Pesticide Container Recycling Day. One hundred percent of Quitman County farmers participated.

c. Smith Lever, state matching funds

d. State specific

Goal Five:
Enhanced economic opportunities and quality of life for Americans

Georgians of all ages, economic backgrounds and socio-economic status need the opportunity to better their lives. The University of Georgia and Fort Valley State University are working to provide educational programs that are relevant to the needs of the various individuals they strive to serve.

Whether it is buying a home or involving youth in performing arts, the universities work to enhance the economic opportunities and quality of life for Americans through their work with Georgians and with institutions in other states.

Buying a home is one American dream that is becoming harder to obtain for many Georgians, and FVSU wants to change that. Through various educational programs, they've taught 46 people home-buying skills and helped three families purchase homes.

Home buying is just one of many aspects of making wise financial choices. Because of changing corporate policies, layoffs and restructurings, many Georgians are finding that they don't know enough about managing their finances. FVSU, along with Consumer Action and Capital One, formulated the program, MONEYWI$E, to teach Georgians financial basics. UGA Extension is working to provide consumer education programs to help individuals maximize limited financial resources, set goals and plan spending-to-achieve goals. Through this, they've provided free tax assistance service and helped Georgians avoid refund anticipation loans.

FVSU and UGA are also working to prepare individuals for the working world, teaching them employability skills that range from proper professional dress for teachers to better customer service. Participants have learned the value of preparing for an interview, and community leaders have learned the hardships faced by the working poor.

Extension educators are often the ones teaching the programs listed throughout this document. But many times, few are trained in management and leadership skills appropriate for a learning organization. One UGA department worked with Extension employees to develop their talents, which in the long run will help stem employee burnout and turnover.

It's been stated repeatedly that children are the future. The universities are taking that fact seriously -- from the youngest child about to be placed in child care to the teenager entering sexual education. They also realize that the family unit is incredibly important to

each community in Georgia. Through various programs and conferences, FVSU is strengthening the family unit by teaching parenting skills and positive development skills. UGA Extension is giving child care professionals and caregivers tools to better their jobs and helping parents realize how important quality child care is for their children's futures.

The 4-H program helps at-risk youth develop self-marketing skills that will prepare them for social and economical challenges. The program is also teaching Georgia students the value of service learning through various projects such as Hero Packs, the Ronald McDonald House and Operation Boiled Peanuts. 4-H has also enhanced many participants self-esteem by giving them an outlet for their interest in performing arts.

These and other examples are listed in the following pages, including UGA's effort to educate individuals about the importance of indoor air quality.

Key Themes: Promoting housing programs

State Performance Goal: 5-14
Home ownership

a. The American dream of owning a home is becoming less and less of a reality to millions of Americans. Access to homebuyer education in rural counties is often unavailable and, if provided, may require travel to a location outside of the county. The Workforce Housing in Georgia Report states, "Georgia must increase the consumer literacy of its workforce by educating them and community leadership regarding existing housing programs and resources available in the state." UGA's Housing and Demographics Research Center indicated, "the state should provide education and outreach to the community regarding affordable housing types, development practices and the availability of funds to assist homebuyers, promote existing housing programs through outreach seminars and provide homebuyer education." The report also concluded that "consumers are not aware of choices and what is needed to participate in the housing market. Persons in the workforce who are potentially eligible know little about available housing programs including first-time homebuyer programs."

   FVSU's Cooperative Extension Program continues to coordinate and implement a homebuyer education program. The program is a 10-hour class that covers understanding and managing credit, budgeting, working with a lender, shopping for a mortgage, working with a realtor, understanding the importance of a home inspection, overview of down payment and mortgage assistance programs and the closing process. FVSU also developed two publications, "Buying a Home" and "The Responsibilities of Homeownership," to meet the needs of the clientele they serve.

b. Extension housing specialists provided 30 hours of training facilitating the homebuyer education classes. Three programs were offered in 2005 reaching 46 individuals. As a result of the homebuyer education programming, three individuals successfully purchased homes. Many other class participants are working to get their credit issues resolved so they can qualify for a mortgage and take advantage of the various programs available to assist with down payments and mortgages.

c. NARETPA, state matching funds

d. State specific

Key Themes: Family resource management

State Performance Goal: 5-19
Financial education program

a. While Georgia is experiencing some economic growth, many families and individuals are facing difficult economic times. Layoffs and business restructuring continue across the state. Many Georgians who lost their jobs found replacement jobs at a much lower salary with reduced benefits, creating additional financial stress and difficulty in meeting financial responsibilities. Bankruptcy rates for the state have increased by 17 percent.

   Tens of thousands of Georgians have a critical need to become knowledgeable and competent in understanding and managing those assets available to them. With the changes in many corporations' policies on insurance and retirement plans, residents are increasingly responsible for their own retirement, but very few Georgians have basic knowledge and skills in these areas. Research shows that education, continuous training and follow-up are necessary to help Georgians develop and maintain a primary base of practical knowledge for effective family resource management. This same research also shows the level of consumer knowledge and skills is frighteningly low. More than 100,000 people targeted in FVSU's service area have a need to know about resources available to them nationally and locally, where to go for appropriate resources, how to access resources, what resources are available and how to effectively manage those resources. Family economic security contributes to the emotional stability of families, strengthens communities and creates a state better able to leave a thriving and sustainable economic legacy for future generations.

   In collaboration with Consumer Action and Capital One, FVSU specialists started a program knows as MONEYWI$E and began their productive relationship with Consumer Action in 2003. Training and financial support for staff was provided initially to insure project success. Continuous follow-up by the program's partners was conducted and in-kind materials were provided. Consumer Action advocacy trainers were available for technical instruction, support and curriculum development.

b. Internally, the MONEYWI$E project has been beneficial to FVSU's College of Agriculture, Home Economics and Allied Programs Organization through national level recognition. The MONEYWI$E project led to 33 effective partnerships with other service provider organizations, resulting in the most appropriate use of available funds as well as the service area's geographic extension and expansion. This expanded area includes 17 counties which FVSU specialists did not traditionally work. Externally, 207 more customer organizations than originally had been identified by FVSU Extension were trained in MONEYWI$E methodologies and given follow-up assistance and technical support when and where needed. Two hundred thirty-seven service provider and community leaders were trained using the MONEYWI$E project training methodology. The project lessons include money management, banking basics, understanding credit, rebuilding credit, talking to teens about money, understanding bankruptcy, saving tools, senior scams, identity theft, elder fraud and micro business basics. These have been successfully integrated into community-based programs which teach consumer education.

c. NARETPA, state matching funds

d. State specific

Key Themes: Family resource management

State Performance Goal: 5-1
Consumer education programs

a. Georgia ranks third highest in bankruptcy cases in the nation. During the 12-month period ending Sept. 30, 2001, one out of every 43 households in Georgia filed for bankruptcy. The personal saving-rate for the U.S. is at the lowest level in history, suggesting that Georgians and other citizens are not saving adequately. Families need to know how to plan their finances, cope effectively with lack of adequate income, control cash flow, manage credit and debt wisely, insure adequately, contribute to savings/investments regularly, pay necessary taxes, prepare to retire at their current living level and pass assets to heirs. Limited resource families are particularly faced with economic uncertainty. It is often difficult for these families and individuals to make wise consumer choices and meet basic needs.

   In 2005, UGA Extension's financial education programs reached 10,494 Georgians through over 22,500 hours of instruction to help them better manage their financial resources and protect themselves from consumer fraud. UGA's Consumer Financial Literacy Program (CFLP) provided free tax assistance through filing federal and state income tax returns for 1,300 low-income Georgians in 24 counties. Media was also a major strategy for public financial management education. Eleven exhibits reached over 600 viewers; 40 newspaper columns circulated to almost 638,300; and 22 articles and publications went to more than 79,000 readers.

b. In 2005, the total value of tax assistance service provided by CFLP on Georgia's economy was $1,432,923. Of this amount, $1,376,542 was the total value of income tax refunds received, $2,457 was the value of savings by clients who avoided refund anticipation loans, and $53,924 was saved by using free tax assistance service. The use of direct deposit tax filing increased from 26 percent in 2004 to 48 percent in 2005 by Georgians who used the free tax assistance service. Use of refund anticipation loans decreased from 12.5 percent in 2004 to 10.9 percent in 2005 among Georgians who used the CFLP tax assistance service.

   Extension provided consumer education programs to help Georgians of all ages to maximize limited financial resources, set financial goals and plan spending-to-achieve goals. Of the Georgians who participated in consumer education programs, 82 percent said the training workshops were helpful to learn about consumer skills and financial management practices. Most of the participants said they plan to follow learned financial management practices. For example, 97 percent planned to set a goal to get out of debt; 81 percent planned to develop a written spending plan; 88 percent planned to start an emergency saving fund; 84 percent planned to request a copy of their credit reports; and 90 percent planned to play their bills on time.

   Most Georgians who participated in consumer fraud prevention education programs cited actions to protect themselves from potential telemarketing fraud and identity theft. For example, 91 percent planned to verify how personal information will be used before giving out any information, and 92 percent planned to file a report with their local police if they are victims of identity theft.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Family resource management

State Performance Goal: 5-2
Resource management for limited resource populations

a. Low income families don't just face the problem of economic survival; they contend with the social and psychological consequences of unemployment and discrimination. The best consumer practices cannot solve the problems of poverty these families endure. However, effective consumer practices are important in alleviating many obstructive aspects of poverty.

   The increasing income gap continues to be the most challenging economic trend facing low-income, limited-resource Georgians. Extreme inequality of income and wealth has weakened the sense of community and common purpose essential to quality of community life. Low income individuals and families typically do not

have access to appropriate education, resource and financial services to smooth income and consumption, manage risks and support income-generating activities. The lack of financial and resource services are particularly acute in rural areas, for women and for the poorest segments of the population. Many low income families are struggling to provide a supportive family environment on very limited resources. Many of these heads of household work full time or part time. Some are unemployed, disabled and homeless while others are receiving Temporary Assistance for Needy Families and other forms of public assistance. These low-income, limited-resource families, working or not, face obstacles in their struggle to become self-sufficient.

Workforce preparedness workshops were researched and designed to effectively meet the needs and strengths of the requesting organizations. Originally working with the Department of Family and Children Services in Twiggs, Peach, Baldwin, Putnam, Jones, Wilkinson and Crawford counties, FVSU expanded its workshops to include Sumter and Monroe counties. The project's purpose was to provide practical, in-depth employability skills to the unemployed and underemployed. These skills include personal and community resource identification, skills assessment, resume development, interviewing skills, obtaining and maintaining employment, quality customer service, telephone courtesy and on-the-job etiquette.

A faith-based and community initiative was started to educate service providers and faith-based institutions on the availability and accessibility of funding resources through governmental interagency faith-based and community initiative centers. FVSU faculty made available process, programmatic, partnership and development information to targeted clientele to facilitate ease of resource accessibility. A micro business basics program was designed to give aspiring entrepreneurs crucial, practical and technical information when considering starting or restructuring a small business. And the "Community Resource Medicare Kit: Understanding Medicare and Knowing Medicare Part D" was developed. This program was designed to help seniors and the disabled understand Medicare and how to maximize its effectiveness.

b. The results of these programs were positive. The workforce preparedness program developed designed and conducted a total of eight 24-hour individualized training sessions to 378 TANF and housing subsidy recipients in the targeted geographic areas. In the faith-based and community initiative, faculty provided forums for 218 faith-based and community organization service providers and advocates in four two-hour sessions. FVSU faculty conducted six two-hour sessions of the micro business basics program to 37 entrepreneurs representing 11 counties in the targeted area. They presented seven two-hour Medicare program sessions to 140 seniors at senior centers in two counties.

All programs designed and conducted by FVSU faculty were done in partnership with collaborating organizations and agencies. The goal was to disseminate information and research and develop and conduct trainings as requested by partner organizations. According to summative program evaluations conducted as part of

FVSU's overall program process goals, the facilitation, pertinent and applicable information of sessions were outstanding. Also, these programs' success can be measured in additional requests and their expanse into more counties.

c. NARETPA, state matching funds

d. State specific

Key Themes: Family resource management, jobs/employment

State Performance Goal: 5-2
Basic skills education for employment

a. Extension provided basic skills education to working poor individuals through either direct education or train-the-trainer programs targeted to social service and adult education providers and taught life skills to low-income individuals and families. More than 1,500 contact hours of workforce preparedness education were provided to 1,239 Georgians. Fifty-seven percent of the participants were low-income or at-risk individuals. The Surviving Tough Times Extension program, targeting individuals experiencing layoff or reduction in hours, provided information to more than 100 unemployed workers about surviving on fewer resources. Seventeen poverty simulation workshops were conducted for over 600 community leaders and service providers. This simulated month in poverty taught participants about the realities faced by working poor families. Workforce preparedness and consumer education information was provided by various media to thousands of Georgians.

b. Of the Georgians who participated in the Surviving Tough Times Extension program, 84 percent said it was very helpful to gain knowledge and skills needed to manage a period of unemployment. Most of the participants learned to make correct consumer decisions. For example, 91 percent planned to call or write their creditors to explain their job loss situation; 90 percent planned to identify at least one way to reduce their spending; 94 percent planned to reduce household utilities to lower their bills; and 91 percent planned to pay basic living expenses and credit obligations before spending money on anything extra.

   Nearly 97 percent of the participants in a customer service education program said that it was helpful to improve their customer service knowledge and skills. Evaluation data indicate that 58 percent improved their customer service skills. For example, 96 percent planned to serve customers with a smile and pleasant attitude; 88 percent planned to consider differences in customers when planning customer service activities; and 94 percent planned for better customer service.

   Of the participants in workforce preparedness education, 76 percent planned to practice before a job interview. Nearly 90 percent of the community leaders, educators and service providers who participated in the poverty simulation workshop

said it helped them better understand and relate to the issues and problems faced by working poor families. One program participant said it was “an eye-opening experience that changed many of my preconceived notions. It will help me to understand my students better.” Of the poverty simulation program participants, 50 percent developed more positive attitudes toward people living in poverty and planned to better serve their needs. For example, 75 percent planned to work with other related community resources to assist people who live in poverty and seek out information that can be used to address poverty issues in their communities.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Family resource management

State Performance Goal: 5-23
Clothing/textiles wise consumer education

a. Self-management skills are the foundation of employee marketability. Many individuals have lost their jobs due to industry closings and/or restructuring. With recent changes in welfare reform, many people are forced into the job market. The need for self-improvement, personal development and information on how to select appropriate dress for a job interview becomes critical to enhancing their success.

Middle Georgia RESA partnered with FVSU’s clothing and textiles specialist to address the requests of two school systems about appropriate professional dress for teachers. The Dress: Standards for Excellence program was conducted in two counties to meet the code of ethics standards for professional educators/staff in public school systems. The program focused on what research revealed about student achievement and teachers’ dress and the importance of teachers dressing appropriately. The program highlighted effective ways to assess existing wardrobes and how to budget for new additions.

Three personal development programs were conducted in six counties to enhance the physical wellbeing, grooming, social skills and other factors involved in personal appearance. The program focused on low-income individuals seeking employment and on employee-marketability skills such as appropriate work apparel, grooming and hygiene. Over 216 consumer apparel and textiles programs were conducted in six counties to help low- and limited-income families improve their decision-making skills when purchasing apparel and textiles. The programs focused on apparel selection, care performance, label interpretation and back-to-school tips. These programs helped families to find ways to generate extra income or save money.

The textiles and clothing training workshop was conducted for program assistants to provide up-to-date information on recent trends and issues in apparel, textiles and

related areas. Clothing safety and textiles awareness programs were conducted to protect consumers from unreasonable risk or injury/death from certain types of unsafe clothing as identified by the U.S. Consumer Product Safety Commission.

b. Five workshops were conducted for teachers at elementary, middle and high schools in the Twiggs, Mitchell and Baker county school systems. Approximately 525 teachers and staff participated in the Dress: Standard for Excellence workshops and more than 525 booklets were distributed. Over 20 personal development programs were conducted in counties and at FVSU, and over 500 limited resource individuals attended the programs. Over 200 “Dress for Success” booklets were distributed to participants and over 1,000 “Circus of Good Habits” coloring and activity booklets were distributed to participants and children. Over 216 consumer apparel and textiles programs were conducted in six counties. Booklets on managing your apparel dollar were distributed to limited resource and low-income attendees. Six FCS program assistants and a county agent were trained during clothing and textiles in-service training. Two clothing and textile trainings were held in Schley and Talbot counties for 18 participants. Clothing safety flyers were distributed to approximately 1,000 individuals to enhance consumer awareness of clothing safety to prevent unreasonable risk of injury or death.

   These programs assisted participants in making more informed choices when selecting clothing and textiles products. They adopted one or more recommended practices to avoid buying clothing on impulse. The program assistants adopted one or more recommended practices and conducted county-based programs similar to the clothing and textile training. Teachers and staff along with the appropriate administrators in one Georgia county have formed a committee to initiate a standard dress code for teachers pending board approval.

c. NARETPA, state matching funds

d. State specific

Key Themes: Leadership training and development

State Performance Goal: 5-8
Faculty leadership development

a. Extension educators excel in subject matter disciplines. However, few are professionally trained in management competencies and leadership styles appropriate for learning organizations. The lack of such competencies leads to employee dissatisfaction, burnout and turnover. Agricultural leadership, education and communication staff developed the managerial assessment of proficiency (MAP), which assesses 12 managerial competencies, two leadership styles and eight values/drives. Participants develop a learning plan to determine which EXCEL

seminars they should attend, at which participants can learn skills and techniques to increase their competency levels.

b. Since 1995, more than 360 Georgia Extension faculty have participated in the assessment and follow-up competency building workshops that are supplemented by user fees. Since its inception more than $60,000 has been generated from fees to support this internal professional development effort for public service faculty. Those participating in the MAP and EXCEL workshops were less likely to leave UGA Extension after completing their initial orientation period. As a result of Georgia's success with this program, leadership for the Southern Extension Leadership Development program was transferred to Georgia. In 2005, over 200 Extension faculty and staff from 13 state Extension services participated in regional workshops to assess their managerial competencies and improve their leadership and management skills. Interest in future MAP workshops has been expressed by Oklahoma State University, Mississippi State University and Auburn University Extension faculty. By reducing staff turnover, an estimated $4.2 million has been saved by Extension systems in the southern region.

c. Smith Lever, state matching funds

d. Multi-state Extension: Southern region

Key Themes: Children, youth and families at risk

State Performance Goal: 5-21
Positive development of the family unit

a. Successful individuals build thriving and effective communities. Families that understand developing a child starts from day one realize that building strong families through healthy communication, shared activities and economic improvement is a continuing and vital concern for all. Educating parents, caregivers and professionals on the most up-to-date researched based information is what FVSU Extension strives for. They use grassroots efforts to endorse family and economic resiliency in the state.
To achieve the goals and objectives for strengthening the family unit, FVSU's family life area has hosted several types of programs. The annual family life conference and childcare workshops allow parents and caregivers to receive the most up-to-date and researched-based concepts of positive development, family coping strategies and basic life skills. Fifteen presentations were held on family life information through churches and community centers. Two senior programs were held on campus for local senior citizens to receive information on health and family. Thirty-five youth presentations were held at local schools and community centers.

b. The educational programming to strengthen the family unit has enabled participants to use increased knowledge of parenting skills within their own families. The self-esteem/positive development programming has provided youth with a more positive outlook on their lives and others.

c. NARETPA, state matching funds

d. State specific

Key Themes: Child care/dependent care

State Performance Goal: 5-4

Child care giving

a. After shelter and food, child care is the third highest household expense for most families of young children. According to DHR, the cost of care ranges from $68 to more than $100 per week per child. Affordable, accessible, high quality child care is not available to many Georgians. Most child care in Georgia and nationwide is of marginal or poor quality. High staff turnover, poor quality environments and lack of training and experience contribute to low quality care. According to the Center for the Child Care Workforce, the average hourly wage of a family child care provider is $4.82; of a child care worker, $7.42; and of a preschool teacher, $9.43. Many parents seek the least expensive source of care, not understanding the benefits of high quality early care and education.

   Extension contributed to ensure high quality child care through several avenues. Faculty organized and presented local and regional training workshops and conferences for child care professionals. They provided self-study courses for caregivers who could not attend in-class training sessions. They also provided print information on child development for child care professionals and consumer information to help parents identify quality child care. By collaborating with employers and community leaders, they supported the availability of consistent, high quality child care as a vital part of the community infrastructure.

   Extension is one of the largest single sources of the required community-based education for child care providers in many Georgia counties. In 2005, Extension faculty provided nearly 51,300 educational contact hours to 27,775 child care providers, parents and others at approximately a fourth of the cost of consultants and other agencies. Two early childhood institutes were conducted in Georgia in 2005. The full-day training conference covered a wide range of topics. Three child care self-study courses were provided to 222 child care providers.

Extension faculty collaborated with numerous other organizations, including child care resource and referral agencies, technical colleges and the Georgia Association on Young Children to ensure high-quality community-based training was available for child care providers. Media efforts were undertaken to increase awareness and child care knowledge. A total of eight exhibits have reached 2,791 Georgians; 151 newsletters reached more than 44,900 readers; 10 radio spots were broadcast to nearly 400,000 listeners; 90 newspaper columns went to a circulation of 1.3 million potential readers; and four television shows targeted 200,000 viewers.

b. The comparison of pre- and post-test results indicates that child care providers who participated in self-study courses significantly improved their child development knowledge. Of the participants, 80 scored higher on post-tests than on pre-tests. Of the child care providers who participated in child care programs sponsored by Extension, 99 percent said those programs helped to improve their knowledge and practice. The child care providers who participated in the Dare to be Messy training workshop indicated they intend to apply learned activities in their child care setting. Of the child care providers who completed the 1234: Counting and So Much More training workshop, 76 percent said they intend to give parents ideas for encouraging young children's math skills and 51 percent said they plan to give children opportunities to practice measuring. Nearly 93 percent of child care providers who participated in the storytelling program planned to encourage children to use their imagination and pretend. Of the child care providers who participated in the All Children Have a Culture educational program, 68 percent said they intend to use bilingual staff or trained interpreters when working with children and families who have limited English speaking ability.

   The majority of the participants in Extension child care programs intended to adopt practices that will improve child care quality. For example, 81 percent planned to read aloud to children everyday; 93 percent planned to schedule enough time for children to engage in dramatic play and 89 percent planned to teach children how to solve conflicts that arise during play. Of participants who completed the teaching basic health and safety training workshops, 93 percent said the program taught them how to teach basic health and safety concepts to young children, and over 90 percent planned to teach basic safety concepts in their child care center or home.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Children, youth and families at risk; youth development/4-H

State Performance Goal: 5-19
Life skills for youth

a. Several studies have shown that poor choices made by youths and adults lead to inappropriate actions which result in negative consequences. Unemployment, poverty, child abuse, drug abuse, unsuccessful parenting and lack of positive leadership in the home are some of the factors that keep youth from developing good decision-making skills. In Georgia, poor choices made by adolescents and teenagers have contributed to teen pregnancies, incarceration and high school drop outs and has produced a generation of young adults who lack basic employable skills. Georgia ranks 43rd among states in infant mortality. In Georgia, there are 395,200 poor children, and 131,349 adults and children receive cash assistance from Temporary Assistance to Needy Families. Several studies indicate that teenage mothers who have babies at an early age are more likely to drop out of school and rely on TANF. Their children are more likely to require care for health problems and disabilities. Georgia has 41,206 children who are victims of abuse or neglect, 13,149 children in foster care, 312,000 children who do not have health insurance and 93,987 grandparents raising their grandchildren. These alarming statistics indicate the need and importance to create family focus programs to address the problems of at-risk youth living in Georgia and throughout America.

   The 4-H youth program is specifically designed to meet the needs and to challenge the strengths of at-risk youth in Georgia. The components of this program are 4-H Sprouts, 4-H and Youth Development of Life Skills. These program components focus on initiating success by empowering youth's minds to a higher level of thinking through leadership, entrepreneurship and science-based educational projects, activities and programming for youth ages 6-18. These programs are designed to expose at-risk youths to a structured and educational system in which all participants are empowered to achieve excellence. The 4-H Sprouts, 4-H and Youth Development of Life Skills programs focus on the national and international subjects and principles of 4-H programming.

b. Through the 4-H youth development program, the 4-H youth development specialist worked with 1,436 youths and 451 adults, implemented two summer residential camps, facilitated 22 4-H science club meeting sessions, 32 4-H leadership club meeting sessions, 81 4-H entrepreneurship club meetings sessions, attended 27 youth development meetings and made 13 presentations.

   Programs were implemented in elementary, middle and high schools, community centers, Camp John Hope, Boys and Girls Clubs of America, 4-H offices and churches. All of the 4-H Sprouts, 4-H and Youth Development of Entrepreneurship program components focus on engaging the minds of all youth participants with a variety of self-marketing skills that will prepare them to engage social and economical challenges. Based on pre- and post-test results, 52 percent of youth participants learned entrepreneurship education -- how to develop, market and finance their own business; positively communicate with future clientele; set and achieve business goals; and successfully cooperate and collaborate with people.

c. NARETPA, state matching funds

d. State specific

Key Themes: Impact of change on rural communities, youth development/4-H

State Performance Goal: 5-5
Service learning and citizenship education

a. Service learning is an integral part of youth development. Youth need opportunities to provide service and increase their understanding of issues relative to at-risk individuals. They need projects that enable them to take a personal part in improving the quality of life for peers who have limited resources or extraordinary challenges.

   Junior/senior 4-H project achievement allows students to include service activities in project work and other activities. These activities are reported in a 4-H'er's portfolio as 50 percent of the final records score (with leadership). Junior conference focuses on not only on workforce preparation skills but also on service to others with the opportunity to complete several service projects for statewide projects. Local 4-H programs include service programs coordinated by 4-H'ers as a part of the 4-H motto of making the best better for the community. Additionally, the new 4-H Ambassador program provides subject matter training that asks for teens to return to the community for service and learning. And in response to the needs of military families, the Operation Military Kids (OMK0 initiative was launched.

b. More than 2,000 7th-12th grade students completed portfolios. More than 800 youth participated in junior conference and raised more than $7,000 for the Ronald McDonald House, 26 banners for veterans' hospitals, 100 bracelets for Hero Packs, 163 pet rocks for children's hospitals and 220 Hero Packs. Forty-two ambassadors completed service projects related to subject matter areas. As a part of OMK, 4-H'ers raised money to send peanuts to soldiers in Iraq. State issues on education, economic development, the environment and safety have been identified and described to state level decision makers. Local grants have been awarded to 10 communities to help put their plans into action. A total of 900 Hero Packs were filled for distribution to military families through OMK ambassadors, and $16,000 was raised for Operation Boiled Peanuts, which shipped 5,000 bags of peanuts to 4,300 soldiers.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Youth development/4-H

State Performance Goal: 5-6
Developing communication skills through performing arts

a. Performing arts experiences enhance self esteem and improve communication skills. While many youth have a high level of interest in performing arts, they often do not have ample opportunities to present their talent and develop presentation skills. This is especially true among younger students.

   4-H provides performing arts opportunities for youth at local, district, state and national forums. These opportunities include four different performance areas and 18 different locations for three age groups. 4-H also held auditions and cast a statewide performing arts group to represent 4-H and develop life skills. In addition to the statewide program, talent presentations and performances are part of an area of regional fairs and talent shows. Through 4-H, 749 youth participated in district competition in performing arts projects, 120 auditioned for the statewide performing arts group Clovers & Company, 198 youth used 4-H performing arts as their base for presentations, and members presented talent at eight other forums.

b. Participation data validates that the largest area of 4-H participate by high school students is in the arts. The inclusion of the arts serves as a motive for many high school students to stay in 4-H. Four recording artists and many educators attribute their success in the music industry to their involvement in the 4-H arts program.

c. Smith Lever, state matching funds

d. State specific

Key Themes: Children, youth, and families at risk

State Performance Goal; 5-22
Teen sexuality education

a. Educating youth on sexuality, sexual behavior and pregnancy will allow them to make more informed decisions. Being informed may help decrease the rate of sexually transmitted diseases, HIV/AIDS cases and lower the teen pregnancy rate of Georgia. To achieve the objectives of providing teens with educational information to make informed decisions on sexuality, sexual behavior and pregnancy, FVSU's Extension program held a combination of 10 classes on these subjects, serving 1,525 students.

b. The youth of the two target locations were able to discuss sexual concerns more freely than initially. The participants were also able to identify and make an informed decision about sex and sexuality.

c. NARETPA, state matching funds

d. State specific

Key Themes: Home safety

State Performance Goal 5-12
Indoor air quality

a. Many Georgians are exposed to contaminants in their homes and nearby environments which can negatively impact their health and quality of life. Of primary concern are polluted drinking water, poor air quality and toxic chemicals and/or gases such as lead, radon and asbestos. Scientific evidence indicates the air people breathe in their homes could be more polluted with toxins than outdoor air. This is quite significant if one realizes that people, particularly older adults and children, spend 90 percent of their time indoors. Sources of indoor air pollution common in a typical home are household products and chemicals, carbon monoxide, formaldehyde, dust, mold, mildew, asbestos, radon gas, lead poisoning and tobacco smoke. According to the U.S. Environmental Protection Agency, indoor air quality problems in schools are responsible for triggering asthma-related problems such as children's absenteeism and visits to the emergency room. According to the Centers for Disease Control and Prevention, asthma affects 1,415 million Americans, including almost 5 million children. Each year 21,000 people die from radon-related lung cancer in the U.S. According to the 2005 Georgia County Guide, chronic respiratory diseases caused 3,241 or 4.9 percent of deaths in Georgia in 2003.

   Extension presented healthy indoor air educational programs to provide research-based information to help Georgians make informed decisions about indoor air quality issues. These programs focused on creating an awareness of the availability of pollutant identification devices, source control practices and mitigation measures.

   Indoor air quality Extension programs reached 8,518 Georgians and provided over 3,180 hours of education in 2005. This includes 3,075 contact hours of radon education provided to 8,084 Georgians. UGA Extension distributed 4,027 radon test kits among the Georgians who live in counties where radon is a serious health issue. More than 2,246 hours of housing education were provided to 2,753 Georgians. Four indoor air quality articles were circulated to over 90,000 readers, 34 exhibits reached nearly 14,500 viewers, 57 radio spots were broadcast to over 190,000, six newspaper columns went to a circulation of over 133,000 readers, and seven television programs targeted to a viewing audience of 300,000.

b. Almost all the participants in the radon education program said it was helpful to understand the significance of testing radon. The comparison of pre- and post-test data confirmed that Georgians who participated in the program significantly improved their indoor air quality knowledge and learned how to prevent radon contamination in their near environments. Of the participants, 96 percent improved their knowledge about radon and indoor air quality. At the end of the radon education program, most of the participants planned to take safety measures for

preventing radon hazards in their near environment. Of the Georgians who received radon test kits, 1,375 tested their homes for radon; 108 found higher radon levels and fixed the problem by mitigating their homes.

Nearly 97 percent of contractors, builders and realtors who participated in the lead-based paint pre-renovation rule education program said it was helpful to prevent the potential hazards of lead-based paints. The comparison of pre- and post-test data confirmed that participants significantly improved their knowledge about lead-related rules and preventing hazards. For example, 94 percent planned to tell people living in homes built prior to 1978 about the potential lead-related health hazards; 94 percent planned to talk to other contractors and inspectors about the lead-based paint pre-renovation rule and how it affects them; and 94 percent planned to distribute the pamphlet “Protect Your Family From Lead in Your Home” to housing residents before renovations begin.

All the participants in the indoor air quality and asthma education program said it was helpful for them to learn about the significance of improving indoor air quality for preventing asthma. At the end of the program, most of the participants said they plan to follow recommended indoor air quality practices to control asthma. For example, 79 percent planned to tell their families about the problems caused by mold, bugs and rot; 72 percent planned to inspect their homes for mold and bug problems; 84 percent planned never to use a pesticide inside their homes unless it is labeled for safe use indoors; and 100 percent planned to use the integrated pest management approach to control household pests and minimize the use of insecticides.

c. Smith Lever, state matching funds

d. State specific

Stakeholder Input Process

The University of Georgia College of Agricultural and Environmental Sciences (CAES) in cooperation with the College of Family and Consumer Sciences have many opportunities to collect stakeholder input.

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

The county faculty in the field are very active gathering input for the college. They do this in a variety of ways; advisory committees, being active with organizations and industries in their county, one-on-one input with clientele and by monitoring phone calls and office visit content for any trends. Every county is required to have an advisory committee in place and to meet with that committee at least twice a year. The membership of the committee must be reflective of the local population and knowledgeable of community issues appropriate for the University to address. County programs must develop county issues for the purpose of developing local Extension programs that have impact. This process offers a great deal of stakeholder input into the state program planning process. This is the best source of information from our end users.

Each CAES department also has individual methods for collecting input. Some departments have advisory committees, other are active in the industry's major organizations and other collect data from individual contact with industry representatives..

The College of Agricultural and Environment Sciences has an overall advisory council. The College of Agricultural and Environment Sciences Advisory Council was created in 1996 by consolidating the State Extension Advisory Council and the Georgia Agricultural Experiment Stations Research Advisory Board. This was done to reflect changes in the college and to help our stakeholders understand the equal importance of all functions of the College (teaching, research, and extension). The council seeks stakeholder counsel and advice to ensure that the programs of the College are responsive to the needs of Georgia residents. The Council members work closely with College faculty, staff and administrators in reviewing ongoing programs and identifying and planning high priority future programs.

Finally, the CAES Dean meets quarterly with key leadership within the state, including Georgia's Secretary of Agriculture, the Georgia Farm Bureau President and other key agricultural leaders.

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 has 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 programs 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.

The University of Georgia and Fort Valley State University Extension administrators, department heads, and district program leaders meet annually in a week long planning conference to share needs assessment, program results and programming ideas. The annual Extension Program Planning Week conference allows for the collaboration necessary to develop complementary and/or joint programming that meets the needs of the citizens of Georgia.

Program Review Process

Extension programs participate in a review process in which issues and programs are reviewed for continued support. Individual and departmental Plans of Work are reviewed the Program Development Team during annual and bi-annual programming cycles. Research projects continue to participate in a merit and/or scientific review process as required. Each project is peer reviewed by both internal and external reviewers.

There have been no significant changes in the review processes described in the Plans of Work submitted for Research and Extension programs of the University of Georgia or Fort Valley State University.

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

The University of Georgia continues to make progress on its integrated research and Extension programming. A very large percentage of the accomplishments documented in this report credit that integrated effort.

At UGA, all of the state level faculty are administratively housed within an academic department. A large percentage of these faculty hold a joint research and Extension appointment, a structure which encourages a high level of integrated work. County faculties have become increasingly involved in integrated activities in the last few years. Several integrated accomplishments in this report involve these faculties.

As stated in the FY2004 report, UGA has increased its participation in multi-state efforts during recent program cycles. Budget cuts continue to increase the need for multi-state collaboration. And in many activities, Georgia uses out-of-state expertise in subject areas not well supported by current Georgia faculty.

The many examples of multi-state accomplishments within this report are documented as such and identify the states involved. The following are examples of multi-state and research/Extension collaborations found in this report:

- Southern Region Small Fruit Consortium is a four-state collaboration with outstanding results. With no one state having enough resources to have a major impact, their combined assets have allowed research to be conducted and shared across state lines. In Georgia alone the work of the consortium has been substantial in an almost $12 million increase in blueberry production between 2003 and 2004.

- The work on tropical spiderwort, a noxious, exotic, invasive weed has become a serious effort in many agricultural production areas. Integrated efforts in multiple crops are well documented in this report. Integrated efforts with peanuts alone have the potential to save Georgia growers more than $13 million annually.

- Georgia is working with all the states in the southern region as it currently gives leadership to the Managerial Assessment of Proficiency (MAP) program. This managerial competency assessment and its development component, EXCEL have been implemented in workshops throughout the southern region through the multi-state efforts of Extension specialists.

- The integrated UGA soybean team has found ways to combat the devastating disease Asian soybean rust through an effective fungicide program. They also found that the disease has an alternate host in Florida beggarweed, a potentially huge find that allows growers, agents and specialists to monitor Asian soybean rust in the absence of a soybean crop.

- Along with Florida, Georgia researchers are conducting studies on tomato spot wilt virus in peanuts. Their research has given peanut farmers better options for controlling the disease through such methods as conservation tillage and new resistant peanut cultivars.

- Research into stem cell therapies, in collaboration with Massachusetts, holds promise for curing or discovering new drugs for diseases ranging from Parkinson's to spinal cord injury. UGA scientists are also collaborating with the U.S. Department of Defense to develop neuronal network biosensors to detect chemical threats.

- Farm bill changes have challenged growers to lower production costs without sacrificing yields. Multi-state research among UGA, North Carolina, Texas and Florida has found that certain herbicides and fungicides can be mixed together and applied onto fields, saving producers time and money.

- Integrated Extension and research at UGA allowed researchers to obtain approval to use herbicide to control johnsongrass growth in bermudagrass. The use of Maverick herbicide provides an annual net gain of about $2.6 million to Georgia hay producers.

- Using multi-state Extension research among Alabama, South Carolina, North Carolina, Arkansas, Florida and Tennessee, peach growers are finding ways to protect their fruit and trees from pest pressures. Research scientists collaborated to produce the Southern Peach Growers Handbook and other publications.

U.S. Department of Agriculture
Cooperative State Research, Education, and Extension Service
Supplement to the Annual Report of Accomplishments and Results
Actual Expenditures of Federal Funding for Multistate Extension and Integrated Activities
(Attach Brief Summaries)
Fiscal Year: 2005

Select One: ☐ **Interim** **(X) Final**

Institution: University of Georgia College of Agricultural and Environmental Sciences

State: Georgia

	Integrated Activities (Hatch)		**Multistate Extension Activities (Smith-Lever)**		**Integrated Activities (Smith-Lever)**	
Established Target %	25	**%**	0.25	**%**	0.25	**%**
This FY Allocation (from 1088)	$4,593,810		$7,543,292		$7,543,292	
This FY Target Amount	$1,148,453		$1,885,823		$1,885,823	
Title of Planned Program Activity						
Agricultural Production System	$821,144		$1,255,204		$1,348,363	
Safe & Secure Food and Fiber System	$103,361		$340,014		$150,866	
Healthy, Well-nourished Population	$5,742		$0		$9,430	
Harmony between Ag & Environment	$183,752		$8,486		$273,444	
Ec Opportunity & Quality of Life	$34,454		$282,119		$103,720	
Total	$1,148,453		$1,885,823		$1,885,823	
Carryover						

Certification: I certify to the best of my knowledge and belief that this report is correct and complete and that all outlays represented here accurately reflect allowable expenditures of Federal funds only in satisfying AREERA requirements.

_____ 3/31/2006

Director **Date**

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