

TENNESSEE AGRICULTURAL RESEARCH  
AND EXTENSION SYSTEM

FY 2001

ANNUAL REPORT  
OF  
ACCOMPLISHMENTS AND RESULTS

University of Tennessee Institute of Agriculture -  
Agricultural Experiment Station  
Agricultural Extension Service  
and  
Tennessee State University -  
Cooperative Extension Program

Tennessee Agricultural Research and Extension System  
Annual Report of Accomplishments and Results  
FY 2001

The University of Tennessee Agricultural Experiment Station  
The University of Tennessee Agricultural Extension Service  
The Tennessee State University Cooperative Extension Program

**GOAL 1: An agricultural system that is highly competitive in the global economy.**

**Overview**

Major program/research areas included under Goal 1 of the Tennessee Agricultural Research and Extension System Plan of Work included: forages; value-added agricultural industries, agricultural management, beef management systems, crop production, the greens industry, soil and water conservation, limited-resource and small farm operators, small farm commercial vegetable and livestock production, consumer horticulture and USDA Small Farms Assistance Program. The following describes the projects and programs conducted by the UT Agricultural Experiment Station, the UT Agricultural Extension Service and the TSU Cooperative Extension Program in addressing these areas. More specific information related what was done and what impacts were achieved in each area is included under the Key Theme section.

*Forages:*

Approximately 40% of the agricultural income in Tennessee comes from directly from forages and forage-based production of beef cattle and dairy products. Winter feeding is also the largest single expense for Tennessee cow-calf producers and may run from 40 to 60 percent of the annual variable costs of feeder cattle production. Hay is the primary winter feed for 91% of the state's cow-calf producer. Eighty three percent of the hay is fed in large bales. Large bales, stored on the ground, unprotected from the weather can experience up to 30 percent loss of dry matter. This is a big loss in dry matter and increases cost of production. Storage methods that would reduce these losses would both cut the winter feed bill and improve profitability for cow-calf producers.

To address this issue, Extension specialists and agents developed educational programs that stressed storing methods to reduce hay spoilage. As result of Extension educational programs, the percentage of cow-calf producers that practiced storage practices to reduce the exposure of the big bales from weather increased from 48 percent in 1996 to 63 percent in 2001. One county Extension agent reported that 20 producers averaged reducing their hay losses by \$802.50 or \$32.00 per cow. Other agents reported that 33 percent and 40 percent of producers had put into effect hay storage practices that protected hay from the weather. These results indicate that Tennessee cow-calf producers are aware of the hay losses that result from storing large round bales unprotected from the weather and have taken steps to reduce these losses. Based on the preceding information, these efforts have

amounted to an estimated \$23 million annual reduction in the winter feed bill for the state's cow -calf industry since 1996.

Extension educational programs were also conducted across the state to inform producers about the need for forage testing. Vouchers for one free forage test continue to be provided by Extension agents to encourage forage testing. In 2001, an Extension state specialist supervised balancing rations to go with 599 forage analyses. A 1997 survey showed a \$362 impact per forage analysis (based on an 82 cow herd) based on either improved performance or feed savings or both. With the average herd size in Tennessee being 24 head, the estimated additional financial impact of these forage analyses was calculated to be \$58,103.

In the last several years, bermudagrass has become a more attractive crop for many Tennessee hay producers. Producers who change to this forage crop need information about its fertility and management requirements. In 2001, Extension agents and specialists conducted field days and programs on recommended practices for bermudagrass for over 500 producers. As a result of this effort, the number of bermudagrass samples submitted to the UT Forage Testing Laboratory more than doubled from the previous year.

University of Tennessee researchers have developed a new orchardgrass variety that has a high yield and a much higher persistence under high grazing pressure and drought conditions than 'Benchmark', the current most grown commercial variety. The UT variety has been approved for release and given the name 'Persist'. Initial testing indicates that with the new variety, longevity of orchardgrass fields will be extended from 2 - 3 years to 5 - 6 years. With this new variety, bovine producers will have an alternative cool season grass to fescue. Orchardgrass is considered to be more palatable and have a higher nutritional value than tall fescue and will avoid the problems associated with fescue toxicosis.

#### *Value-Added Agricultural Industries:*

Tennessee's farming sector continues to be stressed by low profit margins, scarce production resources and changing marketing conditions. The farmer's portion of the average consumer dollar spent on food has decreased by one penny each year during the past three to 20 cents in 2000. Prices in commodity markets continue to fluctuate sporadically while production and operating costs continue to increase. Opportunities for income improvement often exist through value - added agriculture enterprises and activities. To appropriately consider, evaluate and take advantage of this value - added potential, folks in Tennessee's agriculture industry must be aware of opportunities and be informed about economic feasibility, planning and market development. The agriculture industry can also benefit from income opportunities not directly related to production agriculture, such as tourism, natural resource utilization and waste utilization.

From January to December 2001, 18 producer-initiated, value-added projects from 16 Tennessee counties were evaluated in the University of Tennessee Agricultural Extension Service's Agricultural Development Center (ADC) by teams involving nine Extension specialists from Agricultural Economics, Food Science and Technology, Forest Products Center, Agricultural and Biosystems Engineering,

Animal Science and the ADC. An estimated 496 farmer/entrepreneurs participated in 19 Extension outreach and training programs involving educational exhibits, workshops, seminars and group meetings. Twenty-four news releases from the ADC provided local, regional and national exposure to value-added issues and information. A grant-funded project from the Tennessee Department of Agriculture's "Ag. Tag" program was concluded and, as a result, a publication and unique instruction tool was finalized under the "Documenting Successes of Value - Added Agriculture Enterprises: A Series of Case Studies" title. Two additional, multi-year grant-funded projects were awarded to the ADC: a \$76,000 FSMIP project titled "Developing Target Markets For Value- Added Niche Products" and a \$20,000 "Ag Tag" project titled "Strengthening Value - Added Enterprises and Markets in Tennessee: Development and Dissemination of Feasibility and Marketing Studies." The Tennessee ADC also released a peer-reviewed publication titled "Targeting School Groups for Agritainment Enterprises: Summary of a Schoolteacher Survey in Tennessee" and 16 fact sheets for use in various educational settings. All publications, grant-project resources and mass media efforts are posted on the ADC web site.

Programs developed and administered by teams and individuals representing the ADC resulted in definite impact on the targeted audiences. The three primary audience groups who benefitted from ADC program efforts in 2001 are county Extension agents, farmers and entrepreneurs with value-added projects, and current and potential small business owners.

The ADC provided training to county Extension agents through nine venues in 2001 to audiences with a combined enrollment of 150. These training sessions increased the agents' awareness of value-added agriculture opportunities, enhanced individual agent's understanding of value-added marketing concepts, improved the understanding and applicability of state-level educational resources regarding value-added programs, strengthened the individual agents' comfort zone for dealing with value-added issues, and extended individual agents' understanding of marketing conditions beyond the commodity stage. County Extension agents now have an increased understanding and are more confident in discussing and applying value-added concepts with farmers and entrepreneurs in their local communities.

One-on-one efforts with farmers and entrepreneurs involved investigation, analysis, development and consideration of various marketing, financial, regulatory and technical/production aspects of business evaluation and expansion. Clients in this audience increased their knowledge and understanding of financial and marketing concepts applicable directly to their business idea. Clients were exposed to business planning, analysis and development concepts and tools from the most basic to the very complex. In addition to the training/education provided, most project entrepreneurs also received tangible results of their project study in the form of financial analysis, market research, feasibility study and/or an overall project report. Clients trained through these efforts of the ADC have indicated a greater chance of business success, cost savings, increased sales and prevention of a failed business.

Efforts of the ADC faculty have had broad impact across the state through programs directed toward current and potential small business owners. The ADC responded to the needs of this audience by developing and disseminating information and educational tools via workshops, seminars, meetings and

personal contacts (normally followed up by Internet communications). Studies performed for project entrepreneurs were often utilized as a basis for published works, group training tools, presentations and to provide general information to others in need of similar instruction/training. Training was provided through topics such as “Considering E-commerce,” “Planning an Agritainment Enterprise,” “Economic Considerations of Alternative Enterprises,” “Identifying and Strengthening Characteristics of Successful Value-Added Enterprises,” “Hospitality & Tourism” and “Marketing for Small Businesses.” As a result of the pro-active programs delivered to current and potential small business owners, entrepreneurs are now better educated, more informed and able to make enlightened decisions regarding the future of their current or proposed enterprises.

Since its inception in 1998, the ADC has completed in-depth, multi-disciplinary, team analyses of 63 value-added projects from 34 counties, conducted 17 4x FSMIP-1999, Flower, Butcher Shop, Schoolteacher, Sawmill, Cookies, R-GROW, Candles, Livestock Waste, Aquaculture, Hunting Resort, Salsa, Popcorn, Pork Co-op) market development surveys, provided instruction for more than 60 meetings, seminars and workshops, secured \$214,500 from external sources for various market and industry development programs and developed more than 69 publications, fact sheets and resource materials for the overall enhancement of Tennessee's value-added agriculture mission, approximately 27 percent of this overall impact resulted from efforts in 2001. ADC project evaluations and analyses have indicated annual gross revenue projections in excess of \$20 million for all projects. Sixty percent of the completed projects have a product available on the market. The ADC has provided assistance and evaluation of new opportunities for farmers and rural communities to enhance incomes, prevent investments in infeasible enterprises and streamline the market development process.

The impact of the ADC programs, initiatives and leadership continues to be felt as income opportunities are improved and economic development investments are made across the state. The dedicated and continuous efforts by those associated with the ADC enhances the path of continual improvement which effectively addresses the ADC's mission, vision and scope. In addition, faculty and specialists involved in the team approach of ADC project work are strengthened through the systems approach to evaluating new and diverse value-added and alternative agriculture ideas and issues. Multi-disciplinary publications, reports and fact sheets from the ADC address current topics and timely issues faced by today's farm families and value-added entrepreneurs. In addition, through a timely, effective and friendly web site, the impact of ADC programs reaches far beyond the enrollment in seminars and the total of accepted projects.

#### *Agricultural Management and Marketing:*

The University of Tennessee Agricultural Extension Service in 8 west Tennessee counties has developed, implemented and continued providing assistance to producers through a Marketing Club Network. Almost 100 producers in 8 counties continue to participate in the Marketing Club. An area wide survey was conducted in 2001 indicated that 75.4% of the participants have used information presented at the conference calls. In addition, of those responding, 40.3% of the participants reported an average of \$11,413.00 increase in gross income over what they would have done otherwise. Crop

marketing avenues are very important and local audience numbers would indicate this as we have maintained between 8 and 14 producers present at all monthly teleconferences since the program started.

Working with Extension farm management specialists, five hundred and sixty four (564) Tennessee farm families developed enterprise budgets for their individual farms in 2001. In addition, 269 farm families worked with Extension agents and specialists to develop record keeping systems for their farms. These families utilized the MANAGE farm management software program or the Finpak software program to complete these record keeping systems.

In the area of marketing, 727 producers attended workshops on how to develop a marketing strategy and how to utilize alternative marketing strategies.

### *Beef Management Systems:*

Beef cattle producers are experiencing many changes in the beef supply chain, and information is becoming a critical part of the management and marketing of cattle. In 2001, the University of Tennessee Institute of Agriculture, cooperatively through the Agricultural Extension Service and the Agricultural Experiment Station, started up a Beef Cattle Initiative in collaboration with the Tennessee Cattlemen's Association and the Tennessee State Department of Agriculture. The initial efforts in the initiative were to identify strategies for improving Tennessee cattlemen's competitiveness in the market. A series of strategic planning meetings were held with input being provided by over 80 cattlemen, sale barn operators, Farm Bureau officials, researchers, Extension specialists and other individuals with a stake in the Tennessee cattle business. As a result of the planning efforts, the initiative will begin to implement a number of coordinated efforts in the coming 3 - 5 years related to beef production, management and marketing. Many of these efforts will involve existing programs like the Beef Cattle fIRM software program and the Beef Quality Assurance program. Specific objectives and priorities within the Initiative are:

- Implement and Evaluate Electronic Animal Identification (EID)

- Use EID in demonstration herds to show its usefulness and importance in record keeping and tracking animal performance to the feedlot and packing plant, capturing additional value, making herd management decisions, as well as in limiting producers' legal liability and enhancing trace back for food safety purposes.

- Integrated Resource Management

- Provide producers with detailed guidance from Extension and agribusinesses to implement the IRM program into their operations. This program considers the goals of beef producers and the changes needed in their production, management and marketing programs to achieve those goals. It includes a good record keeping program such as THE Beef Cattle fIRM, and use of records to make improved management decisions and evaluate the impact of those decisions.

- Master Beef Producer Program

Offer an intensive management educational program to beef producers who depend on their beef cattle to make a contribution to family income. The program prepares beef producers to manage their operation at the highest level economically feasible and provide them with information to help them achieve their goals in the beef operation. Five to seven meetings, each lasting three hours, will certify participants as Master Beef Producers.

- Building Awareness of the Tennessee Beef Initiative

Increase the visibility and attract resources for beef producers among Tennessee political leaders, as well as the state and national beef cattle industry.

Extension efforts in several beef programs continued to have positive results in 2001. More than 1000 Tennessee beef producers became certified through the Beef Quality Assurance program in 2001. Computer software developed through a multi-state Beef Cattle Management and Marketing System grant was provided to agents in Tennessee and Georgia through in-service training. The software is now being used by agents with beef producers to address needs in a variety of areas of a beef cattle operation.

*Crop Production:*

In 2001, Extension organized and conducted a standard wheat variety testing program of 24 wheat varieties in over 16 locations. Insecticide demos utilizing Gaucho/Warrior T for aphid control and subsequent control of BYD (Barley Yellow Dwarf Virus) were also conducted. Results were disseminated through: No-Till Field Day, Multi-County Wheat Field Day, production meetings, mass newsletter mailings, in-service training, farm and agribusiness visits, individual contacts and the Extension/Experiment Station websites. Producers adoption of superior varieties resulted in a 2.0 bushel per acre yield increase worth \$5.22 per acre increase. Producers utilizing the Gaucho seed treatment in combination with the Warrior T spray achieved a 4 bushel per acre increase worth \$10.44 additional per acre.

Similar Extension variety demonstrations were conducted in 2001 in West Tennessee for corn and soybeans. Surveys have indicated that 96 per cent of producers in West Tennessee depend on the data generated from these multi-county standardized test demonstrations in making variety choices. In a six-county area of West Tennessee, the value to producers in selecting varieties based on the demonstration results was documented to be over \$8 an acre (\$12.81 for corn, \$8.74 for soybeans and \$5.22 for wheat).

*Alternative Crops*

Another thrust that continues in this area is to improve practices associated with vegetable and small fruit production to a degree sufficient to provide East Tennessee tobacco producers with income alternatives to tobacco production or to replace lost income from reduced tobacco quotas. The vegetable initiative is a consortium of research and extension faculty focused on varietal selection and management practices to improve the profitability of vegetable production in east Tennessee. Improvements have been made in production management. Strawberry production is also being seen as a possible alternative crop for tobacco producers. One Extension specialist presented research that will help producers select vegetable or small fruit enterprises that are feasible for their operations. Some producers have realized greater net return per acre on less than five acres of strawberries than on several hundred acres of row crops.

Another area of research and development that continues in the Agricultural Experiment Station involves the use of precision agriculture to reduce input usage while maintaining production levels and increasing net income. A complex set of new technologies to sense plant stress from nutrition of pests while moving through the field is being developed. Complementing these developments is the development of sprayer technology to effectively remediate identified problems on a spot basis. Development is progressing and patent protection for certain technologies has been sought.

### *Bioenergy*

Developing additional sources of renewable energy is a national concern. Results of economic analysis indicate that at a farm-gate price of \$40 per dry ton for switchgrass, farmers could potentially reallocate 20 million acres from traditional crops into production of switchgrass to be used in firing electric power plants or ethanol production. This shift of acreage out of corn, wheat, and soybeans could raise their prices above USDA loan rate levels and eliminate the need for loan deficiency payments to producers of these crops. The total savings generated could have been up to 5 billion dollars annually from 1996 to 2000. If these savings were passed to utilities, the effect would be to lower the net cost of switchgrass to utilities to less than \$20 per dry ton. In this case, the government would have saved several billion dollars per year, farmers' income would have been 3 billion dollars higher, and the production of renewable fuels would have reached a significant milestone.

### *Greens Industry:*

Over 800 new Extension Master Gardener trainees were enrolled and trained in 2001. Participants in local Master Gardener associations provided over of 36,000 hours of volunteer service to Extension and Tennessee communities this year. At \$10 an hour this volunteer service has an estimated value of \$360,000. A high percentage of Master Gardener training sessions for new volunteers were now done by trained volunteers, thus freeing up county agent time from these training duties. Volunteers also conducted demonstrations, participated in diagnostic clinics, answered telephones, co-hosted weekly television program, made home visits and participated in a number of other service projects which Extension would not be able to provide without the assistance of these volunteers.



A TSU Cooperative Extension Program Horticulture/Urban Gardening/Master Gardener Programming Team was formed to address the issues of home gardening, pesticide usage by home owners and training of volunteer Master Gardeners to extend the outreach of Cooperative Extension agents in their communities.

University of Tennessee plant science researchers have developed dogwood cultivars which are resistant to anthracnose and powdery mildew. These varieties will permit the ornamental horticulture to more economically produce and sell dogwoods of higher quality. A survey of consumers' attitudes toward a new dogwood tree that is resistant to powdery mildew revealed that, on average, consumers would be willing to pay an additional \$11.87 in Jackson, MS, \$13.91 in Nashville, TN, \$14.58 in Knoxville, TN, and \$16.78 in Detroit, MI, for such a dogwood. This amount would be in addition to the typical retail price of \$55 to \$60 for five-foot, one-inch caliper trees in five-gallon containers. In separate studies the potential reduction in loss from anthracnose and powdery mildew has been estimated to be \$42 million.

#### *Soil and Water Conservation:*

As a result of Extension educational programs, based on research results, farmer confidence continued to be evident in the increased use of no-till production systems on 71% of soybean acreage, 65% of corn acreage and 61% of cotton acreage in 2001, up from 64% of soybean, 59% of corn and 50% of cotton acreage, respectively, in 2000.

#### *Limited-Resource and Small Farmers:*

In Tennessee, net farm income continued to fall in 2000 and 2001. Marketing strategies, better management practices, value added agriculture and alternate crops and livestock were explored to minimize those losses and make Tennessee agriculture economically viable and globally competitive.

Limited resource and small farmers have special concerns about their viability and survival. According to 1998 USDA Census of Agriculture, 6900 farms (75.8 percent of all farms) in Tennessee have an income of less than \$10,000. Minorities operated 1,458 farms (1.6 percent of all farms). Although small-scale family farm operators produce a small percentage of the total agricultural output, they control significant agricultural resources (land, buildings, machinery and equipment). They are also major purchasers of agricultural inputs and are an important stabilizing force for rural, agriculture-related business communities. Problems of small-scale farm operators have traditionally included limited capital, uneven cash flow, lack of management skills and limited resources. The TSU Cooperative Extension Program organized agents and specialists into issue-programming teams to work in collaboration with The University of Tennessee (UT) Agricultural Extension Service (AES) to address these needs. The small farms team was organized to work with issues related to small-scale farm operators. The horticulture/urban gardening/master gardeners team was organized to address the issues related to home gardening, pesticide safety and environmental stewardship.

The TSU Cooperative Extension Program also provided leadership to incorporate the USDA Small Farms Assistance Program (SFA) into the ongoing Extension programs.. The SFA program has been very successful in organizing small farmers into production and marketing cooperatives to help pool their resources and reduce their input costs and overheads.

TSU and UT Extension also collaborated to jointly fund an extension specialist to work with limited resource and small farmers to address their needs for farm enterprise diversification, farm produce marketing and to offer educational programs in best management practices. Additionally, an extension agent is assigned small farm responsibility in each county. The small farm agents/specialists issue program team provides coordinated comprehensive service in this area.

*Other Areas of Accomplishment:*

Improving Genetic Composition Animals:

Within the past year, animal scientists at the University of Tennessee cloned the second Jersey calf from an adult somatic cell. This event continues to build on the research that led to the first cloned calf the previous year. The second calf was cloned specifically from a female with a known mastitis history. Researchers hope to continue the somatic cell cloning effort so that they may one day be sufficiently reliable to use for cloning animals for improved production or providing animals of known genetic composition for more effective research.

**Allocations for Goal 1 Projects and Activities:**

UT 1862 Research:

- Hatch - \$2,765,984
- Multistate - \$409,456
- Animal Health - \$51,904
- McIntire-Stennis - \$588,501
- State Outlays - \$12,790,955

UT 1862 Extension:

- Smith-Lever b and c - \$3,013,515
- State and County Allocations - \$14,055,586

TSU 1890 Extension:

- Smith-Lever b and c - \$350,500
- County Allocations - \$55,500

**FTE's for Goal 1:**

UT 1862 Research - 66.5

UT 1862 Extension - 149.3

TSU 1890 Extension - 7.5

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**KEY THEME - SMALL FARM COMMERCIAL VEGETABLE AND LIVESTOCK PRODUCTION**

**Title:**

Extension Black Farm Landowners Programs

**Description:**

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Homeowners need important and timely information to maintain their lawns and landscape plants. Home gardeners produce a significant quantity of vegetables and small fruits for consumption by their families and neighbors.

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marketing and to offer educational programs in best management practices. Additionally, an extension agent is assigned small farm responsibility in each county. The small farm agents/specialists issue program team provides coordinated comprehensive service in this area.

In Franklin County, the TSU agent used a variety of program delivery methods including: a commercial vegetable production meeting that focused on produce that could be direct marketed; on farm visits; three on farm variety trials to test the adaptability of new cultivars; weekly newspaper articles and radio programs. Other activities included encouraging five vegetable producers to participate in a alternative vegetable production techniques field day at the plateau experiment station; conducting a three-night goat management workshop, which was attended by 60 goat producers; and follow up farm visits to those beef producers that attended the Novice Beef Seminar series and the Cumberland Beef Day programs. The agent also prepared weekly radio programs and newspaper articles to address issues covered in both programs and utilized end of program surveys to identify continuing educational needs of goat producers as well as receive base line data to measure future program impacts.

In Rutherford County, 39 4-H youth members signed up to participate in the 4-H goat project in 2001. Four workshops were planned and delivered in addition to their monthly meetings. These four sessions focused on handling and grooming their animals for the 2001 goat show. In Cheatham County, the TSU/CEP extension agent conducted her first class of master gardeners. Twenty-two Cheatham County residents signed up and 20 completed the class. There were 12 classes for a total of 36 hours of instruction. Class topics included: basic botany, herbaceous/ woody ornamentals, soil management, organic gardening, pesticide safety/ weed control, small fruit production, lawn grass management, disease control, insects, landscape design, vegetable gardening, and lawn and garden equipment.

Other program delivery methods were: two presentations to local garden clubs; 15 homeowner news articles published in *The Ashland City Times*, *The South Cheatham Advocate* and *The I-24 Exchange*; telephone recommendations; distance diagnostics to diagnose problems; promotion of soil testing; and home visits.

In Dyer County, master gardener classes were taught twice a year. The classes were formed in the spring and fall to allow individual gardeners to make a choice when they could attend class. Agents, specialists and volunteers taught topics according to class outline. News articles, radio and television announcements were made to inform the public about classes. Volunteer projects were presented to class participants.

In Hardeman County, the TSU/CEP agent provided technical assistance to help homeowners improve their knowledge on proper pruning, planting, spraying, and the safe use of chemicals in the home landscape. The following program delivery methods were used: a tree-planting workshop for the local Girl Scout group; compiled an outdoor classroom resource manual to meet the state T-cap teaching objectives for local elementary school; lawn demonstration on weed control and the use of different types of fertilizers; and an inaugural master gardener program; garden seminar; and educational booth on garden production practices at the local lawn and garden show. Additionally, two vegetable demonstrations were conducted to enhance growers' knowledge in vegetable production: (1). sweet potato production trial (2). Weed control and the production potential in late-planted field peas. Other

program delivery methods included: newsletters, seven news columns, three radio announcements, numerous visits and one-on-one contacts. Agent also received a creative program delivery enhancement grant proposal for \$2,500.00.

**Impact:**

The small farms/home horticulture programming team conducted several educational workshops focusing on raising and marketing goats, alternative crops production, and small farmer cooperatives.. As a result of this effort, the Western Tennessee Farmers Association (WTFA) was formed. In addition, this association was successful in securing a large grant to further explore the formation and operation a farmer's co-op for niche marketing through local farmers markets and individual roadside farm produce stands. Field crop demonstration and educational plots were conducted in Tipton, Franklin, Hardeman, Lawrence and Rutherford counties.

The Tennessee Goat Producers Association was organized as a result of the efforts of with the TSU livestock (goats) extension specialist. A statewide survey was mailed to several hundred goat producers to identify the educational needs of goat farmers in Tennessee. The forestry extension specialist collaborated with several agencies and organizations to meet the educational needs of small forest land owners.

Small Farm Assistance (SFA) program specialists provided technical assistance to approximately 500 small and limited resource farmers in 15 counties. These specialists worked closely with Northern Tennessee Farmers Association (NTFA) an association of minority farmers. The assistance through this program (SFA) has helped several farmers to seek the banking and/or government loans to finance their struggling farm operations and re-evaluate their farm operations

In Franklin County, sixty goat producers utilized the goat management school as a way to improve knowledge and skills to improve profitability. End of program surveys indicated an average knowledge increase of 32% for those thirteen topics covered during the workshop. Program evaluations also indicated the need for future program topics for those attending the workshop.

Total gross income from the beef program totals \$41,695 in Franklin County: five beef producers utilized graded feeder calf sales as a way to group market 188 feeder calves - 188 calves at 700lbs with a 5 cent per/pound increase = \$6,580; three beef producers stockpiled 140 acres of pasture for fall grazing producing hay savings on these farms valued at \$2,030; five producers used back grounding as a way to increase sale weights thus increasing income per/cow - 188 calves marketed with increased sale weights of 200 lbs at 85 cents has increased gross revenue by \$170/cow = \$31,960; two producers utilized hay storage methods to decrease forage wastage on 150 round bales - \$25 a bale at 30% savings equals \$1125.

Outcomes from the educational program in fruits and vegetables were: nineteen producers attended the commercial vegetable meeting; five producers attended the vegetable field day at Crossville; four producers utilized the Pick Tennessee Products website as a marketing tool; three producers planted

alternative crops to net an estimated \$1500/acre; thirteen producers utilized the farmers market as a direct sales outlet; two producers adapted the (honor system) as a means of vegetable marketing; and two producers utilized plasticulture production techniques to increase yields.

In Rutherford County, thirty-nine 4-Hers participated in livestock workshops. Evaluations showed following results: 22% of the enrolled eligible members participated in the goat meetings; 35% of the participants learned about goats grooming; 23% of the participants understood the reasons for clipping the goat's hair; 75% of the participants understood the reasons for trimming the goat's feet (nails); and 100% of the participants practiced leading their animal during the handling workshop.

In Cheatham County, soil test numbers as reported from the soil lab increased showing an increase in knowledge of soils and a practice change. This also leads to better lawn care practices and reduces chemical waste.

A post test evaluation instrument was administered to the participants of the master gardener program and showed that: from 75% to 94% of participants increased their knowledge and skills in basic botany, herbaceous/woody ornamentals, soils and soil testing, organic gardening, weeds and pesticides, fruit production, lawn grass Management, Insect and disease Control. Insects of Lawn, Garden Equipment, Plant Selection, Landscape Design and Pruning Fruit Trees. The 20 participants that completed the Master Gardener classes will use their new found knowledge and skills during 40 hours of community service and volunteer time. They will be helping Cheatham County residents with horticulture related problems.

In Dyer County, two Master Gardeners classes with nineteen (19) people have completed the course. Twelve (12) individuals completed 40 hours of volunteer hours each. Master gardeners have completed five community projects. More homeowners and garden centers are enrolling employees in classes to help their businesses. The first master gardener graduation was held with ten (10) participants receiving master gardener diplomas.

In Hardeman County, the consultations provided by the agent have resulted in an increased knowledge of the clientele of better and more creative landscape practices. According to MIS reporting system, agent horticultural calls have increased by 71%. One thousand seven hundred fifty three clients received newsletters.

The outdoor classroom will continue to provide a learning environment for students and support the school curriculum (T-cap) in science, social studies, reading and math for grades K-6 - 500 students will benefit from the outdoor classroom. Nine volunteers completed the master gardener program. If they volunteer 30 hours in community service, the value of their service would be \$2,700 at the rate of 10/hr. Fruit tree donations from Cumberland Valley Nursery in McMinnville, Tennessee to help grower establish a small fruit orchard saved the producer \$437.50. A community garden for residents at Ridgecrest Senior Housing Apartments provided 20 residents with fresh homegrown vegetables. Technical assistance was also provided for 15 youth at a local church for a vegetable garden -, 100% of the youth gained knowledge in vegetable production.

**Funding Source:**  
Smith-Lever and State

**Scope of Impact:**  
State Specific

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**KEY THEME - ANIMAL GENOMICS**

**Title:**  
Improving the efficiency of cloning

**Description:**  
In August 2001, a University of Tennessee research group produced Emma, the second Jersey cloned at UT from an adult somatic cell. Our research reaffirms that a somatic cell does not have to be induced into a “quiet” state before using it to clone an adult animal.

**Impact:**  
Using somatic cells for the purpose of cloning adult animals demonstrates that cloning procedures are more straightforward than previously thought.

**Funding Source:**  
Hatch and State

**Scope:**  
State Specific

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**KEY THEME - FORAGES**

**Title:**  
Education on Production of Bermudagrass for Hay

**Description:**  
Over the last several years, bermudagrass has become a more attractive crop for many hay producers across the state. The fertility and management requirements of this crop result in the need for changes in producers management schemes for economical and successful production.

Educational programs were conducted to teach the recommended practices for bermudagrass production. Fields days and meetings covering over 30 counties were used in this effort. Over 500 people attended these events.

**Impact:**

Due in part to this educational effort, the number of bermudagrass hay samples submitted to the Forage Testing Laboratory more than doubled. As for the production systems, a survey conducted a few weeks after a bermudagrass hay school indicated that over 90 percent of the participants intended to change some component of their production program due to the topics covered during the school.

**Funding Source:**

Smith-Lever and State

**Scope:**

State specific

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**Topic:**

New Orchardgrass Variety Offers Alternative to Tall Fescue

**Description:**

Beef and dairy cattle account for more cash receipts than any other agricultural commodity in Tennessee. Development of a new orchardgrass that is both productive and persistent will be of great interest to livestock producers because it will provide a cool season grass alternative to tall fescue. Tall fescue, although popular because of its ability to persist in pastures from year to year, frequently causes producers to lose money because of the presence of the fescue endophyte that causes fescue toxicosis. Annual losses due to fescue toxicosis exceed \$1 billion to U.S. cattle producers.

Researchers with the University of Tennessee Agricultural Experiment Station have developed and released a new orchardgrass variety: 'Persist.' The new variety is expected to double the longevity of orchardgrass pastures in Mid South climates as well as extend the grazing season by as many as 30 days. It has been named 'Persist' for its longevity in the field. The new variety has high yield and much higher persistence under high grazing pressure and drought conditions than 'Benchmark', the current most-grown commercial orchardgrass variety.

**Impact:**

Persist may provide cattle producers with an alternative to tall fescue. Tall fescue is presently preferred over orchardgrass for pastures because tall fescue can better withstand grazing pressure and other stresses such as drought. Yet, Persist overcomes these limitations. In addition, the orchardgrass may be a better source of nutrition for cattle because it will not subject grazing animals to the toxic endophyte *Neotyphodium coenophialum*. Tall fescue often plays host to this fungus. However, cattle that consume infected fescue can experience fescue toxicosis. Symptoms of which can include lower conception rates, reduced weight gains or milk production, increased body temperature, rough haircoat, and poor blood circulation in the feet and tail. Fescue toxicosis results in annual losses exceeding \$1 billion to U.S. producers – \$100 million of that from Tennessee's 50,000 producers. Persist should also



be attractive for dairy farmers who wish to produce hay in addition to grazing. Equine producers will also benefit because of the sensitivity of horses to the fescue endophyte.

**Funding Source:**

Hatch and State

**Scope:**

Research

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**Title:**

A Better Way to Store Hay

**Description:**

Winter feeding is the largest single expense for Tennessee cow -calf producers and may run from 40 to 60 percent of the annual variable costs of feeder cattle production. Hay is the primary winter feed for 91 percent of the state's cow-calf producer. Eighty three percent of the hay is fed in large bales. Large bales, stored on the ground, unprotected from the weather can experience up to 30 percent loss of dry matter. This is a big loss in dry matter and increases cost of production. Storage methods that would reduce these losses would both cut the winter feed bill and improve profitability for cow -calf producers.

Extension specialists and agents developed educational programs that stressed storing methods to reduce hay spoilage.

**Impact:**

As result of the educational programs, the percentage of cow -calf producers that practiced storage practices to reduce the exposure of the big bales from weather increased from 48 percent in 1996 to 63 percent in 2001. These results are supported by reports from county Extension agents. One reported that 20 producers averaged reducing their hay losses by \$802.50 or \$32.00 per cow. Others reported that 33 percent and 40 percent of producers had put into effect hay storage practices that protected hay from the weather. These results indicate that Tennessee cow -calf producers are aware of the hay losses that result from storing large round bales unprotected from the weather and have taken steps to reduce these losses. Based on the preceding information, these efforts have amounted to \$23 million annual reduction in the winter feed bill for the state's cow -calf industry since 1996. This would have also transposed into extra profit.

**Funding Source:**

Smith-Lever and State

**Scope:**

State specific

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**KEY THEME - AGRICULTURAL COMPETITIVENESS**

**Title:**

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**KEY THEME - AGRICULTURAL PROFITABILITY**

**Title:**

Beef Cattle Producers Increase Income Through Cooperative Marketing

**Description:**

Marketing of beef cattle can easily result in the difference between profit and loss for beef cattle producers. Alternative marketing revenues must be utilized in order for farmers to realize the full value of their product. Most cattle in Tennessee are sold one or two at a time through local weekly livestock auction barns. It is widely known that revenue increases when cattle are marketed in larger and more uniform lots especially in 50,000 pound lots.

Group meetings, newsletters, farm visits, and other educational efforts have been conducted to inform producers of different marketing options.

**Impact:**

Extension agents assisted beef cattle producers in organizing the Lower Middle Tennessee Cattle Association. This association conducts eight (8) tele - video auction sales per year. Thirteen Maury County producers marketed 1,674 head through these sales. They grossed \$1,085,179 which was approximately \$113,396 more than they would have because of this marketing effort. This represents more than \$67 per head of increase for these farmers.

A graded value-added feeder calf sale was conducted by the same association in October 2001. Fifteen Maury County producers marketed 150 head of the 346 total. Of the sales gross revenue of \$175,224, Maury County producers grossed approximately \$87,000. This was an increase of about \$3,000 over what the same cattle would have sold for through conventional local livestock auction barns. This represents an additional \$20 per head net income.

**Funding Source:**

Smith-Lever and State

**Scope:**

State specific

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**Title:**

## Feeder Cattle Marketing

### **Description:**

Marketing calves through cooperative, organized sales produces added returns for Tennessee cow-calf producers. Tennessee cow-calf producers are at a disadvantage when marketing due to the small number of feeder calves from individual herds. This prevents opportunity to take advantage of marketing feeder cattle in 50,000 lb. load lots which would provide a market price advantage.

University of Tennessee Agricultural Extension Service specialists have cooperated with the Tennessee Department of Agriculture, the Tennessee Cattlemen's Association and livestock marketing firms in educational programs that emphasized the advantage of improved prices for feeder calves by marketing through feeder calf sales. Calves from numerous farms are grouped with comparable calves in an effort to market 50,000 lb. lots. This allows the small producers to gain a marketing advantage compared to marketing feeder cattle as single lots.

### **Impact:**

Following are results of grouping similar calves and increasing the number per lot offered for sale. These do not include sales where "value-added" health and management practices were carried out prior to marketing. The economic benefit of "phenotypic" grouping of feeder calves offered for sale is evident based on reports of Extension agents. Added returns over local, weekly auctions reported per head ranged from \$20.00 to \$42.00. The mean was \$31.35. According to the Tennessee Department of Agriculture Livestock Marketing Reports, 80,000 feeder calves were marketed through cooperative feeder calf sales the past year. This generated an extra 2.5 million dollars annual receipts to the state's beef industry compared to marketing through weekly auctions..

### **Funding Source:**

Smith-Lever and State

### **Scope:**

State specific

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### **Title:**

Farm and Financial Management/Marketing - Estate Planning and Marketing Skills.

### **Description:**

Two economic concerns face a number of Franklin County, Tennessee farm families for the immediate and long term future. Low grain prices over the past three years have many producers concerned over the current profitability of their farm business and wanting to know how they can stay economically competitive.

Another concern for many of these families is the long term future of the business. Many of these producers have a deep agricultural heritage. Currently, fifty-five sibling producers are engaged in full -

time, commercial agricultural production with a parent or in-law. Given the value of the land and assets that many of these farms have accumulated through multiple generations of agriculture production, many of these sibling producers are concerned about the inheritance tax burden and the financial impact on the business and their livelihood and that of future generations.

Extension personnel planned and conducted two marketing seminars designed to address key marketing issues in December 2000 and 2001 to assist producers in developing needed skills for the coming years. Extension agents also made forty-three marketing-related personal visits with producers. Timely marketing information was incorporated in a monthly newsletter to each of the 962 farm producers.

Extension personnel also planned and conducted, an estate planning seminar, targeting the fifty-five identified farm families with inheritance issues. A follow-up session with individual estate planning consultations was also offered.

**Impact:**

As a result of Extension's efforts the following impact was ascertained through follow-up program surveys.

- 38 producers attended the two marketing sessions, based on evaluations, producers rated each of the sessions' topics as very helpful.
- Two producers reported utilizing marketing skills to obtain an average marketing price of \$2.80 for approximately 250,000 bushels of corn.
- Fourteen producers reported they felt more confident in their marketing decisions by utilizing skills to calculate profitable farm prices.
- Eight producers reported having a better understanding of basis, with three producers utilizing basis contracts as a marketing tool for the first time.
- Twelve producers reported they had a better understanding of LDP's and how to better utilize this program.
- Two producers reported utilizing option strategies as an alternative to building more on-farm storage facilities.
- One producer reported this saved him in excess \$50,000.
- Based on participants reported information an estimated \$149,000 of additional income or savings was netted above previous marketing strategies.
- 108 participants participated in the estate planning session representing 59 farm families. Fifteen families returned for individual consultations.
- The law firm conducting assisting with the seminar and consultations has reported completing planning for eight Franklin County farm families creating immediate protection of \$3.2 million dollars in assets.
- One farm family, with three generations currently involved full-time in the operation, established a family limited partnership that created protection of over one million dollars. One family member stated "This has been the best move we have made for our business and our children's future in farming".

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Improving Marketing Skills for Agricultural Producers

**Decription:**

For farmers to remain economically competitive in the years ahead, improving marketing skills is a must. A needs assessment conducted with 35 area agricultural producers identified marketing as an important need of farmers. A listening session consisting of 26 area agricultural leaders and lenders also identified marketing skills as a weakness of agricultural producers. With the recent price declines in agricultural commodities, it has become essential that farmers improve their marketing skills.

An Extension area farm management specialist planned and conducted three marketing meetings with twenty-nine middle Tennessee agricultural producers participating. Two newsletters were written containing marketing information on LDPs, basis, fundamental and technical analysis, market carry, price levels, and your own business situation. The area specialist also made 56 one-on-one marketing-related contacts with producers.

**Impact:**

A survey was conducted to evaluate the marketing meeting in Coffee County. The survey showed the following:

- 50 percent increased their overall marketing knowledge.
- 60 percent increased their knowledge of marketing information on the internet.
- 48 percent increased their knowledge of crop reports.
- 60 percent increased their knowledge of livestock fundamentals.
- 30 percent increased their knowledge of seasonality.
- 31 percent increased their knowledge of forward pricing.
- 88 percent increased their knowledge of charting.
- 15 percent increased their knowledge of government programs.

A survey was also conducted to evaluate the marketing meeting in Franklin County. The survey showed the following will become new annual practices:

- 45 percent will use options as a price risk management tool.
- 27 percent will calculate farm and family expenses.
- 55 percent will calculate my price.
- 64 percent will expand their marketing plans by including fundamental analysis and seasonality of pricing.

A survey was conducted among participants to determine the effectiveness of the Extension marketing program. (Estimated financial impact is listed to the right in parentheses.)

- One producer now checks the market (CBOT) every other day for pricing opportunities.
- One producer used the sixty-day PCP lock-in for his corn which netted him \$2.44/bu. This was the first time he had ever used this marketing alternative. (\$3,400)
- One producer contracted 4,000 bushels of wheat at \$2.80/bu. (\$2,560)
- One producer contracted 15,000 bu. of corn at \$2.58/bu. and another 10,000 bu. at \$2.42/bu. (\$16,650)
- Two producers received over \$3.00/bu. for their wheat counting LDP payments. (\$25,000)
- One producer made three contracted sales of corn resulting in 50 bu./acre sold for an average price of \$2.23/bu. (\$5,700)
- One producer contracted 30,000 bu. of corn at \$2.50/bu. (\$19,500)
- One producer contracted 60,000 bu. of white corn at \$2.75/bu. (\$24,300)
- One producer averaged \$2.45/bu. for his entire corn crop. (\$11,375)
- One producer contracted 45,000 bu. of wheat at \$2.70/bu. (\$24,300)
- One producer contracted 3,000 bu. of corn at \$2.18/bu. He gained a penny per bushel by negotiations with the elevator owner. This was the first time he had ever contracted grain. (\$990)
- One producer contracted 20,000 bushels of white corn at .20 over (basis contract).
- Four producers received the following wheat LDP payments: \$.47, \$.45, \$.45, and \$.40.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Marketing Alternatives for Tennessee Farmers

**Description:**

Tennessee farmers face rising input costs and lower market prices. There are marketing alternatives that will allow farmers to limit risk exposure and enhance income. Teaching these marketing alternatives to farmers and enhancing the farmers' ability to use those tools is an important component of a marketing/management educational program.

During 2001, marketing alternatives educational programs were taught in 10 producer groups' meetings to a combined audience of 727. Also, 5 inservice training workshops were taught to 91 Extension Agents and Specialists. Participants in these meetings were taught how various marketing tools could be used to enhance income and/or reduce marketing risk. A publication was authored on the subject which will be released in January, 2002. The publication examines and compares the impact associated with various marketing alternative during the decade of the 1990s.

**Impact:**

During the 1990s, using marketing tools was shown to increase income as much as \$340 per acre for Tennessee farmers. Presenting this information to farmers in a way that they can use it to help improve their decision-making skills is vital to an educational program. Evidence that the topic was effectively taught to producers can be summarized in the following post-program evaluations:

“Thank you. Thank you. Thank you. Wow, did we ever hit a home run! I’m still hearing producers comment about the presentation you made at Grain Conference. I don’t believe that I have ever encountered such a timely, sound, simplified explanation of marketing in my career. My hat’s off to you for the wonderful presentation and for the efforts you have made in generating this type of data. On behalf of the entire Grain Conference planning committee, we appreciate you.”

Following a Coffee County marketing meeting, participants were asked to rate their change in knowledge level as a result of two row crop sessions taught that day. Participants on average stated that their knowledge level had increased 47% and 31% in a pre/post test for the two sessions.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Farm Management in the Cumberland (TN) District

**Description:**

Tennessee agriculture is undergoing rapid changes. These changes are occurring in the business and financial structure of the industry. Producers are faced with making changes in their production methods, and the way they market their products. Also, government farm program payments are declining. While these changes may aid the consumer, agricultural producers will face a much more competitive and uncertain financial future. Failing to recognize and manage this change will jeopardize the financial health of many farmers.

Approximately 4,600 farmers in Area Eight of the Cumberland District gross about \$108.2 million and spend about \$76.8 million each year. This represents an approximate net income of \$31.4 million for an eight county area. Cattle, Dairy, Poultry, Vegetables, and Tobacco represent 82% of that total according to the 1997 Ag Census. These enterprises have seen some tremendous changes in technology, organization, and marketing opportunities in the recent past. These changes, if not managed correctly, will greatly affect producers and in turn affect the agriculture income of that area. In meeting with the eight county Agricultural Agents and discussing their findings from their own needs assessments, and in conversations with past and present MANAGE participants it was decided that a

comprehensive farm financial program was needed. This program would focus on improving record - keeping, budgeting, marketing, farm financial analysis, and overall profitability of farmers in Area Eight.

Conducted nine educational meetings with an attendance of 712 producers. Topics covered at said meetings ranged a wide variety of Farm Management topics such as Hay Economics, Record Keeping for Farmers, Alliances, Beef Marketing, and Computer Application in Agriculture.

In addition to the educational meetings, twenty three long run farm plans were estimated and evaluated for 41 producers. These farm plans main agricultural enterprise varied from Beef Cattle to Nursery Stock.

**Impact:**

Impacts from the long run farm plans were measured by results from FNLRB analysis and observation of changes made to an operation after the analysis was completed.

The change in the net farm income from alternatives suggested by the producers and the farm management specialist ranged from -\$39,525 to \$67,174

The change in cash flow from alternatives suggested by the producers and the farm management specialist ranged from and -\$26,582 to \$36,257.

Sixty-eight percent of MANAGE participants made a change in their operations as a result of the farm financial analysis.

Twenty-three percent of MANAGE participants made no changes in their operation as a result of the farm financial analysis.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Record Keeping for Improved Management Practices

**Description:**

Effective farm managers rely on accurate farm production and financial records to make informed management decisions. Improving the record keeping systems of farm families should result in making more informed decisions that affect their farm profitability.



Three-hundred and six (306) individuals were contacted in the 2001 program year with record keeping information. These contacts were made by one-on-one farm and office visits, workshops, field days and group meetings. Six informational meetings were conducted that focused on the importance of financial and production records. Five hands-on computer workshops and training sessions were conducted that focused on computer record keeping systems. Attendance at these meetings totaled one-hundred seventy-nine (179). Assisted eighty-eight (88) farm families in organizing and implementing a computerized financial or beef cattle production record keeping system. Provided technical support for THE Beef Cattle fIRM, a computerized beef cattle record keeping system. Registered users of this program include 370 farm users and agricultural professionals in Tennessee, and 86 farm users in 26 states other than Tennessee. Promoted and demonstrated the new Windows Version of THE fIRM which was released in the Fall of 2000.

**Impact:**

Financial benefits from this information can vary greatly among producers. The estimated range of benefits to the farm families varied from very little value to thousands of dollars.

The following are specific examples where workshops, meetings and training programs were evaluated by producers and agents.

Record Keeping Workshops: Average of twenty-two responses.

100% indicated the workshop was worth their investment in time.

87% indicated their ideas about record keeping had changed during the workshop.

74% would consider changing their method of record keeping after the workshop.

THE Beef Cattle fIRM: Average of fifty-nine agent evaluations.

- a. Training changed your knowledge of the subject matter - 4.25 (with 5 = "improved" and 1 = "no change")
- b. Training was informative - 4.45 (with 5 = "very informative" and 1 = "uninformative")
- c. Change interest in topic - 4.42 (with 5 = "increased" and 1 = "decreased")
- d. According to 52 users in a survey, 90% indicated the software was somewhat or very useful in making production and management decisions.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Improving Farm Financial Management Skills for Agricultural Producers in East Tennessee

**Description:**

All aspects of the U.S. agricultural industry are moving to technologically advanced production systems. Farming as it once was is gradually being replaced with technological farms using improvements; such as electronic identification systems for livestock, computer monitored milking systems, and computer monitored watering systems in nurseries. The advancements in agriculture may improve the U.S. agricultural industry as a whole, but many producers in East Tennessee question their ability to sustain their industry's advancements. These technological advancements are likely to eliminate or reduce the number of inefficient producers. However, small producers are not synonymous with inefficient producers. The question that many East Tennessee producers are left with is whether to expand or become more efficient on a smaller scale.

Thirty-six producers participated in the MANAGE program (five of those had also participated last year). Of the 36 producers, 23 required whole farm financial analysis or individualized budgets. Four of the 36 producers set up computerized record keeping systems. New participants were introduced to the MANAGE program primarily through their county Extension agent, Farm Service Agency's Borrower's Training, and referrals from banks. However, some participants learned of the MANAGE program from Extension producer meetings and field days.

**Impact:**

Twelve of the 36 participants are considered successes because of improvements they made resulting from the information they received through the MANAGE program. Increasing profit was not the basis for success, because some participants reduced or minimized their losses. Some simply improved their management practices (e.g., adopting a computerized record keeping system). Nearly all of the participants expressed their gratitude for the MANAGE program. Most participants admitted that they had never broken down their income and expenses per enterprise until the MANAGE program forced them to do just that. One producer's wife thanked the area Extension specialist privately for forcing her husband to see for himself that his "dream" was costing them money.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Farm Planning and Recordkeeping

**Description:**

Farm families have seen decreasing net farm incomes due to lower commodity prices, decreased production quotas and increased input costs. Through whole farm planning, analysis can help families make accurate decisions and develop skills to keep accurate records to support future decision-making.

**Farm Planning -**

Thirty-three farm families were consulted in developing farm plans on a whole - farm or partial enterprise basis. Producers were educated in areas of financial management, record-keeping, enterprise budgeting, etc.

**Recordkeeping -**

Quicken Workshops – 4 recordkeeping workshops were conducted in Robertson, Houston, Stewart, and Humphreys Counties.

THE Beef Cattle fIRM Software – 73 individuals participated in seminars on using THE Beef Cattle fIRM for keeping accurate beef cattle production records. Additional farm families were visited individually for consultation with THE fIRM.

Electronic Identification – Over 400 calves were electronically tagged on 7 farms using AgInfoLink software and equipment. Results from marketing these calves are yet to be determined, but some producers have already been offered \$5/cwt. premium for these calves sold in tractor load lots. We have realized the importance of this technology in the future and our responsibility to educate our producers in this area. Thus, Montgomery County is the only Tennessee county office to own electronic identification equipment and I am the sole operator of the EID software program.

Tobacco Systems Software – 332 individuals participated in demonstrations in using the Tobacco Systems Software to help them develop enterprise budgets for dark and burley tobacco to increase profitability.

**Impact:**

A farm plan helped one producer decide against investing over \$150,000 in a blueberry enterprise that could not be adequately supported in his situation. Other alternatives were discussed for the producer.

Results from marketing the EID tagged and health program verified calves have already been \$5/cwt. premium for these calves sold in tractor load lots.

The following are results from the evaluations from the Quicken Recordkeeping Workshops:

Instructor's knowledge of subject	9.6 / 10
Instructor's ability to explain the material	9.4 / 10
The type of material cover in this workshop	9.2 / 10
The amount of time given to each workshop	9.0 / 10
The example used in the workshop material	9.3 / 10

Selected Comments:

“Now that I understand Quicken, I will switch to it and keep my data better”  
The best part of the workshop was “the patience of the instructor” and the “hands-on work and quality of instruction”

Grants proposals were developed and submitted to fund demonstration of Electronic Identification in cattle (\$22,000 – Philip Morris Shared Solutions Grant) and fund Quicken Recordkeeping Workshops (\$750 – U.S. Tobacco).

**Funding Source:**  
Smith-Lever and State

**Scope:**  
State Specific  
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**Title:**  
Farm and Financial Management in Chester, Decatur, Fayette, Hardeman, Hardin, Henderson, Madison, and McNairy Counties in Tennessee

**Description:**  
To remain competitive and ensure a sustainable production system within the state, Tennessee’s growers and agribusinesses must make informed decisions. The success of their operations increasingly depends on making correct choices from an array of commodity options, production practices, and management and marketing strategies. Producers taking advantage of the educational programming offered in Farm and Financial Management will acquire the basic tools necessary to make informed decisions about their farming operations. Producers will learn the importance of income statements and cashflows as they relate to their marketing decisions.

An Extension area farm management specialist worked with county personnel in developing and implementing educational workshops throughout the year. Twenty workshops were held in the area where management and marketing strategies were a part of the program. In addition, twelve other workshops were attended on the district and state level where contacts were made concerning management and marketing.

Met with individual farm families to develop crop and livestock plans for their farm . In addition, individual farmers received training on developing enterprise budgets to be used in making informed decisions about their farming operation. Several families received training in keeping and using farm records.

Kept the public informed by the use of newsletters and newspaper articles. Newsletters were written in partnership with other Extension Agents. Newsletters were localized so that each county had an opportunity to participate.

**Impact:**

Thirty-four (34) farmers learned how to develop income statements. This information is critical for these individuals in determining the viability of their farming operation. The most useful piece of this statement is the profit or loss potential of the operation.

Eleven farmers learned how to develop detailed cash-flow statements for their farm. This information is useful as a guide to track the sources and uses of funds generated by the farming operation. The information is valuable as an indicator of credit worthiness and the ability to repay debts on a timely manner.

Eighty-eight farmers learned how to develop crop and livestock budgets for their farms. The information gained allowed these farmers to determine what crop and livestock choices offer the greatest profit potential for the present season. This information is needed to determine the crop and livestock mix for the farm.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Improving Abilities of Farmers and Farm Families to Make Management Decisions Insuring Sustainability of the Farm Operation.

**Description:**

Many farm families need guidance to better utilize their farm records as tools for making planning decisions. The initial determination may show a need to improve the record keeping system and then develop the ability to use those records for planning toward the farm families' goals.

Through the Extension-developed MANAGE computer software program, farm families continue to receive a comprehensive farm financial analysis often as a start to the planning process. Through the analysis, farm families review their current farm situation and evaluate alternatives or changes to the farm enterprise mix. Where possible, the farm records provide the basis for the analysis. New enterprises are evaluated as to how they might fit into the current operation allowing for labor, equipment and financial constraints. Where a comprehensive farm analysis was not warranted, individual enterprise budgets and assistance with record keeping were provided to begin the planning process. Group meetings and field days provided other opportunities to deliver farm management information on a variety of topics. Through a coordinated effort with county agricultural agents, local agribusinesses,

lending institutions and other state and federal agencies, farm families are provided information on agricultural production, marketing, program availability and other agricultural topics.

**Impact:**

Twenty-two farm families in the Cumberland District area were provided with a comprehensive farm financial analysis. Requests for information on alternative enterprises grew substantially, especially with the introduction of new alternatives like freshwater shrimp production. Through participation this year an estimated improvement of \$150,000 in farm income or net farm savings took place through farm families' participation in the MANAGE program.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Improving Producers' Skills in Keeping and Using Records for Decision Making Purposes

**Description:**

For farm businesses to survive the current farm financial crisis, farmers must have and use records for decision making purposes. Records are an important part of management and marketing. They are used in the planning and evaluation part of management and in preparing marketing plans. Without records management ends. Without management profitability declines. A listening session of twenty-six middle Tennessee business leaders, lenders, and Extension agents identified records as a weakness of agricultural producers. A survey was completed as to the financial needs of potential Extension audiences. Nearly one hundred percent responded that records and financial management were important educational needs.

Eight meetings on records and two on farm planning were conducted to improve record keeping and decision making skills among producers. A total of one hundred and twenty-three producers attended these programs. Six nursery producers attended a three-day multi-county Quickbooks workshop. A tomato production budget was completed. The area farm management specialist was also a co-author with Dr. Alan Barefield on Publication PB 1677, "Using Computers to Manage the Modern Nursery". The area specialist also assisted eighty producers in developing farm records, thirty-one in developing budgets, and forty-one in developing farm plans.

**Impact:**

A survey of the twenty-nine producers who participated in an Extension program on keeping and using records for decision making purposes showed the following:

- One hundred percent increased their interest in financial management.

- One hundred percent increased their skills in preparing and using balance sheets, income statements, cash flow statements, and enterprise budgeting.
- Ninety-seven percent increased their skills in record keeping and their knowledge of financial management.
- Ninety-seven percent replied that they plan to implement some of the skills learned.

A survey of the nursery producers who participated in the Quickbooks workshop showed the following:

- Producers' overall knowledge of the software program had increased one hundred and twenty percent.
- Producers' skills in record keeping and financial management had increased ninety-one percent.
- Producers' knowledge of the use of this software program had increased eighty percent.

Four other producers were trained in and are now using this software program. One nursery used Quickbooks to prepare twenty-two W-2s.

One producer reported that he increased his net worth by \$27,050 as a result of what he learned from Extension. Another producer reported increasing his net worth by \$12,000 as a result of using recommended practices from the Extension program.

Based on what he found out during the Extension program, one producer bought his father's farm and sold his own farm. He ended up with over \$40,000 in the bank from these transactions. Another producer reduced feed cost from \$67,000 in 1998 to \$22,800 in 2001.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Financial Management for Tennessee Farmers

**Description:**

Tennessee farmers face rising input costs and lower market prices. Financial planning can be a vital part of farm management as farmers make decisions impacting both short and long term profitability.

Extension agents and area specialists- farm management are on the front line in dealing with the financial challenges faced by Tennessee farm families. Through the MANAGE program thousands of farm families have been assisted in helping to make difficult financial decisions. To be useful, these decisions

must be based on accurate information and analysis. Members of the farm financial management team compiled and distributed information on cost and returns to farmers, lenders, Extension agents, and specialists. Software and educational programs on financial record keeping were also developed and conducted that provide the basis for sound financial planning.

**Impact:**

Impacts from the financial record keeping component alone were found to be \$795 per farm in the short run, according to producer survey information. But even more impacts are drawn from the financial planning component of farm management. The MANAGE program has consistently and significantly had positive impacts on the farm families of Tennessee through enhanced decision-making skills, greater financial understanding, and direct financial gains.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Alternative Enterprises for Tennessee Producers

**Description:**

Many "traditional" row crop and tobacco farmers in Tennessee are searching for alternative enterprises with which they can supplement their agricultural income, and hopefully stay in business another year. Other producers are looking for alternatives to keep their children on the farm, in order to keep the farm in the family.

Through the use of public presentations, as well as one-on-one contacts, I have presented research based information that will help them select enterprises that are feasible to their operation. I have tried to address advantages and disadvantages of various alternative enterprises, potential returns, as well as potential problems along the way. Much interest has been expressed in annual plasticulture strawberry, pumpkin, and plasticulture muskmelon production. Variety, fumigation, and frost protection trials and demonstrations have been conducted in annual plasticulture strawberry production. Herbicide trials and demonstrations have been conducted in plasticulture muskmelon production. Several pumpkin variety and herbicide trials and demonstrations were conducted.

**Impact:**

Acreage and interest in vegetable and small fruit crops, especially annual plasticulture strawberry, pumpkin, and plasticulture muskmelon production continue to increase. As markets permit, some growers that have started producing some of these alternatives continue to increase their acreage. Some producers have realized greater net returns/A on less than 5 acres of strawberries, than several



hundred acres of row crops. Some tobacco growers have been able to replace lost income from quota reductions.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Fruit and Vegetable Supply-Chain Management, Innovations, and Competitiveness

**Description:**

Changes in production, distribution, and consumption of fresh produce have made it difficult for small, independent growers to enter the commercial distribution system. Wholesalers and retailers find it more costly to purchase their smaller and variable quantities of produce. Consequently, most small independent producers find it difficult to operate in the commercial segment and often must find other markets for their products. Farmers, extension workers, and government officials look to direct marketing as a way of addressing several concerns. These concerns include increasing sales, preserving small farms, strengthening economic and social ties between farms and urban residents, and development of emerging outlets for organic and specialty farm products.

Tobacco and/or vegetable growers will be interested in a study of the feasibility of sequentially cropping vegetables with tobacco transplant production in greenhouse facilities. While several vegetables could offer some potential, the focus was limited to tomatoes because of available budgetary information on tomatoes and because tomatoes are Tennessee's number one vegetable crop.

Compared to other outlets, little consideration has been given to green grocers. Although neglected, these outlets possess several marketing advantages. Green grocers tend to be spread throughout metropolitan areas, as opposed to direct-market outlets, such as farmers' markets and on-farm locations, so travel costs for customers more closely approximate those of grocery stores. Many customers like the personal attention, quality, and freshness afforded by green grocers, as well as the convenience of not having to search for items they want to buy in large stores. Advantages to growers from selling to green grocers include avoidance of the need to rent spaces at farmers' markets and having their own sales people at the stands. Smaller production volumes are also more compatible with the sales volumes of green grocers.

Budgetary analysis based on actual farm data and synthesized data using an economic engineering approach was used to evaluate the economic feasibility of sequential crop production systems in a single greenhouse and to evaluate the income potential for three alternatives at selected levels of price and

yield with tobacco transplants alone, tobacco transplants and fall tomatoes, and spring and fall tomatoes.

**Impact:**

Results from a consumer survey asking for their perceptions and expectations at the green grocer outlet where they were contacted revealed that quality was the most important ideal attribute overall. Employees, pricing, and hours of operation formed a cluster below quality. Information, signs, and appearance comprised a second cluster. Variety was last, which was expected because patrons presumably were at the outlets to buy fresh produce. Among the top four ideal subgroups, no significant differences by store were found. Results suggest respondents are fairly homogeneous with respect to their ideal criteria for rating store features. Few socioeconomic variables had impacts on respondents' ratings, and significant stores had significant impacts on the ratings. The study demonstrates the survey technique can be implemented easily by any green grocer. Results can be used to identify strengths and weaknesses of individual outlets.

Because quality was most important to the average respondent and the typical person reported that the green grocer did not meet ideal expectations regarding products, this gives insight as to what green grocers can work on to improve customer satisfaction. This would be the most important feature to strive to improve. The surveyed outlets were reported to be close to meeting expectations with respect to employee interactions with shoppers, hours of operation, and information provided. The results revealed the fact that customers were not looking for milk, eggs, bakery products, or coffee at these stores. In other words, the results indicated that the stores are meeting customer expectations regarding non-produce offerings, and this matched their indications as to expectations for such products at green grocer outlets.

Sequentially cropping tobacco transplants and fall hydroponic tomatoes or spring hydroponic tomatoes and fall hydroponic tomatoes do appear to be viable options for extending the growing season and attaining greater efficiency and profitability with greenhouses. Both scenarios resulted in positive net returns; however, the cropping system of spring hydroponic tomatoes and fall hydroponic tomatoes has the higher net revenue. Environmental factors, consumer preferences, and prices can alter the results given the dependency each crop has on these factors. Actual net returns may be reduced substantially by the expenses associated with marketing tomatoes. Both combination scenarios resulted in a profit for the operation, but on an individual basis, the fall hydroponic tomato budget showed a relatively low net return raising questions about the feasibility of the crop. Producers can potentially make a higher return on the fall crop if prices are higher, yields are higher, or both. Another consideration for producers who are already in greenhouse production is the lower expenses for the greenhouse. With lower greenhouse costs, the fall crop will be more profitable.

**Funding Sources:**

Hatch Act (Regional Project Funds)  
USDA, IFAFS grant

**Scope:**

Integrated Research and Extension

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**Title:**

Removing Distribution Barriers Confronting Small - Volume Fruit and Vegetable Growers

**Description:**

Changing food consumption patterns for produce and the emergence of convenience (precut) packaging have created opportunities for fruit and vegetable production, which has prompted many to suggest that small farmers (particularly tobacco farmers) should switch to these alternative crops. But consolidation and increased concentration within the fresh produce distribution channels are also occurring. Changes in information technology, processing, wholesaling, and transportation continue to favor larger market participants who also benefit from specialized managerial and coordination activities.

However, as the activity at food distribution outlets increases, opportunities for small growers expand. These growers can choose to continue with direct sales to retail customers (consumers). The presence of alternative buyers at the market also helps to guarantee buyers, and thereby, can encourage expanded production and sales through brokers or sales to wholesalers, processors, and food distributors.

Tennessee and three neighboring states (Georgia, Kentucky, and North Carolina) are participating in a joint regional project. Information gathered into a database will provide a benchmark for identification of distributional barriers confronting small - volume growers for a variety of produce commodities. Because all of the elements of the distribution systems are involved, this will be the first time that simultaneity problems can be addressed. The nature of the database will also permit an evaluation of the importance of coordination among sites and agencies involved in fruit and vegetable marketing. The co operators have created five survey instruments and sampling designs, and are beginning the survey processes. The five surveys are 1) growers, 2) Extension agents, 3) public market managers, 4) marketing agents, and 5) state departments of Agriculture. Once the instruments were finalized, attention turned to identification of interviewees for each of the five groups of surveys in each of the four states.

**Impact:**

The goal of the regional project is to pool the information from each state for each of the stakeholder groups. Similarities and differences among the states will be noted. Results will be used to develop a blueprint for creating viable market outlets for small fruit and vegetable growers. The document can be used by fresh produce stakeholder groups for market development in any state.

**Funding Source:**

USDA IFAFS

**Scope:**

Multistate Integrated Research and Extension - TN, GA, KY, NC

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## **KEY THEME - ADDING VALUE TO NEW AND OLD AGRICULTURAL PRODUCTS**

### **Title:**

Adding Value to Tennessee Agriculture: Extension's Initiative for Value - Added Enterprise Development

### **Description:**

Tennessee's farming sector continues to be stressed by low profit margins, scarce production resources and changing marketing conditions. The farmer's portion of the average consumer dollar spent on food has decreased by one penny each year during the past three years to 20 cents per dollar in 2000. Prices in commodity markets continue to fluctuate sporadically while production and operating costs continue to increase. Opportunities for income improvement often exist through value - added agriculture enterprises and activities. However, to appropriately consider, evaluate and take advantage of this value-added potential, folks in Tennessee's agriculture industry must be aware of opportunities and be informed about economic feasibility, planning and market development. The agriculture industry can also benefit from income opportunities not directly related to production agriculture, such as tourism, natural resource utilization and waste utilization.

From January to December 2001, 18 producer-initiated, value-added projects from 16 counties were evaluated in the Tennessee Agricultural Extension Service's Agricultural Development Center (ADC) by teams involving nine specialists from Agricultural Economics, Food Science and Technology, Forest Products Center, Agricultural and Biosystems Engineering, Animal Science and the ADC. In addition, an estimated 496 farmer/entrepreneurs participated in 19 outreach and training programs involving educational exhibits, workshops, seminars and group meetings. Twenty -four news releases from the ADC provided local, regional and national exposure to value - added issues and information. A grant -funded project from the Tennessee Department of Agriculture's "Ag. Tag" program was concluded and, as a result, a publication and unique instruction tool was finalized under the "Documenting Successes of Value- Added Agriculture Enterprises: A Series of Case Studies" title. Two additional, multi-year grant-funded projects were awarded to the ADC: a \$76,000 FSMIP project titled "Developing Target Markets For Value- Added Niche Products" and a \$20,000 "Ag Tag" project titled "Strengthening Value- Added Enterprises and Markets in Tennessee: Development and Dissemination of Feasibility and Marketing Studies." The ADC also released a peer-reviewed publication titled "Targeting School Groups for Agritainment Enterprises: Summary of a Schoolteacher Survey in Tennessee" and 16 fact sheets for use in various educational settings. All publications, grant -project resources and mass media efforts are posted on the ADC web site.

### **Impact:**

Programs developed and administered by teams and individuals representing the Extension Agricultural Development Center (ADC) resulted in definite impact on the targeted audiences. The three primary audience groups who benefitted from ADC program efforts in 2001 are county Extension agents, farmers and entrepreneurs with value - added projects, and current and potential small business owners.

The ADC provided training to county Extension agents through nine venues in 2001 to audiences with a combined enrollment of 150. These training sessions increased the agents' awareness of value-added agriculture opportunities, enhanced individual agent's understanding of value-added marketing concepts, improved the understanding and applicability of state-level educational resources regarding value-added programs, strengthened the individual agents' comfort zone for dealing with value-added issues, and extended individual agents' understanding of marketing conditions beyond the commodity stage. County Extension agents now have an increased understanding and are more confident in discussing and applying value-added concepts with farmers and entrepreneurs in their local communities.

One-on-one efforts with farmers and entrepreneurs involved investigation, analysis, development and consideration of various marketing, financial, regulatory and technical/production aspects of business evaluation and expansion. Clients in this audience increased their knowledge and understanding of financial and marketing concepts applicable directly to their business idea. Clients were exposed to business planning, analysis and development concepts and tools from the most basic to the very complex. In addition to the training/education provided, most project entrepreneurs also received tangible results of their project study in the form of financial analysis, market research, feasibility study and/or an overall project report. Clients trained through these efforts of the ADC have indicated a greater chance of business success, cost savings, increased sales and prevention of a failed business.

Efforts of ADC faculty have had broad impact across the state through programs directed toward current and potential small business owners. The ADC responded to the needs of this audience by developing and disseminating information and educational tools via workshops, seminars, meetings and personal contacts (normally followed up by Internet communications). Studies performed for project entrepreneurs were often utilized as a basis for published works, group training tools, presentations and to provide general information to others in need of similar instruction/training. Training was provided through topics such as "Considering E-commerce," "Planning an Agritainment Enterprise," "Economic Considerations of Alternative Enterprises," "Identifying and Strengthening Characteristics of Successful Value-Added Enterprises," "Hospitality & Tourism" and "Marketing for Small Businesses." As a result of the pro-active programs delivered to current and potential small business owners, entrepreneurs are now better educated, more informed and able to make enlightened decisions regarding the future of their current or proposed enterprises.

Since its inception in 1998, the ADC has completed in-depth, multi-disciplinary, team analyses of 63 value-added projects from 34 counties, conducted 17 4x FSMIP-1999, Flower, Butcher Shop, Schoolteacher, Sawmill, Cookies, R-GROW, Candles, Livestock Waste, Aquaculture, Hunting Resort, Salsa, Popcorn, Pork Co-op) market development surveys, provided instruction for more than 60 meetings, seminars and workshops, secured \$214,500 from external sources for various market and industry development programs and developed more than 69 publications, fact sheets and resource materials for the overall enhancement of Tennessee's value-added agriculture mission — approximately 27 percent of this overall impact resulted from efforts in 2001. ADC project evaluations and analyses have indicated annual gross revenue projections in excess of \$20 million for all projects. Sixty percent

of the completed projects have a product available on the market. The ADC has provided assistance and evaluation of new opportunities for farmers and rural communities to enhance incomes, prevent investments in infeasible enterprises and streamline the market development process.

The impact of the ADC programs, initiatives and leadership continues to be felt as income opportunities are improved and economic development investments are made across the state. The dedicated and continuous efforts by those associated with the ADC enhances the path of continual improvement which effectively addresses the ADC's mission, vision and scope. In addition, faculty and specialists involved in the team approach of ADC project work are strengthened through the systems approach to evaluating new and diverse value-added and alternative agriculture ideas and issues. Multi-disciplinary publications, reports and fact sheets from the ADC address current topics and timely issues faced by today's farm families and value-added entrepreneurs. In addition, through a timely, effective and friendly web site, the impact of ADC programs reaches far beyond the enrollment in seminars and the total of accepted projects.

**Funding Source:**

Smith-Lever, State and three external grant projects in market development projects aimed at enhancing value-added agriculture in Tennessee.

**Scope:**

State Specific

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**Title:**

**Analysis of Economic Impacts of and Opportunities for Tennessee Agri-Industry Development**

**Description:**

Agriculture in Tennessee and elsewhere has exported a low-valued product when increased value could be added in state prior to export out of state. Rural areas in Tennessee can be characterized by higher than average unemployment and in some cases persistently in poverty. Attracting agri-business to the Tennessee rural areas will increase value to products produced in Tennessee and provide additional jobs.

- ▶ Prospectus for 6 different industries have been developed with our assistance.
- ▶ Industry briefs on Tobacco, nursery and landscaping, furniture, farm sector indicators, and wood processing have been developed for various clients within the state.
- ▶ Study conducted for an Empowerment Zone on opportunities for further developing a wood processing industry
- ▶ Development of a wood transportation and location model (WTRANS)
- ▶ Conducted studies on wood residue availability and price within the state
- ▶ Initiated impact of logging industry on state

**Impact:**

- ▶ The project has resulted in increased information to wood products industries looking to locate in the state.
- ▶ The Tennessee Department of Agriculture has requested information on wood residue location and value along with information on the importance of the Tobacco industry on the state's economy.
- ▶ Development of analytical system allows us to provide information in a timely fashion. For instance, information generated in December is currently being used by the state's administration in developing a rationale for the use of Phase 1 tobacco monies.

**Funding Sources:**

Hatch Act

**Scope:**

State Specific

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**Title:**

Production of Cellulosic Microfibers

**Description:**

Researchers with the University of Tennessee are using agricultural cellulosic materials, by-products, or waste to produce lyocell fibers -- a new class of rayon fibers. Lyocell manufactured fibers have the absorbency, and resulting comfort, of cotton and rayon, but are stronger. Production of cellulosic microfibers using lyocell technology will extend the range of uses of this type of fiber into softer, more drapeable apparel and into the area filters where the high surface area of the finer fibers enhances filtration properties. Agricultural producers of cellulosic and lignocellulosic wastes and by-products should be interested in the potential for value added uses for these materials.

We have begun by preparing lyocell solutions from different cellulosic sources: purified dissolving pulp (as the standard), softwood pulp, sugar cane bagasse, kenaf fibers, and recycled cotton. The rheological properties of the solutions are being determined to predict their spinnability and the effect of impurities such as lignin on the processing. The processing parameters will then be adjusted, and other manufacturing techniques used, to produce very fine microfibers.

**Impact:**

Fabrics produced from polyester microfibers, because of their soft and luxurious feel (both resulting from their very fine diameter), have already become premium fabrics and cellulosic microfibers, with the added benefit of water absorbency, should be in even higher demand. The small diameter of microfibers imparts more flexibility and softness and a silk-like feel to fabrics. Furthermore, significantly enhanced wiping action on microchips, glasses, electro-optic devices, and automobile parts without scratching is imparted, and use as filters results from the fiber diameter being close to the thickness of dirt and oil layers. Methods for producing microfibers from cellulose would complement industrial research and

provide potential for a significant market volume in the microfiber industry. Such success would benefit the agricultural industry as well by providing additional outlets for wood pulp and for underutilized by-products such as bagasse and wheat straw. Finally, there is an environmental benefit because the cellulosic microfibers are biodegradable, whereas the currently produced synthetic microfibers are not.

**Funding Sources:**

National Research Initiative

**Scope:**

State Specific

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**Title:**

One Step Closer to Soy-Based Engine Oil

**Description:**

The United States remains reliant upon foreign crude petroleum oil. The development of soybean-based engine oils could be an important step towards reducing the need for foreign oil.

The University of Tennessee is part of a team of scientists, including those from other universities, the USDA, and private industry, working together to produce a better soybean. Initial tests of some of our new enhanced soybean germplasm indicates the possibility of creating an excellent crankcase engine oil. Research is needed to continue to investigate this possibility and bring the application to fruition.

**Impact:**

Bio-renewable replacements for crude petroleum oil will have a major impact on the United States' national security. It would also have a positive economic impact on producers and has the potential to reduce pollution due to petroleum-based fuels.

**Funding Sources:**

Hatch Act, Commodity (Describe): United Soybean Board - Better Bean Initiative

**Scope:**

Multistate Research - TN, ?

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**Title:**

Corn as a Source of Bioenergy

**Description:**

The United States' dependence on foreign petroleum is an economic as well as national security issue. Agricultural biomass can be converted into a fuel, and this technology has the potential to benefit consumers as well producers.



Corn stover has been identified as the primary short-term bioenergy feedstock material, but there are problems associated with harvesting and processing corn stover to maximize its quality as a fuel (or industrial feedstock). There are also problems associated with minimizing material losses and improving handling efficiencies. Researchers with the University of Tennessee Agricultural Experiment Station, in cooperation with the Oak Ridge National Laboratory and UT-Battelle, are studying moisture control and management involving drying and safe storage of post-harvest corn stover. Moisture affects other process unit operations because it affects the mechanical properties of corn stover, including its ability to function as a fuel.

**Impact:**

An understanding of the moisture relations in corn stover will lead to the development of effective, efficient, and cost-effective systems for the handling of corn stover and other biomass feedstocks.

**Funding Sources:**

Hatch and Other (Describe: U.S. Dept. of Energy/Oak Ridge National Laboratory)

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**Title:**

Economic Impacts of Growing Bio-Energy Crops

**Description:**

During the 2001 calendar year more than thirteen renewable energy Congressional bills were introduced for consideration. All of the them, in different degree, have implications for agriculture and bio-energy dedicated crops.

Researchers with the University of Tennessee Agricultural Policy Analysis Center have reviewed the synergism between agricultural and energy policies. The results indicated that at a farm gate price of \$40 per dry ton for switchgrass, farmers could potentially reallocated 20 million acres from traditional crops into bio-energy dedicated crops. This shift could have taken farm prices for corn, wheat, and soybeans above loan rate levels and consequently eliminated the need for loan deficiency payments and reduced the amount of emergency payments provided by the government. The total savings generated could have been up to \$ 5 billion a year for the period 1996-2000. These savings would have allowed that utilities (users of switchgrass) could have access to it at less that \$20 per dry ton. In this case the government would have not only saved several billion dollars a year, but farmers income would have been \$3 billion higher, and the production of renewable fuels would have reached a significant milestone.

**Impact:**

The results of these analysis provided significant support for the passage of planning funds for the Sun Grant Initiative. The Sun Grant Initiative is a proposed Congressionally mandated program that sponsors the development of biomass research centers in five land grant universities across the country, including the University of Tennessee.

**Funding Sources:**

Hatch Act and Other (Describe: U.S. Department of Energy and Oak Ridge National Laboratory Contract)

**Scope:**

State Specific

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**KEY THEME - ORNAMENTAL/GREEN AGRICULTURE**

**Title:**

Testing Stress-Resistant Kousa Dogwoods

**Description:**

The kousa dogwood is a popular landscape tree with natural resistance to dogwood anthracnose and powdery mildew. When located in full or afternoon sun exposures, kousa dogwood foliage often develops an unsightly curl, diminishing the aesthetic appeal of the tree during the summer months in the southern United States. A kousa dogwood that would grow well in the hot, dry southern climates could enhance sales for the nursery industry, including Tennessee’s \$27-million deciduous flowering tree industry, which is the third largest in the United States.

Researchers with the Tennessee Agricultural Experiment Station are working to substantiate that their new varieties are superior to typical kousa dogwoods in terms of heat and drought resistance. In 1998 and 1999 the researchers identified several individual kousa trees that had both a superior growth habit and minimal leaf curl during high temperatures and water deficit stress in July and August. During the 2000 and 2001 summer seasons, superior selections were compared with average and above-average control groups. The superior selections had more desirable leaf appearance (less curling) and showed more vigor than either control group throughout both summer seasons. The superior selections are also larger than typical kousas, tend to have the best overall tree shape, and generally show a more visually appealing foliar quality even in the absence of stress.

**Impact:**

If propagated trees from the superior selections retain the resistance consistently exhibited in their parent trees, the best among them can be developed as kousa dogwood cultivars that offer improved appearance in southern states. This may expand the use of this tree in landscapes throughout USDA hardiness zones 8 and 9, thus offering the nursery industry increased opportunities for sales.

**Funding Source:**

Hatch and State

**Scope:**

Integrated Research and Extension

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**Title:**

Chemical Control of Weeds in Nurseries and Landscapes

**Description:**

Tennessee’s nursery owners and homeowners in the Southeastern United States spend substantial amounts of money annually to keep their nursery stock weed - free. Most of this expenditure is for hand- weeding labor, since most chemical weed killers also damage or kill the desired ornamentals.

Researchers at the University of Tennessee are working to rid nursery stock of some of the more prolific perennial weed species – nutsedges and wild garlic. Herbicides known to control these weeds are being mixed with several types of carriers (surfactants) to help alleviate or greatly reduce the customary chemical damage to ornamental species grown.

The research has found that seed-oil based adjuvants provide more effective control of both yellow and purple nutsedge than the recommended non-ionic surfactant when combined with halosulfuron (Manage) herbicide and applied over-the-top of selected ornamental nursery crops. The methylated sunflower seed oil (Sun-It II) combined with one-half rate (18 g ai/ha) of halosulfuron resulted in 98% to 100% control of yellow nutsedge. These seed-oil adjuvants (Sun-It II and Scoil), when combined with halosulfuron at three-fourths (27 g ai/ha) rate, provided 97% to 100% suppression of purple nutsedge. Seed oil adjuvants, Scoil and Sun-It II, when combined with halosulfuron provided superior nutsedge control compared to the non-ionic, organosilicon, or paraffin-based crop oil adjuvants, and were less phytotoxic to the nursery crops tested.

**Impact:**

Tennessee ranks sixth in the nation in total gross nursery production, with sales measuring at least \$124 million annually. The herbicide/adjuvant combination studied helps consumers and industry by reducing chemical exposure to the environment and chemical damage to the nursery crop species, while maintaining the same level of nutsedge control.

**Funding Source:**

Hatch and State

**Scope:**

State Specific

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**Title:**

Technical and Economical Efficiencies of Producing, Marketing, & Managing Environmental Plants

**Description:**

Nurserymen and other industry participants who are making production and marketing decisions could benefit from the insight provided by analyses of structural changes occurring within the industry. Because of the relatively long production period for many of Tennessee's landscape ornamentals, growers must strive to anticipate demand for products several years in advance of the actual sales year. Adjustments in regional competitive position may necessitate adjustments in production methods, products grown, and market outlets supplied.

Analysis of survey data collected from nurserymen in several states continues to be a productive area. The descriptive data from three nationwide nursery surveys continues to be examined. The importance of mass merchandisers as an outlet increased from 18.8 percent of all wholesale sales in 1993 to 22.1 percent in 1998. Sales to garden centers dropped from 26 percent in 1993 to 18.6 percent in 1998, and the 'other retailer' category declined as well. This confirms that growers are facing a significant change in the competitive infrastructure as these large retailers exert their market power in the marketplace. For shares of production in specified plant categories, there were minor changes in the leading categories between 1993 and 1998. Deciduous trees and the combination of the broad-leaved evergreen shrub/azalea categories each amounted to a little more than 13 percent of production. Root packaging was dominated by the container category, particularly in the south. The balled - and - burlapped method was the only other significant category, and is more important for woody ornamentals in cooler climatic zones.

Consumers' attitudes toward a new dogwood tree that is resistant to powdery mildew were collected at two locations in Tennessee, one in Michigan, and one in Mississippi. The primary goal was to determine the additional amount consumers would be willing to pay for such a dogwood. Results indicated consumers' willingness to pay more for five feet, one - inch caliper trees in a five - gallon container, which typically retails around \$55 to \$60, ranged from \$11.87 in Mississippi, \$13.91 in Nashville, \$14.58 in Knoxville, and to \$16.78 in Michigan.

**Impact:**

Marketing research in the nursery plant industry is restrained by data limitations. Collection of primary data is essential. Cross sectional data permits industry participants the opportunity to have an improved description of the structure of the industry and to observe adjustments occurring within a particular state or among adjacent states. Such insight helps nurserymen as they make plans regarding output expansion and/or plant selection decisions. Customer surveys help nurserymen understand the interests and perceptions of the retail customer. This helps nurserymen and others involved in selling directly to the final consumer determine which products to grow and the bundle of attributes customers are seeking when shopping for horticultural products. Results will impact Tennessee and all other states competing with Tennessee growers striving to supply mass merchandisers, garden centers, landscapers, re - wholesalers, and all other retailers selling horticultural products.

**Funding Source:**

Hatch and State

**Scope:**

Multi-state (Southern Region)

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**KEY THEME - ANIMAL PRODUCTION EFFICIENCY**

**Title:**

Better Bulls Improve Production and Value of Feeder Calves

**Description:**

Weight, graded and uniformity are economically important traits that impact the returns from the sale of Tennessee feeder cattle. Approximately 750,000 feeder cattle are annually marketed by the state's cow-calf operations. Improvement in any of the factors would improve income to both the individual producer and the state's beef industry. Use of "better" genetics and improved genetic management by producers are the keys to improvement.

Extension personnel conducted both state-wide and local educational programs to improve the genetics of feeder cattle in cooperation with the Tennessee Beef Cattle Improvement Association, Tennessee Cattlemen's Association, feeder cattle sale associations, agri-business contacts and the college of Veterinary Medicine, Experiment Station and research faculty of the University of Tennessee.

**Impact:**

The impact of the educational programs in beef cattle genetics and breeding can be demonstrated by reviewing the impact statements of Extension agents' annual reports. Some examples include: "Producers that purchased performance tested bulls reported that their calf crop increased weaning weights by an average of 25 pounds and increased revenue by \$24.50 per calf sold" .... "A producer who utilized birth weight and weaning weight EPD's in his new sire selection realized an increase in weaning weight of his calf by 25 pounds and realized an increase in revenue \$25.00 in pounds of calf weaned per cow exposed" .... "Proper bull selection for a producer with over 150 cows added an average of 30 pounds to the weaning weight of his calves and an additional 4500 more pounds of calf to sell". If 25% of the state's calf crop's genetic potential could have been improved similar to the above reports, value per head of the calves could be increased by \$25.00 per head, and it would add \$4.7 million to the revenue.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Wanted – More Sows and Cows

**Description:**

The profit margin in cattle and swine operations can depend on the production of female offspring. Further, replacement heifers and gilts are the future of any operation. Current methods for predetermining the sex of offspring in farm animals are costly, laborious and require a high degree of technical expertise. Such factors continue to limit the availability of this technology to livestock producers.

Researchers with the Tennessee Agricultural Experiment Station are working on methods of manipulating sperm to yield more female embryos in cattle and swine.

**Impact:**

Testing of manipulation procedures that may increase the number of female embryos in cattle and swine thus improving the efficiency of producing replacement heifers or gilts. This research has the potential to improve the state and nation’s cattle industry. Tennessee’s \$416-million industry ranks ninth in the nation. The state’s \$61-million swine industry can also benefit from improved reproduction of replacement heifers and gilts.

**Funding Source:**

Hatch and State

**Scope:**

State Specific

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**Title:**

Improving Pork Quality – The Effect of Hydrogen Ion Concentration in the Meat

**Description:**

The pH of pork muscle has a large impact on the quality of the pork. Low muscle pH results in pale, soft and watery pork. These traits are very objectionable to consumers and hinder export possibilities of U.S. pork. Although geneticists are working to improve pork quality through selection, accurate evaluations of indicators like pH are needed for selection to be effective at improving pork quality.

Researchers with the Tennessee Agricultural Experiment Station compared the pH of pork to its hydrogen ion concentration. The pH is a mathematically transformed value, while hydrogen ion concentration is a physiological measurement. The concentration of hydrogen in pork muscle can impact its quality, i.e., its taste and texture. An evaluation of the statistical properties and potential selection differences between the two measures was conducted.

**Impact:**

The study shows that if pork selection is based on pH rather than the biologically active trait of hydrogen ion concentration, a selection differential loss of 5 percent to 7 percent occurs. This means animals should be retained for breeding based on their hydrogen ion concentration rather than pH. Additionally, a misguided selection based upon pH would result in investing hundreds of thousands of dollars in breeding programs that would produce pork that will fail to meet export quality standards.

**Funding Sources:**

Hatch and Commodity (Describe): National Pork Board

**Scope:**

State Specific

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**Title:**

Effects of Nutrition on Health of Young Pigs

**Description:**

Efforts to improve nutrition and to find dietary additives to optimize the growth and health of livestock have been a primary focus of animal scientists for many decades. The interaction of nutrition, intestinal bacteria, and gastro-intestinal physiology has been shown to greatly affect animal health, and in particular, the health of young animals. Currently, the most effective dietary additives for livestock have included a number of growth-promoting antibiotics. However, with a continued emphasis on reducing antibiotic use in livestock operations, alternative additives, such as complex oligosaccharides, yeast extracts, and other compounds are being evaluated for their effects on GI health, intestinal pathogens, and foodborne bacteria.

Researchers with the Tennessee Agricultural Experiment Station are working to develop diets or find nutritional additives that maintain a healthy bacterial flora in the GI tract that excludes pathogens. We are combining a number of microbial techniques and animal husbandry practices, and conducting trials that range from highly basic “discovery” research to highly applied research that can be quickly transferred to livestock production systems. We have determined that at least one component of milk sugar, galactose, when applied to young pig diets can optimize the production and maintenance of gut mucins that help protect the young animal from intestinal pathogens. Additionally, we have helped characterize effects of various commercial feed additives on the gastro-intestinal health of newly weaned animals or, in some cases, determined that proposed effects did not occur. Additionally, we have determined how diet and/or specific subtherapeutic antibiotics affects shedding of foodborne pathogens, including salmonella, by livestock, thereby providing information that could be used to develop feeds that provide optimal growth with the least cost and reduced risk of foodborne pathogens.

**Impact:**

Ultimately, these dietary strategies will result in healthier animals that resist invasion of GI (enteric) pathogens, thus lowering the risk that the animals will shed infective pathogens into their environment and lowering the incidence of intestinal diseases in animals. This will have a simultaneous effect of increasing the productivity of livestock operations and increasing the consumer confidence and acceptance of agricultural products. The result should be greater domestic and international consumption of meat products and increased profitability for producers.

**Funding Sources:**

Hatch, Special Research Grants, Animal Health and Disease, Institution Challenge Grants, Commodity (Describe): National Pork Board, Other (Describe): Animal health foundations, Industry grants and contracts

**Scope:**

State Specific

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**Title:**

Environmental Stressors Reduce Farm Animal Fertility

**Description:**

Exposing farm animals to environmental stressors such as elevated temperatures reduces their ability to reproduce. Reduced pregnancy rates result in direct economic losses to livestock producers.

Research at the Tennessee Agricultural Experiment Station demonstrates that the effects of elevated temperature occur very early on for reducing reproduction in dairy cattle. Specifically, exposure of oocytes to elevated temperature reduces their ability to develop following fertilization. Negative effects of elevated temperature appear to alter cytoplasmic components of the oocyte.

**Impact:**

Gaining a further understanding of the negative effects of environmental stressors at the cellular and molecular level in oocytes and early embryos is critical for development of novel strategies for improving reproduction and embryonic survival in face of stressful conditions. The profit margin for a dairy can depend on the success of the dairy's breeding program.

**Funding Source:**

USDA - IFAFS  
Hatch

**Scope:**

State Specific

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**Title:**

Improving the Efficiency of Cloning

**Description:**

Improving efficiency of cloning adult animals using somatic cell nuclear transfer will hasten availability of cloning procedures to livestock producers for the purposes of cloning genetically superior farm animals. Moreover, given the ease most somatic (body) cells can be grown and genetically modified in the laboratory, use of cloning procedures will become ideal for producing genetically modifying farm animals for the purpose of producing pharmaceuticals or organs for the human population.

Researchers at the University of Tennessee have successfully produced two live bovine clones. With the birth of Millennium followed by Emma (<http://web.utk.edu/~taescomm/utcloneproject>), the research affirms that somatic cells do not have to be induced into a “quiet” state before using them to clone an adult animal.

**Impact:**

Use of proliferating somatic cells for the purpose of cloning adult animals demonstrates that cloning procedures are more straightforward than previously thought.

**Funding Sources:**

Hatch

Other: The University of Tennessee Professional Development Awards; The University of Tennessee Idea Grant; UT Food Safety Center of Excellence

**Scope:**

State Specific

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**Title:**

Integrated Resource Management

**Description:**

Beef producers are finding it more difficult to remain competitive in the production of feeder calves. Traditional Extension programs have focused on the promotion of one or two economically important management practices during a specified period of time . Taking a whole farm approach where the best combination of management practices can be implemented will have a greater impact on improving returns from the beef operation.

The number of Integrated Resource Management Demonstration farms in Tennessee was increased from eleven to fifteen. Production and financial records are being kept on these farms to use in educational programs. These records have been compiled to determine the range and average costs

and production parameters. Extension agents have used these demonstration farms in their educational programs.

**Impact:**

Integrated Resource Management (IRM) demonstrations have been conducted in Tennessee since 1992. In 1997, the IRM demonstration program was revitalized. Results of data collected on eleven farms showed an improvement in productivity and a decrease in cost of production. Results presented are based on the number of years completed in the program rather than calendar years since all farms did not start on the program at the same time. Average weaning weight increased from an average of 467 pounds (11 farms) in Year 1 to 551 pounds (4 farms) in Year 4. Pounds of beef produced per cow increased from 385 (11 farms) in Year 1 to 491 (4 farms) pounds in Year 4. Costs per hundred pounds of weaned calf decreased from \$1.71 (11 farms) in Year 1 to \$0.83 (4 farms) in Year 4.

**Funding Source:**

Smith-Lever, State and IFAFS (USDA)

**Scope:**

State Specific

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**Title:**

Beef Cattle Management and Marketing Systems

**Description:**

Beef producers do not have an easy method of budgeting their operations in such a way that takes into account their unique individual operations. By using a systems analysis, all aspects of the operation can be included based on actual estimates from the individual farm.

Computer software has been developed using a team of Animal Scientists, Agricultural Engineers, Forage Specialists, and Veterinarians which each developed the various budget components. The system has the ability to allow the user to select forages and fertilization, hay storage, fencing systems. It also allows one to select management programs, evaluate marketing alternatives and incorporate these specific factors into a individualized budget. summary reports are available in each section as well as a general report summary. The system has been tested with producers. Forty Extension Agents and Specialists from Tennessee and Georgia have been trained to use the software. Agents indicated the training was useful and that the software would be helpful in their beef cattle Extension programs.

**Impact:**

Following training of additional Agents, they will be surveyed to determine usage of the software in their counties. Greene County Agent has used the fencing, hay storage and forage production sections of the software to teach grazing school. The forage section is being used to teach forage production at Tennessee Tech. The Lauderdale County Agent has used the software with two beef producers.

**Funding Source:**

Smith-Lever, State and USDA Fund for Rural America

**Scope:**

State Specific

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**Title:**

Adding Value to Feeder Cattle

**Description:**

Beef production and marketing is changing to a supply chain management system. Buyers are getting more specific regarding their requirements for feeder cattle. A large percentage of beef producers have no particular breeding plan and market their calves without a health/management program. In addition, about 80 percent of the feeder cattle in the state are marketed one head at the time, costing producers approximately \$4 per hundred pounds.

Extension agents have been trained and beef producers have been informed of the benefits of marketing feeder cattle of known genetics, a uniform health/management program and in loads of about 48,000 to 50,000 pounds. Research and demonstrations have been conducted on the effectiveness of post-weaning feeding of calves. Successful marketing activities have been reported to beef producers in other parts of the state

**Impact:**

The impact of this educational program has been evaluated by comparing the prices of specially prepared calves to those of weekly auction sales. In Giles County, 32 producers formed a beef marketing alliance in which they are using similar genetics, a uniform health/management program and marketing in load lots in a video board sale. In 2001, thirteen producers marketed 692 head for a income advantage of \$44,360. Ten other producers marketed 1,129 head through video sales capturing \$52,001 in additional income compared to weekly auctions. In Van Buren and White counties eight producers marketed calves for added income of \$21,000. In Moore County 10 producers sold 500 head of calves for \$5,000 additional income. In Wayne County, 26 producers sold 766 head through graded feeder sales for added income of \$15,300. And in Madison County 24 producers sold 1601 head of calves through the Brownsville feeder cattle sale for a total of \$57,011 of additional value. The Smoky Mountain Feeder Calf Association successfully marketed about 10,000 feeder cattle through seven feeder sales. One of these sales is designated the Southeast Pride Plus Sale. That sale was for cattle which had been double vaccinated and all cattle had an Electronic Identification Tag. The producers all were Beef Quality Assurance certified. About 900 head were sold to repeat buyers for price premiums of \$30 to \$87 per head.

**Funding Source:**

Smith-Lever and State

**Scope of Impact:**

State Specific

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**Title:**

Adapting Recirculation Technology for Tennessee Aquaculture

**Description:**

Although sales of trout (including eggs) were valued at nearly \$61 million nationwide, two factors can limit commercial fish production: nitrite toxicity and mortality due to environmental stress. Nitrite in the blood combines with hemoglobin to form methemoglobin. Excessive methemoglobin levels result in brown blood disease in fish. This is most common in farm and commercial fish ponds when sediments are disturbed, either during spring or fall turnovers or when the pond is mechanically agitated. Also, fish mortality has been associated with acid conditions, including those that might occur as a consequence of acid rain.

Researchers with the Tennessee Agricultural Experiment Station investigated feeding trout additional salts as a simple, cost-effective way of reducing nitrite toxicity and mortality due to acid stress.

**Impact:**

Feeding additional amounts of either sodium chloride or calcium chloride reduced the formation of toxic methemoglobin in the blood of trout exposed to nitrite in the water. In addition, these same salts prevented the dangerous loss of chloride ions in fish exposed to acid conditions that might occur as a consequence of acid rain. These simple feed additives may therefore help producers reduce incidental fish mortality. For the catfish industry alone, the research carries the promise of a potential \$2 -million savings per year.

**Funding Source:**

Hatch and State

**Scope of Impact:**

State Specific

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**KEY THEME - PLANT PRODUCTION EFFICIENCY**

**Title:**

Soybean Variety Demonstrations and Adoption

**Description:**

Variety selection data, including maturity groups, biotechnology and disease susceptibility, are paramount in producers' planting decisions. In 2001, over 84 varieties were available for producer purchase, including 56 (67 percent) new developments. Biotechnology, specifically Roundup Ready (RR) varieties (64) accounted for 76 percent of available variety selection with 76 percent of these being new developments. Producers lose ten percent-plus of yield annually from foliar/systemic disease, that was more than doubled in the 2001 production year. Private company data is limited or non-existent concerning variety performance in disease environments. Producers rank these needs as of primary importance in extension programming.

Eighty-four varieties were evaluated for yield, including various maturity groups and genetically enhanced varieties with 5 large on-farm demonstrations. Another large replicated on-farm study evaluated 109 varieties for yield and disease characteristics. A replicated study analyzing yield and economic returns of RR -vs- Conventional variety selection was conducted. Submitted Grant proposal that was funded by the Tn. Soybean Promotion Board to replicate the RR -vs- Conventional study with area producers. Two production meetings (1 area wide), No-Till Field Day presentation, Disease Management Field Day, newsletters, visits with agribusinesses, individual contacts (phone, office & farm visits) and posting of yield and agronomic data on Extension/Experiment Station Website used to disseminate results and encourage adoption of practices.

**Impact:**

Producer adoption of use of superior identified varieties with improved disease resistance improved yield as compared to all varieties by an average of 1.6 bu/acre in 2000. This represents an increased production of 120,000 bushels valued at \$654,000 or roughly \$8.75/acre. Results from analysis of 2001 yields indicates a 1.6 bu/acre yield increase from selection of superior varieties, as well. Total impacts for the 2001 crop is unavailable at this time since acreage has yet to be certified by the Tennessee Crop Reporting Service. Over 50 producers and agribusiness personnel participated in Disease Management Field Day. Private seedsmen now commit to screening new variety entries in the disease plot demonstrations. Several producers have commented on reducing disease problems on their farm as a result of variety selection. Local agribusinesses post these yield and disease data in the forefront in their places of business to assist producers in their variety selection needs.

**Funding Source:**

Smith-Lever, State and Private Agribusiness Contributions

**Scope of Impact:**

Integrated Research and Extension

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**Title:**

Mycorrhizal Soils and Plant Drought Resistance – Teamwork Makes A Difference!

**Description:**

Soil nutrients and moisture are literally a plant's bread and butter. Partnering with mycorrhizal fungi gives plants a big edge in foraging for nutrients and moisture. Symbiosis with these beneficial soil microbes can reduce soil erosion, boost plant nutrition and increase a plant's ability to withstand drought.

Researchers with the Tennessee Agricultural Experiment Station are working to characterize how mycorrhizal symbiosis affects plant and soil water relations.

**Impact:**

Scientists with the Tennessee Agricultural Experiment Station have found that mycorrhizal fungi, which team up with roots, can help damaged soil as well as change how much water a soil can hold. Inoculating trees and crops with these symbiotic fungi makes the trees and crops more resilient when faced with drought and other harsh environmental conditions.

**Funding Sources:**

Hatch and National Research Initiative

**Scope:**

State Specific

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**Title:**

Wheat Variety Demonstrations and Adoption

**Description:**

Weakley County, Tennessee and surrounding counties are primarily corn/wheat/soybean rotation producers, with roughly 20% of cropland planted to wheat. Ninety eight percent of producers plant wheat for erosion control, rotational benefits and cash flow. Producers dependent upon superior yields to maximize returns for profitable production. Producers indicate that variety selection and efficient use of inputs are primary emphasis for extension programs

Conducted on-farm demonstrations of: variety performance (24 varieties), Gaucho seed treatment, planting dates, nitrogen rates, seeding rates and no-till. Analyzed yield performance and disseminated results through; area production meetings, newsletters, agribusiness visits, individual contacts (office, phone or farm visits) and Extension/Experiment Station Website in an effort to encourage adoption of practices. Numerous farm visits made as a result of tremendous armyworm infestation to make IPM recommendations. Variety test demonstrations were screened for tolerance to Sencor herbicide for control of problem winter annual weeds.

**Impact:**

Producer adoption of superior varieties identified in the Standardized Testing program resulted in an increased production of 2 bu/acre or 61,440 bushels valued at \$160,358 or \$5.22/acre for Weakley Co. producers. Producers utilized the Gaucho seed treatment on 8,000 acres and sprayed as per IPM

an additional 4,000 acres with Warrior T for control of aphids and resulting Barley Yellow Dwarf Virus, for an average yield increase of 4 bu/acre valued at \$83,520. Preliminary agribusiness records indicate that roughly 6,000 acres were treated with Gaucho seed treatment for the 2002 crop just planted. Agribusiness records and personal observations note that up to 80 percent or 25,000 acres were treated with approved insecticides for the control of armyworm in 2001.

**Funding Source:**

Smith-Lever, State and Private Agribusiness Contributions

**Scope of Impact:**

Integrated Research and Extension

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**Title**

Corn Variety Demonstrations and Producer Adoption

**Description:**

In the 2001 Standardized Variety testing program, which includes most hybrids/varieties available for purchase in the Northwest Tennessee area, 120 (67 percent) of the 179 entries of corn, wheat, soybeans and milo were new entries. Varietal and biotech or GEO developments are rushed into the marketing arena without proven localized testing, placing producers at risk. Hybrid/Variety yield and disease resistance data is rated as the strongest priority by producers for extension efforts. Extension developed the Standardized Hybrid/Variety and agronomic testing program to enable producers to identify locally available superior hybrids/varieties with superior disease characteristics for use on their farms.

Extension agents, specialist, producers, agribusinesses and seed/chemical representatives met to develop hybrid/variety protocols and agronomic focus for on - farm demonstrations in an effort to meet the needs of local producers. Contacts were made and seed/inputs procured for dissemination to agents throughout the production area. Sixteen west Tennessee, 3 middle Tennessee and 3 western Kentucky counties planted and harvested over 91 demonstrations involving 66 corn hybrids, 12 milo varieties, 17 wheat varieties and 84 soybean varieties. Additionally 4 counties participated in replicated agronomic test involving RR technologies and seed insecticide studies. Seven counties conducted corn seed treatment demonstrations. Locally, 16 demonstrations were conducted in Weakley Co., TN with a total of 76 demonstrations in the six - county area of responsibility. Data was gathered from each of the demonstrations and analyzed by SAS utilizing DMRT to determine differences. Results were summarized in an Excel spreadsheet for the 12 specific hybrid/variety testing protocols along with agronomic disease data generated from replicated variety disease trials. These data were disseminated to producers through; 8 production field days/meetings, inservice training, 4 multi - county newsletter mailings of yield data analysis, sharing PowerPoint programs, posting of variety and agronomic data on the Extension/Experiment Station Website, agribusiness visits, and individual contacts (office, phone & farm visits) in an effort to encourage adoption of practices.

**Impact:**

Surveys reveal that 96 percent of producers depend upon data generated from the multi - county standardized test in making variety planting decisions on over 931,000 acres of corn, wheat and soybeans in the six county area including; Weakley, Henry, Gibson, Obion, Dyer and Lake Counties. In the six county area, the value to producers was documented to be over \$8.13 million dollars in the 2000 crop year (6.25 bu./A or \$12.81 for corn, 1.6 bu./A or \$8.74/A for soybeans and 2.0 bu./A or \$5.22 for wheat). In Weakley County, the increase in yield resulting from the selection of superior varieties is valued at \$1.49 million. Financial impact for the 2001 crop unavailable at this time from lack of certified acres from Tennessee Crop Reporting Service, however impact on yield will be 3.8 bu./A for corn and 1.6 bu./A for soybeans. Wheat is still in the field.

**Funding Source:**

Smith-Lever, State and Private Agribusiness Contributions

**Scope of Impact:**

Integrated Research and Extension

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**Title:**

Using Computers Enhance Cotton Production

**Description:**

Producers, crop consultants, extension agents, seed and chemical industry scientists, other research scientists need timely data on the performance of cotton in field environments to enhance yield and profits.

The University of Tennessee Cotton Agronomy and Physiology Project conducted a multi - state study was to evaluate the adaptation of the COTMAN Expert System to ultra - narrow row (UNR) cotton in 2001. The goal was to collect the empirical data necessary to recalibrate COTMAN for use in UNR cotton across the belt. A uniform protocol was conducted in five states (AR, NC, MS, TN, TX) to determine the main - stem node number of the last effective boll population in UNR relative to wide - row cotton grown in typical field environments. The Cotton Agronomy and Physiology Project also verified the advantages of defoliation timing using the COTMAN Expert System in Tennessee.

**Impact:**

The Tennessee portion of the multi - state study was conducted in 10- and 40- inch rows at the Milan Experiment Station. Results showed that the last effective boll population was closer to the terminal of plants grown in UNR than in wide rows. For the three - year regional study of defoliation timing, COTMAN quantified the gains in lint yield and fiber quality with increasing maturity and the potential losses to producers from premature crop termination. Economic analyses of these data showed that



defoliation timing can strongly impact producers' net revenues. Producers can use these findings to schedule crop termination while maximizing yield potential and preserving quality.

**Funding Sources:**

Hatch

**Scope:**

Multistate Research - AR, NC, MS, TN, TX

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**Title:**

Transgenic Cotton Varieties Have Superior Yields

**Description:**

Producers, crop consultants, extension agents, seed and chemical industry scientists and other research scientists need timely data on the adaptation of new cotton cultivars to field environments.

The University of Tennessee Cotton Agronomy and Physiology Project conducted a comprehensive program of cotton variety testing at three experiment stations and at one off-station site (Agricenter International) in 2001. This industry-supported research involved field trials and quality testing of commercial cultivars and new experimental strains. In response to their requests, the 2001 data were posted on a web site by December. Two sponsored protocols were also conducted in 2001 to quantitatively characterize new experimental strains through plant mapping. This work identified several promising experimental strains with superior yield potential as well as transgenic resistance to certain herbicides and insect pests.

**Impact:**

The University of Tennessee Cotton Agronomy and Physiology Project identified several promising new transgenic varieties for Tennessee, based on their performance in multi-location trials in 2001. Results from the cotton variety testing program will provide the research basis for extension planting recommendations for 2002. The data were posted on the TAES variety website by December. Producers who use these data to select varieties will benefit from high yield potential, early maturity and superior fiber quality.

**Funding Source:**

Hatch

**Scope:**

State Specific

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**Title:**

## Cotton Seed Size – Bigger is Better

### **Description:**

Producers, crop consultants, extension agents, seed and chemical industry scientists, other research scientists need timely data on the performance of cotton in field environments to enhance yield and profits.

The Cotton Agronomy and Physiology Project participated in a seven -state seed sizing study. Emergence percentage generally improved as seed size increased, but emergence response was influenced by the edaphic environment. Emergence response was influenced by the edaphic environment -- minimal in sandy soils but more pronounced in silty or clay textured soils. Results suggest that sorting and selecting larger seeds could improve emergence and yield performance of some cotton varieties.

### **Impact:**

The Cotton Agronomy and Physiology Project demonstrated that planting larger sizes of cotton seed can improve emergence and yield of certain commercial cotton cultivars. In a two -year regional study, emergence percentage generally improved as seed size increased. Results will be useful to the seed industry in determining optimal seed quality criteria and marketing standards.

### **Funding Sources:**

Hatch

### **Scope:**

Multistate Research - Seven Southern states

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### **Title:**

Another High-Yielding Soybean Adapted for the South

### **Description::**

Soybean is a major agricultural crop with diverse human and animal nutritional uses as well as versatile industrial product uses. The release of a new high-yielding public soybean germplasm will add to the available genetic stocks for breeders to improve soybean for farmers, processors, and consumers.

In 2001, the Tennessee Agricultural Experiment Station released a new soybean germplasm, TN93-99, that produced high yields in breeders tests and in the USDA Southern Regional testing program over multiple years and locations.

### **Impact:**

Many elite sources of soybean germplasm are restricted, and remain difficult or impossible for plant breeders to obtain for crossing and applied variety development programs. Having a new high -yielding public germplasm, that is well -adapted over a broad geographic region of the Mid-South and southeast

United States provides a new opportunity for plant breeders to develop improved soybean populations for farmers, processors, and consumers.

**Funding Sources:**

Hatch Act and Commodity (Describe): Tennessee Soybean Promotion Board

**Scope:**

State Specific

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**Title:**

Early Maturing Soybeans May Yield More in Tennessee

**Description:**

Tennessee farmers planted more than 1.1 million acres of soybeans in 2000. It is estimated that there are about 25,000 farms in Tennessee wherein soybean yields are a major component of profitability.

Production measurements, physical properties, and chemical composition combine to indicate that growing maturity group III and IV soybeans in West Tennessee would be more advantageous. Yields of Group III and IV's were not very much affected by planting date; hence, they offer greater management flexibility to the farmer -- under irrigated conditions. Group V can be planted, as they are now, but there is essentially no flexibility in planting date if production and physical quality of the soybeans are to be optimized. The fact that all group V's were still in the field when the fall frost occurred indicates that there is a risk that the group V's will be affected by adverse weather conditions. Group V beans were not yet fully mature at 210 days after planting. Considering that non-irrigated culture is the predominant production system in West Tennessee, results will have to be obtained for non-irrigated fields before this can become a comprehensive recommendation.

**Impact:**

It is estimated that there are about 25,000 farms in Tennessee wherein soybean yields are a major component of profitability. The production management options investigated directly impacts these farms. When completed, the research will indicate the potential of planting early maturity groups earlier in the year while assuring yield and quality. The information should give producers another production planning option and improve his chances of net gain.

**Funding Sources:**

Hatch and State

**Scope:**

State Specific

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**Title:**

## Improving Farmer Confidence in Herbicide Tolerant Weed Management Systems.

### **Description:**

Herbicide tolerant crops provide new and improved weed management options for Tennessee row crop producers. Program and variety selection, weed populations shifts and treatment timing decisions, however, are challenges to successful, economical use of these weed management systems.

Four inservice training sessions were conducted and attended by 118 extension agents. These included two day-long in-field sessions. Three day-long weed control schools were also conducted and attended by 231 agricultural chemical dealers, applicators and sales personnel. Information was presented at seven Experiment Station, county or industry field days and tours involving 905 persons. Thirty-one weed control demonstrations were also conducted. The comprehensive weed control manual was revised. A weed control home page was maintained on the World-Wide Web.

### **Impact:**

Utilization of herbicide tolerant crop-based weed management programs offer effective, economical and environmentally sound production programs. Efforts through education helped to increase farmer confidence in these systems as evidenced by 70, 85 and 59 percent of the soybean, cotton and corn acreage in Tennessee, respectively, being planted to Roundup Ready varieties in 2001. Farmer confidence in these systems was also evident in utilization of no-till production systems. No-till represented 71, 65 and 61 percent of the soybean, corn and cotton acreage in 2001. This is compared to 64, 59 and 50 percent, respectively, in 2000. Confidence in weed management is essential for successful, sustainable no-till production.

### **Funding Source:**

Smith-Lever, State and private agribusiness funds

### **Scope of Impact:**

State Specific

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### **Title:**

Tennessee Wheat Production

### **Description:**

To increase the knowledge of managing insect pests in wheat by use of recommended pesticide usage and integrated pest management (IPM) techniques to control insects for producers, agents and agribusinesses.

Ten county demonstrations, using the most up-to-date techniques of insect control, were conducted in counties. Aphid monitoring using special traps were used to alert producers the best times to use insecticides or to incorporate at planting insecticides for prevention of aphid feeding on wheat. Through

the use of seed treatments producers can prevent disease transmission of wheat viruses to the plants. Diagnostic identifications were used to identify insects in wheat and relay via faster transmission of answers through the internet so producers could make timely applications for control of these pests.

**Impact:**

Producers who used these recommendations were able to save \$12 to \$15 per acre by not having to apply unnecessary pesticides for aphid control in wheat. Producers who had armyworm infestations this season were able to control the pests on a more timely basis saving losses of yields. Several producers saved an average yield of 10 bushels per acre by preventing damage to grain which would have resulted in at least 50% losses through head clipping by armyworms.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Corn Production in Tennessee

**Description:**

To increase the knowledge of insects for producers, agents and agribusiness personnel in Tennessee and how to effectively control these pests in field crops.

Approximately 105 farm visits were made in counties across Tennessee to provide producers and agents with up to date and state of the art information on how to control and manage corn pests in field corn and in storage of the grain at harvest. Ten on-farm demonstrations were made with the assistance of agents and agribusiness personnel at the farm level. Demonstrations were made in conjunction with other Extension specialists in the state (e.g., ag. systems and bioengineering and plant pathology specialists).

Producers were shown how to control insects in grain bins as well as in the field with use of new monitoring techniques in stored grain and pheromone traps in corn fields.

Approximately 750 producers, agents and agribusiness personnel were provided information and techniques at county meetings, field days and on farm demonstrations.

**Impact:**

In Cannon County alone, producers using Bt varieties recommended by UT based on pheromone trap catches realized a savings of \$17,160 by reducing insecticide usage in their fields.

Several producers were able to prevent serious damage to their stored grain by use of technology to monitor temperatures in grain bins. In two bins which had abnormal high temperature, quick transfer of information about these bins saved producers over \$125,000 dollars by prevention of spoilage through simple aeration. Otherwise, this damage would have gone unnoticed by these producers.

Identification of potential damage to corn fields from insect infestation of the southwestern corn borer was made using special pheromone traps which alerted these producers to the presence of the insect the year prior to the planting season. These producers subsequently used special varieties of bt corn to prevent damage to their crop. The previous crop had over 50% damage by this insect pest.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Tennessee Cotton Production.

**Description:**

The use of demonstration plots to provide producers with up-to-date information on cotton insects and their control. Five on-farm demonstrations using approved pesticide recommendations were completed. Newsletters, including the "What's Happening" newsletter and 13 IPM Cotton newsletters were produced during the growing season. Scout training sessions (5) were conducted to update agri-business personnel, producers and agents on cotton insect problems. The acquisition of Furadan 4F as an emergency use label was used to control cotton aphids. Approximately 50 cotton producers were introduced to the use of this new label for control of aphids in their production practices. Insect identifications were made using the Extension distance diagnostic system on the internet to expedite information to producers and agents for quick control of pest species.

**Impact:**

The use of the new label using Furadan 4F reduced cotton production practices by approximately \$10 an acre in western Tennessee. Approximately 10,000 acres were treated at a cost of 5 dollars an acre. This reduced treatment costs by \$5.00 per acre in the 10,000 treated acres.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Pepper Sales Are Hot, Hot, Hot!

**Description:**

Hot peppers have the potential for becoming a cash crop for Tennessee growers. Varieties are being evaluated for performance and yield by the University of Tennessee Vegetable Initiative. The greater value for the peppers is in processed products hence there is a need for the evaluation of engineering properties in relation to maintaining the "heat" associated with the pepper. Relating agronomic variables to "processability" is being undertaken and gives producers an insight on how to grow and handle their produce in a manner that optimizes its value for fresh markets or processing.

Researchers with the Tennessee Agricultural Experiment Station are tracking the physical characteristics of jalapeño pods and capsaicin levels over a given number of harvests after plant maturity is reached. We have hypothesized that there will be consistency in the mean physical measurements of pods at earlier harvests and that capsaicin levels will be lower. In this study five harvests were undertaken after the plant has matured. The treatment factors in this study are cultivar type, pod color, harvest number, and drying air temperature. In the study, the drydown of cut and whole peppers at different temperatures was simultaneously addressed. It remains to be seen whether variety, pod color, pod integrity (cut or whole), and drying temperature affected the level of capsaicin in the dried material.

**Impact:**

Sales of hot foods, hot pepper, and hot pepper products are estimated to continue to increase. Research in evaluating engineering properties of hot peppers in relation to the peppers' "heat" levels allows farmers to improve the quality of their product and therefore be part of this burgeoning market.

**Funding Sources:**

Hatch and Local (Describe: Tennessee Vegetable Initiative)

**Scope:**

State Specific

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**Title:**

Economic Evaluation of Handling and Curing Systems Using Low -profile Curing Technologies for Burley Tobacco

**Description:**

Extension specialists and agents, other researchers, tobacco farmers and other industry personnel. The emphasis is on reducing production costs of U. S. tobacco to make it more competitive in the global market and to enhance the net incomes of tobacco farm families.

The University of Tennessee has been the leader in the development of new low - cost handling and curing systems for burley tobacco. The research and outreach efforts are focused on technological alternatives that have lower initial investment costs and lower annual total costs and reduced labor and skill requirements than conventional alternatives. Economic research results on burley tobacco management systems indicate a labor reduction of 30% per ha using low - investment technologies and recommended practices. Some example practices include choice of disease-resistant varieties; hydroponic transplant production systems to improve timeliness, reduce risks, and lower cost; reduced field plant populations to improve net returns to limiting resources; bud to early flower topping with a minimum of four weeks from topping to harvest; low - profile curing structures to reduce initial investment and annual costs; and a streamlined, assembly line approach to market preparation. Some current specific work on some of the topics to lower costs and improve profits can be found at The University of Tennessee's tobacco website, TOBACCO Info Online, ([www.utextension.utk.edu/tobaccoinfo](http://www.utextension.utk.edu/tobaccoinfo)).

**Impact:**

Through numerous and varied outreach efforts by researchers and extension personnel, many of these practices have been adopted by many burley tobacco farmers to lower cost per unit of output and to enhance net farm income.

**Funding Sources:**

Commodity (Describe: Philip Morris, U.S.A., Private Grant)

**Scope:**

Integrated Research and Extension

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**Title:**

Application of Soybean Oil to Delay Flower Bud Development, Thin Fruit, and Manage Insect Populations

**Description:**

If a new market for soybean oil can be developed in peach production, soybean and peach farmers could both benefit. Soybean farmers could benefit from increased demand and prices, while peach farmers could benefit from increased revenue.

Application of soybean oil emulsified with 10% lecithin applied at an 8% concentration with water at a rate of 200 gal/acre has been shown to thin flower buds and delay peach bloom as much as six days. Temperature data from the Knoxville and Middle Tennessee Experiment Stations were used to determine whether net revenue from peach production would have been higher at the Knoxville Middle Tennessee Experiment Stations if soybean oil would have been applied during dormancy each year.

**Impact:**



Applying soybean oil each year would have resulted in a \$285/acre/year increase in net revenue over the 1980-96 period at the Knoxville Experiment Station and \$230/acre/year at the Middle Tennessee Experiment Station over the 1987-96 period. Income risk also would have been reduced. Results demonstrated that peach producers could benefit from dormant applications of soybean oil spray to delay bloom and thin fruit buds and that demand for soybean oil could potentially increase if soybean oil spray were marketed.

**Funding Source:**

United Soybean Board

**Scope:**

State Specific

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## **GOAL 2: A safe and secure food and fiber system.**

### **Overview**

Major program/research areas included under Goal 2 of the Tennessee Agricultural Research and Extension System Plan of Work included: food safety, food quality/security and land ownership for black land owners. The following describes the projects and programs conducted by the UT Agricultural Experiment Station, the UT Agricultural Extension Service and the TSU Cooperative Extension Program in addressing these areas. More specific information related what was done and what impacts were achieved in each area is included under the Key Theme section.

#### *Food Safety:*

The Food Safety Center of Excellence was established by the University of Tennessee in December 2000, as part of the university's 21st Century Research Initiative. The center will develop and evaluate strategies to destroy or control food-borne pathogens and reduce the occurrence of food-borne illnesses. Contributing to this work is a multi-disciplinary team of researchers, consisting of members of UT's Institute of Agriculture's Department of Food Science and Technology as well as researchers and Extension specialists from departments outside the department. Specialists include scientists with expertise in biochemistry, reproductive biology, food service management, parasitology, infectious diseases and risk assessment. The University of Tennessee is funding the Food Safety Center with \$5 million over the next five years. Current research developed by the Institute's food safety initiative has already attracted more than \$3 million in federal and private support. UT Food Safety Center of Excellence projects and programs will concentrate on these specific objectives:

- ▶ Develop and evaluate strategies to destroy or control foodborne pathogens and therefore reduce the occurrence of foodborne illness.
- ▶ Identify mechanisms associated with development and transfer of antibiotic resistance in foodborne pathogens and devise strategies that limit occurrence of antibiotic-resistant bacteria in foods.
- ▶ Develop novel animal production strategies that do not involve the use of antibiotics, such as the identification and production of disease-resistant animals. This will help prevent or control diseases of food-producing animals - diseases that ultimately impact human food quantity and quality.
- ▶ Develop strategies to reduce environmental contamination by foodborne pathogens at animal production and food processing facilities through environmental management and risk assessment.
- ▶ Develop, communicate and disseminate instructional food safety information to students (beginning in K-12), consumers, producers and processors of food products, and the food service industry in Tennessee and nationally. The UT Agricultural Extension Service has a significant presence and infrastructure in each county in the state for disseminating results of research and educational programs.

Early focus within Center projects continues to be on post-harvest food safety and microbial contaminants which may enter the food supply. Early results have produced simple procedures to enhance the quality of milk entering the marketing stream, increasing potential returns to milk producers and improving the quality of milk to consumers. Increased funding for the Food Safety Center will broaden its focus and will center its efforts on microbiology. This long term effort is exceeding expectations.

In FY 2001, Extension food safety education programs reached 78,725 adults and youth through the Expanded Food and Nutrition Education Program (EFNEP) and the Tennessee Consumer and Nutrition Education Program (TNCEP). Thousands of Tennesseans also received food safety information through radio, newspapers, television, health fairs, videos, computer programs, publications, newsletters and the "Safe Food for Families" web site.

A study completed on the incidence of *Escherichia coli O157:H7*, *Listeria monocytogenes*, and *Salmonella* at nine locations on a dairy farm showed that there may be critical control points on the farm for the pathogens; the study suggests that a procedure similar to HACCP, currently used in the food processing industry, could be used on-farm to reduce the possibility of pathogen contamination in the food chain. Other findings from the study were that no *Escherichia coli O157:H7* were found on the farm, and that the incidence of *Listeria monocytogenes* and *Salmonella* were similar on the farm and on nearby non-farm sites included in the study.

Swine are fed antibiotics to prevent disease and improve growth performance; however, antibiotic administration can cause bacteria in the pig's intestinal track to develop antibiotic resistance. Some species of these bacteria can cause human illness if ingested. Experiment Station research has been conducted to better understand factors which may promote or deter development of antibiotic resistance. It was found that bacteria associated with baby pigs nursing sows that have not been fed antibiotics are less apt to develop antibiotic resistance. Bacteria associated with pigs that are raised in stressful conditions (e.g., cold stress, crowding, poor sanitation) are more likely to develop antibiotic resistance. And, it was found that administering different antibiotics in a rotational sequence reduces the acquisition of antibiotic resistance. These results demonstrate that changes in animal husbandry practices can reduce the development of antibiotic resistance while still allowing the use of antibiotics to prevent animal disease and improve performance.

University of Tennessee Experiment Station research has indicated the viability to use Geographic Information Systems to determine the environmental constraints on the distribution of La Cross encephalitis. Such information would assist in the control of this disease results in long term medical difficulty and costs approximately \$400,000 per hospitalization.

*Food Quality/Security:*

Land Ownership Project

Black farmers have faced many obstacles in their efforts to retain ownership of their land. The loss of land points to the need for an intensive education program that will address estate planning, property ownership, making wills, filing the deed, rights and responsibilities of a farm ownership, taxes, the value of land, their role as a provider of the safe and secure food and fiber system for their communities and other legal issues. Individually, small and limited resource farmers are often unable to meet vegetable market requirements for variety, quality and timing. Organizing and combining resources through a cooperative effort will help them be competitive to provide safe and secure food and fiber system for their communities. In 2001, the TSU Cooperative Extension Program conducted landownership meetings for 120 black farm owners in West Tennessee. These meetings addressed a number of landowner issues, specifically ways in which land is lost and how landowners can avoid these problems through wills and preparing for property transfer prior to the death of the landowner. Participants have requested additional information about wills and many have rewritten their wills. A list of 1,900 black farm owners was also compiled in 22 Tennessee counties as a way of facilitating communication with these individuals about issues and future programs related to their needs.

During FY 2001, TSU and UT Extension specialists and agents also worked with small farmers in West Tennessee to organize a production and marketing cooperative. As a result of these efforts, a cooperative was established to assist operators of small farms with production and marketing efforts. The cooperative established a sweet potato demonstration project to demonstrate the economic feasibility of sweet potato production and to test various varieties of sweet potatoes. Results of the demonstration will help cooperative members to determine if sweet potatoes is a viable crop for them and, if so, what varieties to choose. Future plans for the cooperative include demonstrations with other crops and the identification of markets for crops grown by cooperative members. Extension specialists and agents will continue to provide assistance to the cooperative.

### **Allocations for Goal 2 Projects and Activities:**

#### UT 1862 Research:

Hatch - \$317,624  
Multistate - \$91,069  
State Outlays - \$1,810,175

#### UT 1862 Extension:

Smith-Lever b and c - \$431,547  
State and County Allocations - \$1,440,777

#### TSU 1890 Extension:

Smith-Lever b and c - \$150,000  
County Allocations - \$30,000

### **FTE's for Goal 2:**

UT 1862 Research - 7.1

UT 1862 Extension - 14.0

TSU 1890 Extension - 2.5

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## **KEY THEME - FOOD SAFETY/HACCP/FOOD HANDLING**

### **Title:**

Safe Food for Families

### **Description:**

Foodborne illness, disease transmitted to people by food, has both health and economic consequences. An estimated 76 million people in the United States become ill, 325,000 people require hospitalization and 5,000 die each year as the result of foodborne illness. Five major pathogens alone cost at least \$6.9 billion annually due to medical costs, productivity losses from missed work, and an estimate of the value of premature deaths.

In 2000-2001, food safety education for consumers was provided to multiple audiences using a variety of delivery methods. Participants in two programs that target limited resource audiences, the Expanded Food and Nutrition Education Program (EFNEP) and Tennessee Nutrition and Consumer Education Program (TNCEP) received food safety education. Education also was provided to members of 4-H, Family and Consumer Education (FCE) organizations, senior citizen centers, child care providers, inmates and food handlers at correctional institutions and volunteers at commodity distribution sites. Food safety information was distributed through Extension publications, news articles, newsletters, exhibits and television demonstrations. Food preservation training was conducted for consumers who wanted to preserve foods safely at home.

### **Impact:**

In the EFNEP program, 6,542 adults and 23,988 youth received food safety education with the following results: 65% (2,653) of 4,175 adults surveyed showed improvement in one or more food safety practices and 90% of 21,327 youth surveyed improved practices in food preparation and safety. Twenty-eight percent (1,171) of adults no longer left perishable foods at room temperature for more than two hours. Fifty-nine percent (2,433) of adults began thawing frozen foods using recommended practices.

In the TNCEP program, 48,195 adults and youth received food safety education. Over 92% (44,538) of participants reported their intention of washing their hands before and after handling food. Eighty-eight percent (10,162) of 11,536 reported they would cook foods to a safe temperature; 88% (10,356)

of 11,699 intended to separate raw, cooked and ready-to-eat foods while storing and preparing foods; 84% (14,628) of 17,332 intended to refrigerate perishable food promptly; and 84% (8,179) of 9,789 intended to preserve food safely.

**Funding Source:**

Smith-Lever, State, EFNEP (CSREES Smith-Lever 3(d) funds), TNCEP grant funds

**Scope:**

State Specific

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**Title:**

Land Ownership Information Project (Black Land Owners), sweet potato variety demonstration, food safety and food quality/security.

**Description:**

Nationally the number of farms in the United States has declined almost steadily since the mid 1930's, but the loss has been significantly heavier among black farmers. In 1910, black farmers owned approximately 15.6 million acres. Today the same group accounts for 2.4 million acres. There are only about 18,451 farms operated by blacks in the United States; when their number peaked in 1920, there were over 926,000. Black farmers have faced many obstacles in their efforts to retain ownership of their land. The loss of land points to the need for an intensive education program that will address estate planning, property ownership, making wills, filing the deed, rights and responsibilities of a farm ownership, taxes, the value of land, their role as a provider of the safe and secure food and fiber system for their communities and other legal issues. . Individually, sma ll and limited resource farmers are often unable to meet vegetable market requirements for variety, quality and timing. Organizing and combining resources through a cooperative effort will help them be competitive to provide safe and secure food and fiber system for their communities.

Four landownership meetings were conducted in the Crocket and Shelby County extension offices and in the Douglas and Hamilton Communities in Memphis. A List of 1,900 black farm owners has been compiled in 22 counties of Tennessee.

During FY 2001, Extension specialists worked with small farmers in West Tennessee to organize a production and marketing cooperative. After several meetings, Southern Growers, Inc. was incorporated in Tipton County in July of 2001. As of FY 2001, this cooperative has received a total of \$300,000 in grants from both USDA Rural development and private organizations to help expand the cooperative's production and marketing efforts. In FY 2001 sweet potatoes were selected as the initial commodity of this cooperative. Using grant funds, extension specialists purchased seven varieties of sweet potato slips and established a one-acre demonstration plot in Tipton County. The total cost of this demonstration was \$400 for slips, \$50 for chemicals, and \$2,600 for variable and fix expenses plus labor.

**Impact:**

One hundred twenty people participated in the landownership meetings. Participants were provided with information on the most common ways land is lost and given practical advice on the need for and advantages of a will, will preparation, making amendments in a will and will execution. Eleven participants requested additional information on probate administration and costs. Eight landowners are making new wills.

The sweet potato demonstration results were presented to 24 small farmers at a field day on August 30<sup>th</sup>, 2001. Potatoes from the demonstration plot have been harvested with a calculated yield of 450 bushels per acre. At current prices of \$15.00 per bushel, this would yield a potential gross income of \$6,750 per acre minus the expenses and labor equaling the net income of \$3,700. The most productive varieties were White Triumph followed by Vardman. All varieties are being evaluated for taste and will be selected for expansion in two market areas: value added markets and direct home consumption. Extension will continue to provide technical and other support as necessary to help this cooperative continue to grow and become sustainable. Future plans include exploring other commodities and new market opportunities that will help sustain small farmers in Tennessee.

**Funding Source:**

Smith-Lever, State and County

**Scope:**

State Specific

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**Title:**

Solving the Puzzle of Antibiotic Resistance in Bacteria from Livestock

**Description:**

Antibiotics are commonly used in livestock systems. Therapeutic use of antibiotics continues to play a major role in combating disease organisms, while subtherapeutic use (inclusion in feeds or drinking water) increases animal performance, decreases pathogen loads, and lowers the prevalence of organisms causing foodborne illness in humans. Contrasting the above benefits, however, are suggestions that agricultural use of antibiotics may be partly responsible for the emergence of drug - resistant bacteria, which in turn may decrease the efficacy of similar products used in human or animal medicine. Currently, little information is available to develop strategies for control of antibiotic -resistant organisms. In particular, almost no information is available with regard to resistance in modern livestock production facilities, or how management, environmental conditions, or drug therapies affect resistance. Because transferable resistance may originate from a variety of bacteria and associated hosts, it is important that confounding factors are characterized so that more effective control strategies can be formulated.

A primary research focus of our group is the determination of the effects of antibiotic use and animal management on antibiotic resistance in bacteria. Additionally, we are characterizing DNA genes that lead to antibiotic resistance in animal and human pathogens. A number of our projects have been aimed at determining how different uses of various antibiotics in livestock production affect, concentrations, and shedding of foodborne pathogens.

Past work by our group has included a pioneering microbiological survey of swine farms that used or excluded antibiotics from production. We determined that pathogenic bacteria from farms that excluded antibiotics were more sensitive to antibiotics; however, resistant isolates occurred on both farm types, and young, recently-weaned animals from all farms harbored the greatest number of resistant isolates. This may indicate that stresses associated with weaning affect bacterial antibiotic resistance patterns, regardless of whether antibiotics were used on the farm. A more recent study investigating a variety of animal stressors, including temperature stress, crowding, and transportation confirm that such factors increase the prevalence and persistence of bacteria that carry resistance factors.

We have also identified resistance genes in *E. coli* and *Salmonella enterica* subtype Typhimurium isolated from livestock and determined the location of these genes on bacterial chromosomes and plasmids (self-replicating DNA elements). An important discovery by our group was that *E. coli* associated with livestock became resistant much more quickly than did *Salmonella* Typhimurium in the same host, possibly indicating a greater ability of *E. coli* to acquire resistance elements such as plasmids (R-factors), or a greater ability to generate chromosomal resistance elements de novo. This finding will be very important as we assess the agricultural use of antibiotics and the risks of promoting resistance in foodborne pathogens. We are currently characterizing the bacterial resistance elements using various DNA-based techniques to determine the relative importance of R-plasmids and chromosomal genes in the acquisition and persistence of antibiotic resistance. Other work is underway to develop rapid methods for detection and differentiation of foodborne pathogens.

**Impact:**

Through this work, we can determine the most effective antibiotic therapies and husbandry practices to maintain animal health, while at the same time, limiting prevalence of foodborne pathogens and antibiotic resistance in livestock. This information will also allow us to determine the origin and reservoirs of bacteria in livestock that are most responsible for foodborne illness associated with agricultural products. Such techniques will be instrumental in the implementation of on-farm Hazard Analysis Critical Control Points (HACCP) strategies for control of specific foodborne pathogens.

**Funding Sources:**

Hatch, Special Research Grants, Animal Health and Disease, Institution Challenge Grants  
Commodity (Describe): National Pork Board, Other (Describe): Animal health foundations, Industry grants and contracts

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**Title:**

Identifying Food Pathogens of the Farm

**Description:**

The safety and security of our food supply is of utmost importance to consumers, producers, our economy, and the government.

Researchers with the University of Tennessee Food Safety Center of Excellence have developed new methods to accurately and consistently detect Salmonella, Campylobacter, E. coli O157:H7, and *Yersinia enterocolitica* in cows, swine, and poultry production environments.

**Impact:**

New methodology for detection of disease-causing bacteria was developed that will permit more accurate and rapid diagnosis of foodborne illnesses and which will quickly identify animals contaminated with foodborne pathogens. These discoveries should make our food supply safer and provide tools to help prevent and manage disease-causing bacteria at the farm. An additional benefit is to allow for the rapid response and diagnosis of some biological agents in the event of an agroterrorism event.

**Funding Sources:**

Hatch, Special Research Grants and Institution Challenge Grants

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**KEY THEME - FOOD QUALITY**

**Title:**

Envisioning the Perfect Country Ham

**Description:**

Successful descriptive sensory evaluation is dependent on development of appropriate terminology for describing products. Terminology needs to be developed for food products to assist in their marketability and in quality assurance.

A literature review for terms used to describe country and similar dry-cured hams yielded few terms. Twenty-six consumers of country ham were interviewed to collect additional descriptive terms. Terms selected for testing included red color; overall, pork, and rancid aromas; overall flavor intensity; sweet and salty tastes; pork, rancid, and dry-cured flavors; moisture; hardness; and tenderness. The attributes hams processed from Duroc and an undefined mix typical of market hogs (Market Mix) were evaluated using a consumer profiling technique with 15-point intensity scales by consumers of country ham.

**Impact:**

The terms selected for the study allowed the panelists to describe characteristics of country hams, making comparison of two ham groups possible. Sensory professionals in the food industry will now have a lexicon of terms to use in studies of country ham attributes.

**Funding Sources:**

Hatch, Commodity (Describe: Hams provided by funds from National Pork Producers)

Other (Describe: Gifts funds in sensory evaluation laboratory)

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**Title:**

Postharvest Quality and Safety in Fresh-Cut Salads

**Description:**

Consumers are interested in increased shelf life and high quality fruits and vegetables. Reducing the use of chlorine in the postharvest processing of fresh-cut vegetables and fruits is desirable from an environmental impact and for improved sensory quality.

Researchers with the University of Tennessee evaluated ozone as a partial or total replacement for chlorine in the treatment of fresh-cut salads containing lettuce, carrots and red cabbage. Iceberg lettuce was inoculated with 8 log CFU/g spoilage microorganisms isolated from lettuce. Inoculated samples were treated with water containing combinations of 0, 100, 150 or 200 (mg/L) chlorine and 0, 2.5, 5.0 or 7.5 (mg/L) ozone, and sampled for aerobic plate counts (APC) and psychrotrophic plate counts (PPC). Commercial salads rinsed with chlorine, ozone or and ozone-chlorine mixture were evaluated for shelf life by an untrained panel (n=30).

Microbiological results show rinsing with an ozone concentration of 2.5 mg/L in combination with 100 mg/L chlorine will achieve a microbial Log reduction for APC and PPC that is equal to a high chlorine treatment (200ppm). These treatment levels were shown to be beneficial and effective in reducing the microflora of lettuce and improving the water quality in the processing line. Sensory evaluation indicated that by using an ozone-chlorine treatment an extension of the shelf life of the ready-to-eat salads can be achieved, going from 16 days using a chlorine treatment, to 25 days using the combination of ozone and chlorine. By the 25th day, 65% of the panelists would still purchase the ozone-chlorine treated salads while none would buy the chlorine treated ones. By the 14th day, the chlorinated salads started showing a brownish color at the edges (probably generated by oxidation of the chlorophyll or by enzymatic reactions within the cells), structural break down, volume reduction, secretion of juices, and color deterioration in general; while the salads treated with ozone-chlorine started to show similar characteristics after 25 days.

**Impact:**

The use of ozone in the rinse water for fresh produce operations is a promising supplement to chlorine. The reduction in chlorine is desirable from an environmental impact and improved sensory quality of the

produce. Use of ozone to treat the processing water can extend the use-time of the recycled rinse water and therefore reduce the time required to pay for installation of the ozone equipment.

**Funding Sources:**

Other (Describe): Tennessee Food Industry (Strickland Produce)

**Scope:**

State Specific

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**Title:**

Improving the Shelf Life of Vacuum -Packed Pork Loins

**Description:**

The pH of pork is an important characteristic affecting product quality and shelf life. Higher pH results in lower drip loss and less chance of undesirable color. However, bacteria may grow faster at higher pH. Consequently, shelf life of higher pH pork may be shorter. There is a need to determine the relationship between pH and shelf life so as to maximize quality.

Researchers with the University of Tennessee have been evaluating the effect of pH of vacuum - packaged pork on shelf life as measured by microbial growth. Pork loins were collected at a commercial slaughter facility one day post slaughter. All pigs were from the same genetic line. Loins were grouped by pH, vacuum-packaged and stored at 4°C. Microbial analyses for bacteria counts were performed over time for up to 34 days. For bacterial counts on vacuum-packaged samples, low pH pork loins had consistently lower counts over the storage time. Results demonstrate that higher pH pork has a shorter microbiological shelf life.

**Impact:**

The results indicate that, while high pH pork may have certain desirable quality characteristics, under vacuum-packaged conditions it also has a shorter microbiological shelf life. Analysis will be done to determine a pH range at which microbiological shelf life and desirable quality characteristics are optimum. By knowing the pH at which pork has the best shelf life characteristics, i.e., visual and microbiological quality, the pork industry will have a target pH for which to strive to maximize quality.

**Funding Sources:**

Hatch, Other (Describe): Industry grant

**Scope:**

State Specific

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**Title:**

**Description:**

Food safety continues to be of concern to consumers, food processors and producers. Guaranteeing the safety of food products is paramount to everyone involved in the “food chain” from farmer to consumer.

Foodborne diseases are a worldwide problem. Reports from the Center for Disease Control and Prevention, the Food and Drug Administration and USDA indicate that the risk of foodborne illness has increased markedly over the last 20 years. Now nearly a quarter of the population is at higher risk for foodborne illness. Costs associated with foodborne illnesses are exorbitant, estimated to range from \$19 billion to \$37 billion annually. A rough estimate of medical costs and lost productivity of workers caused by foodborne illness in Tennessee is \$406 million to \$766 million per year. The situation becomes more problematic because of rapidly changing demographics, with an increasing number of elderly people and immunocompromised individuals who are more susceptible to foodborne pathogens.

A major challenge in food safety today is the complexity of the research problem. The threats are numerous and varied such as *Escherichia coli* O157:H7 in meat and apple juice; *Salmonella* in eggs, on vegetables and on poultry; *Vibrio* in shellfish; *Cyclospora* and hepatitis A virus on fruit; and *Cryptosporidium* in drinking water. Much has changed in what we eat and where we eat. Americans are eating a greater variety of foods, particularly poultry, seafood and fresh fruit and vegetables, and consumers demand these foods year round. Americans are also eating more of their meals away from home. Food expenditures away from home account for 47.5% of total food expenditures or nearly half. This food is purchased and consumed from grocery stores, restaurants, and in institutional settings such as schools, hospitals, nursing homes and day care centers. Consequently, as more people become involved in preparing our meals, the chance for foodborne illness increases dramatically.

**Impact:**

It is widely accepted that “food safety” encompasses all aspects of food production from farm to fork. The UT Food Safety Center of Excellence was established in December 2000. In its first year of operation, scientists with the center received grant and contract awards of more than \$2 million. The center is to be a leader in the development and dissemination of science-based information on timely and relevant food safety issues and concerns that will minimize problems associated with food borne illness and to significantly impact development of new technologies and economic development in the region. The center is working to develop meaningful data regarding some of the very difficult food safety problems associated with animal production and sustainable agriculture.

**Funding Sources:**

Hatch, Institution Challenge Grants, State (Describe): The Tennessee Agricultural Experiment Station  
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**Title:**

## Improving Value, Safety, and Efficiency of Food and Feed Processing

### **Description:**

Food safety and product quality are chief among the concerns of consumers and two of the most important issues facing food processors. The fragile nature of many fruits and vegetables makes maintaining product quality, while optimizing decontamination efficacy, quite a challenge.

Researchers with the Tennessee Agricultural Experiment Station are working to design a produce spray-washing system modeled after carcass washers that will maximize cleaning efficacy, maintain product quality, and be applicable to a wide variety of products. The extent to which washing removes a contaminant is dependent on several factors. The character of the surface, smooth or rough; surface-to-volume ratio; and the level of contaminant present all affect the ability of a washing system to clean a particular product. Because decontamination efficacy is increased as temperature and pressure increase, tests should be conducted to determine the highest pressure and temperature at which no surface damage occurs.

### **Impact:**

Improving the mechanics of spray washing produce and its effect on the removal of microorganism from produce surfaces will lead to improved efficacy of the many washing systems that are already installed in the U.S. produce industry. The end result will be safer, more desirable fruits and vegetables.

### **Funding Sources:**

Hatch, State (Describe: Tennessee Vegetable Initiative)

### **Scope:**

Integrated Research and Extension

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### **Title:**

Irradiated Ground Beef: The Adoption Decision by Supermarkets and Grocery Stores

### **Description:**

Sizable health costs resulting from E. coli contamination in ground beef have brought food safety concerns to the forefront. Recent changes to USDA/FSIS meat inspection regulations permitting ionizing radiation for treatment of uncooked meats have the potential for mitigating a portion of these losses. However, for regulations changes to be effective, the product must be adopted within the industry, and retailers must demonstrate a willingness to sell irradiated ground beef to consumers. This study investigates the decision by grocery and supermarket establishments in the United States to adopt irradiated ground beef. A national survey will be conducted to obtain data.

A preliminary survey of Knox County area retail meat managers has been conducted. The study examined views on marketing and profitability expectations regarding irradiated red meats held by retail meat managers.

**Impact:**

Results from the preliminary study suggest that most meat managers do not believe irradiated red meat products will be introduced in the next year, however many believed they would be introduced in the next three years. The majority believed irradiated ground beef would be sold first and that it would be sold as an unbranded product, with irradiated products eventually comprising less than a quarter of red meat sales.

In response to possible concerns, educational materials supplied to meat managers and meat department personnel might outline environmental risk levels, as well as the potential benefits of shelf -life and time-savings that could accrue from selling irradiated red meats.

Perceptions of consumer concern about food safety and potential negative market effects of the radura symbol influence managers' profitability expectations. Some believe consumer concern about pathogens in red meat products may be outweighed by perceived health risks from irradiation, and that the radura symbol may adversely affect sales. These results reinforce the importance of having information readily available to meat department customers to explain potential food safety benefits of irradiation and the meaning of the radura symbol.

**Funding Sources:**

National Research Initiative

**Scope:**

State Specific

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**Title:**

Beef Quality Assurance (BQA) helps to ensure a safe, wholesome food product.

**Description:**

Food safety is a large concern of consumers. A safe, wholesome beef product starts with local cow-calf production and they must be aware of their role in this effort and carry out practices to ensure it.

Educational programs have been directed toward cow-calf producers to ensure the production of a safe, high quality food product. The proper use of vaccines, health products as well as injection producers and observing label directions on health products and feed additives have been stressed.

**Impact:**

More than 1022 Tennessee beef producers became certified in Beef Quality Assurance (BQA) practices. This is only about 20 percent of the state's cow-calf producers but the interest and demand

for certification training has increased. BQA certification has been an “added value” practice and has a positive influence on market price. In organized, cooperative marketing efforts, BQA certification has been part of a “total management” program that has resulted in an added \$3.00 to \$11.00 more per cwt. than if calves were marketed through local, weekly auction markets. Private industry, Tennessee Farmers Cooperative and Tennessee Livestock Producers, Inc. have developed a health and management program based on BQA practices that is now part of a marketing program and it has been met with limited success.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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### **GOAL 3: A healthy, well-nourished population.**

#### **Overview**

Major program/research areas included under Goal 3 of the Tennessee Agricultural Research and Extension System Plan of Work included: nutrition and diet issues, healthy food products and healthy lifestyles and health care issues. The following describes the projects and programs conducted by the UT Agricultural Experiment Station, the UT Agricultural Extension Service and the TSU Cooperative Extension Program in addressing these areas. More specific information related what was done and what impacts were achieved in each area is included under the Key Theme section.

#### *Nutrition and Diet Issues:*

Tennessee families receiving Food Stamps report a lack of knowledge in the areas of cooking, food purchasing, managing food dollars and identifying alternatives to purchasing fast foods and pre-prepared foods. In 2001, 89 counties utilized local Tennessee Nutrition Consumer Education Program (TNCEP) coalitions to design and deliver nutrition education to address these critical concerns.

The goal of TNCEP is that Food Stamp individuals and families will gain knowledge and skills needed to reduce the risk of inadequate nutrition while becoming empowered to move toward self-sufficiency. This goal will be accomplished by helping families effectively use Food Stamps and related resources.

In 2001, Tennessee conducted the \$4.1 million TNCEP nutrition education program in 89 counties. Half the funding was contracted through the Tennessee Department of Human Services and USDA Food and Consumer Services. The other half was matched through in-kind contributions by the University of Tennessee Agricultural Extension Service and the 89 county nutrition coalitions. Extension's Tennessee Nutrition and Consumer Education Program (TNCEP) continued to help individuals gain the knowledge and skills needed to select healthy diets.

In 2001, there were 190,547 TNCEP teaching contacts, including adult and youth. In addition to program contacts attending classes, TNCEP delivered nutrition messages through an estimated 7,261,818 contacts by way of social marketing programs (e.g., educational handouts, single session programs, and exhibits and mass media efforts (e.g., newspaper articles, newsletters, radio programs, video/computer programs, grocery bag stuffers, and television).

TNCEP personnel trained 12,445 volunteer nutrition educators in 602 "train-the-trainer" sessions. Community personnel such as classroom teachers, day care providers and school food service workers participated in these educational sessions. These volunteers each conducted an average of three community-based nutrition education programs for individuals or small groups. Three thousand five hundred and fifteen (3,515) Extension faculty, county coalition members and program partners conducted 12,810 teaching sessions. As a result of these classes, 190,547 contacts were made with Food Stamp eligible recipients.



In a 2001 survey of TNCEP participants in 26 Tennessee counties, 90 per cent of the respondents reported that they were making changes in their diets to reduce risk factors for diet-related diseases. Another 81 per cent reported that they are reading food labels to help select more nutritious foods. Seventy-eight per cent of the respondents indicated that they had made actual changes in their food safety practices. Based on research conducted at the University of Virginia, there is a considerable savings on health care dollars when individuals adopt healthy eating practices. They found that 10 dollars in health care costs are saved for every dollar spent on nutrition education.

#### *Healthy Lifestyles and Health Care Issues:*

An Experiment Station program to meet the needs of a healthy, well-nourished population has centered upon the interaction between nutrition and heart disease, and its correlate, obesity. This area of research is, by its nature directed toward the cellular level and the metabolism which occurs. The research has generally identified the interaction between genetics and the effects of nutrition on health. The research is long term in nature and impacts will be derived only with long term evaluation of hypotheses.

The University of Tennessee Agricultural Extension Service, in a collaborative effort with the UT College of Pharmacy, received a \$459,295 grant from the USDA Rural Utilities Service to establish a telecommunications network in Tennessee to improve the availability and utilization of information by residents in rural communities of Poison Control Centers. In 2001, the project, Health Education in Rural Communities Using Laptops for Educational Sessions (H.E.R.C.U.L.E.S.) established a network of telecommunication sites in 21 West Tennessee counties and in the district Extension offices in each of the four Tennessee Extension districts. The goal of the project is to provide access to the Poison Control Center through the use of computer telecommunication equipment located at each site. This use will facilitate the use of the Poison Control Center by linking the community education network of the UT Extension Service with the resources of the Poison Control Center. Extension personnel in each of the sites will be provided training to use the telecommunication equipment and will conduct programs about the resources of the Poison Control Center and how to utilize the H.E.R.C.U.L.E.S. project to access them.

The TSU family life extension specialist, in cooperation with the Meharry Medical College, conducted a study of obesity in young children, their eating habits and its effect on their grades in the school. Along with data collection, appropriate information on foods and nutrition was provided to the families.

#### **Allocations for Goal 3 Projects and Activities:**

UT 1862 Research:

Hatch - \$327,728

Multistate - \$51,465

State Outlays - \$741,508

UT 1862 Extension:

Smith-Lever b and c - \$833,837  
Smith-Lever d (EFNEP) - \$1,907,368  
State and County Allocations - \$3,553,919

TSU 1890 Extension:  
Smith-Lever b and c - \$155,000  
County Allocations - \$40,000

**FTE's for Goal 3:**

UT 1862 Research - 5.2

UT 1862 Extension - 107.8 (does not include 81.76 EFNEP-funded paraprofessional FTE's)

TSU 1890 Extension - 3.5

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**KEY THEME - HUMAN NUTRITION**

**Title:**

Changing Ingredients to Enhance Their Value to Farmers and Consumers

**Description:**

The challenge that food producers and farmers alike face is a rapidly changing consumer demand. Foods that promote health are in large demand. To prevent the occurrence of life-threatening dietary related diseases (e.g. coronary heart diseases, heart attacks, osteoporosis), novel and structurally complex food products need to be developed that at the same time have a pleasant and appealing taste, texture, appearance and aroma. Formulation of these products is difficult and complex and the flexibility of the food industry with respect to the choice of ingredients constantly decreases. New and novel technologies are therefore needed to formulate these products and satisfy consumer demands.

Our program in colloidal and interfacial food science is continuing to bridge the gap between basic and applied research in food science. Researchers with the University of Tennessee Department of Food Science and Technology (in collaboration with national and international academic institutions) are working to develop a new processing method called "high-intensity ultrasonic processing" that is capable of dramatically modifying the functional properties of food ingredients such as proteins, carbohydrates and lipids. We improved the emulsifying properties of soy, whey and meat proteins and enhanced the antimicrobial activity of lysozyme, a protein that can be found in egg white. At the same time, the research improved our fundamental understanding of the structure-function relationship that is the basis of food quality such as good texture, appropriate color and appearance and desired flavor.

**Impact:** Using this technology, the food industry is able to develop new products using underutilized crops and agricultural raw products and expand the range of applicability of common food ingredients such as proteins and carbohydrates. It therefore raises the value of these agricultural products, helping farmers to get higher prices for their products. Also, the enhancement of antimicrobial properties of proteins such as lysozyme through modification of their physicochemical properties ultimately results in a better protection for consumers against potentially deadly foodborne diseases.

**Funding Sources:**

Hatch, Commodity (Describe: Tennessee Soybean Promotion Board), State (Describe: SARIF Equipment Grant)

**Scope:**

State Specific

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**Title:**

New High- Yielding Soybean Packs More Protein

**Description:**

Soybean is a major agricultural crop with diverse human and animal nutritional uses as well as versatile industrial product uses. The release of a new high -yielding public soybean variety will positively impact farmers, processors, and consumers.

In 2001, the University of Tennessee Agricultural Experiment Station released a new soybean variety, 5601T, that ranked #1 for yield among all commercially available conventional maturity group V soybean varieties tested for two consecutive years (2000-2001) in the Tennessee State Variety Test and #1 for yield for two consecutive years (1999-2000) in the USDA Uniform Tests over broad geographical regions of southern USA. This new variety is adapted to millions of acres of soybean producing areas throughout the Mid-South and Southeast USA.

**Impact:**

Farmers faced with low commodity prices need to effectively manage their farm budget. Choice of variety is an important farming decision, which impacts the bottom line. Having a new high -yielding public variety, 5601T, that is well-adapted over a broad geographic region of the Mid-South and southeastern United States provides a new opportunity to maintain or increase farm income from soybean production.

The new variety produces excellent seed yield with somewhat higher than average seed protein, which also makes the variety potentially appealing to foods processors who desire large volumes of reliable sources of soy protein to meet consumer demands.

In addition to its high yield, 5601T is resistant to stem canker, resistant to soybean potyvirus, and resistant to southern root-knot nematode. It would be an excellent parent for soybean breeders to utilize in crossing programs to complement with additional traits for further genetic improvement.

**Funding Sources:**

Hatch, Commodity (Describe): Tennessee Soybean Promotion Board

**Scope:**

State Specific

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**Title:**

Healthier Soybean Oil Improves Market-Share

**Description:**

USA soybean exports and commodity prices have plummeted in recent years. The development of healthier soybeans will stimulate demand by health-conscious consumers and improve market-share. Soybean is a major agricultural crop with diverse human and animal nutritional uses. The development of a better bean will benefit soybean farmers, processors, and consumers.

The University of Tennessee is part of a team of scientists, including those from other universities, the USDA, and private industry, working together to produce a better soybean. We have reduced the level of saturated fat in soybean oil and we are continuing to find ways to reduce the level of transfatty acids, in order to develop a healthier vegetable oil.

**Impact:**

The development of low-saturated-fat soybean oil with reduced transfatty acids will enhance demand by health-conscious consumers and will provide processors with the type of soybeans that they currently need to meet new FDA food labeling regulations. Better USA soybeans may improve exports, reduce domestic stocks, and improve the commodity price that farmers need to sustain their livelihoods.

**Funding Sources:**

Hatch, Commodity (Describe): United Soybean Board - Better Bean Initiative

**Scope:**

State Specific

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**Title:**

Wanted: Easy Bake, Low-Fat and Low-Cal Cookies

**Description:**

Reduced-fat and reduced-sugar cookies are a popular alternative to high-calorie counterparts; however, developing modified products to match full-fat/full-sugar versions is a difficult task. Spread is the primary indicator of cookie-flour quality and sensory evaluation is not often used to assess flour quality. This research will eventually benefit the consumers who want reduced-fat and reduced-sugar cookies.

Researchers with the University of Tennessee Agricultural Experiment Station studied 280 treatment combinations of four flours at 5.8%, 7.5%, 8.8%, and 10.4% protein; three fat replacers (Betatrim, Stardri, and Simplese) at 0%, 35%, 55%, and 75% fat reduction; and two sugar replacers (Isomalt and Maltitol) at 0, 45% and 65% sugar reduction. Cookie spread (width/thickness) was determined and cookie hardness were evaluated.

**Impact:**

Lower protein, soft-wheat flours should be used to produce reduced-fat cookies most similar in appearance and texture to full-fat cookies. Some fat/sugar replacer combinations can also be used to mimic textural properties of full-fat/full-sugar cookies. Isomalt and Maltitol, as sugar replacers, will not compromise cookie spread. This basic research should assist the food industry in formulation of products that will meet needs of consumers who want to limit fat and calorie intake.

**Funding Sources:**

Hatch Act  
Other (Describe: Gifts funds in sensory evaluation laboratory)

**Scope:**

State Specific  
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**Title:**

TSU Extension Nutrition and Health Programs

**Description:**

Maintain health and healthy diet is a serious concern for many residents of Tennessee. This issue is of special concern to limited resource and minority families. Many families do not fully understand the importance of healthy diet or have the information to maintain a healthy diet on limited resources. Education plays a critical role in addressing this issue. Through a special needs USDA grant, the TSU family and consumer science extension specialist, in cooperation with the Meharry Medical College, conducted a study of obesity in young children, their eating habits and its effect on their grades in the school. This project was initiated in the 2000 program year and was completed with findings and recommendations released in 2001.

In Henderson County, extension conducted a variety of educational programs to promote good nutrition and food safety: Henderson County Senior Health Fair to promote healthy living for senior

adults; Breakfast Bunch with 51 Kindergarten children to teach them about good nutrition; monthly nutrition programs at 4 Senior Citizen Centers and a GED class; and using the TNCEP Carnival, a collaborative effort between the local hospital and Extension to encourage 3rd grade youth to eat right.

In Lauderdale County, the TNCEP Coalition, a team of local collaborators conducted monthly meetings. Total of 89 Nutrition and Consumer education programs were conducted, reaching more than 10,120. ( classes, workshops, fairs/exhibits).

Two newsletters reaching about 1400,5 handouts prepared for grocery bag stuffers going to 4 grocery stores estimated contact 8500. One Youth Day Camp conducted with 450 pre-school age children.

Educational materials are placed in all schools throughout the county as well as public services agencies. i.e. Health Department, Department Of Human Services, Head Start, Family Resource Center, Senior Citizen Centers. One community wide health fair conducted. In Dyer County, a Special Summer Food Service Program was implemented providing approximately 527 children a daily nutritious meal. During the 10 week program, over 15,303 lunches and 7552 breakfasts were served. Collaborators were YMCA, Dyersburg Housing Authority, Newbern Housing Authority, Dyersburg State Community College Upward Bound Program, Job Training Partnership Act, Dyersburg Parks and Recreation, Dyer County Consumer Service, Dyer County 4-H Program, Mt Pleasant Baptist Church, Tabernacle Baptist Church and Ross United Methodist Church. All contributed to the success of the Special Summer Food Service Program

The TSU/CEPCRD agent and program assistant provided basic training to workers to carry out responsibilities with the children. In addition to providing nutritious food, a variety of educational and recreation programs were provided for children.. Teaching and recognizing symbols and alphabets were taught during the program. Project identifying trees and leadership roles were given to teenagers. As a pre-test, students were asked to identify plants before information was given on plant identification. Children learned about soil and water, nutrients in the soil and the importance of controlling weeds when growing plants. Post-test results showed a 80% increase in knowledge after lessons. Family consumer science and 4-H agents also taught life skills to children.

In Crocket County, a UT area specialist conducted two gardening meetings. . Subject matters included: current gardening practices, economic value, and gardening management. Small group settings and hands on techniques were developed. This year the clients and the public received broccoli plants, tomato plants, purple hull peas, white onions, cabbage plants, grapevines, mustard seeds, and green beans. Other crops planted were: pears, cucumber pickle, okra, squash, corn, beets, cantaloupes, egg plant, radishes, pecans, pimentos, figs, plums and carrots. The TSU/CEP program assistants taught 170 limited resource families proper canning techniques, selecting the correct equipment for canning, and using the correct temperature when storing food. Certificates were given to those gardeners that participated. A collaborative effort was made utilizing the TSU Staff, Area Specialist(s), and the TSU Family Life Clientele. This program was also made available to the public.

**Impact:**

For the USDA special needs grant, Along with data collection, appropriate information on foods and nutrition was provided to the families.

In Henderson County, approximately 30 seniors participated in the Senior Health Fair and picked up information on Health and Nutrition.

Evaluations from Breakfast Bunch showed that 51 (100%) students will wash hands after going to the bathroom and 50 will wash hands before touching food. 45 of the students said they will try to eat breakfast everyday. The cafeteria manager reported an increase in breakfast for a few weeks after this session.

Evaluations done at the Senior Centers and GED class showed that 27 out of 88 participants (30%) will reduce risk factors for diet related diseases.

Evaluations done at the TNCEP Carnival with 3rd grade students showed that 48 of the 81 (59%) students participating said they would eat less from the top of the pyramid.

In Lauderdale County, according to TNCEP monthly evaluation tool, more than 90 percent of participants improved nutrition skill building practices; eighty -five percent of seniors participating in this community program engage in their physical exercise program; teachers reported students eating new and different foods at school; senior audiences prepared healthier meals; children assisted parents with grocery shopping as well as reading food labels; churches and civic organizations show increase interest in health issues. First community wide health fair was conducted with churches community partners teaming to give guidance and leadership.

In Dyer County, according to Dyersburg Police Department, youth crime declined by 66% from 2000 to 2001. More children are receiving meals that are more nutritious according to parents attending the program- A dietitian approves all the menus. Twenty (25) jobs were created to help the local economy and families. Six agencies were involved with the program, more than ever before. Because of leadership roles given to youth, more youth are becoming responsible according to their behavior during the program. A wholesome place was provided for youth during the summer months.

In Crocket County, participants gained knowledge on a variety of medical/nutritional subjects. The children developed hands on techniques such as hand washing. As a result of health program, participants gained updated information, immediate on site medical results, referrals if needed, and network with agencies for future contacts. Over 400 participants attended which included adults/y outh. Forty-one out of 55 evaluations were returned. The response was that the facilities and screening were excellent, well organized, and good for the community. Over 1000 letters were mailed to the Family Life Clientele, Pastors, Ministers, Laymen, Health Agencies and Organizations, Local factories and businesses. A estimated \$30,600.00 was saved as a result of free and reduced health care screening. An onsite evaluation tool was developed. The evaluation was distributed to each agency that was represented. At the end of the program results were tallied and a final report was given at the following Inter- Agency Council meeting.

**FUNDING SOURCE:**

Smith-Lever, State, Tennessee Department of Human Services and local county governments.

**Scope:**

State Specific

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**KEY THEME - HUMAN HEALTH**

**Title:**

Curing Cancer with Vegetable Oil

**Description:**

Using a reformulated vegetable oil, University of Tennessee researchers have reduced preexisting intestinal tumors in mice by at least 50%. These modifications can be applied in the reduction of cardiovascular disease and inflammatory disorders and they have applications that can have a clinical impact in humans as well as in other venues, such as the companion pet industry. Importantly, the new oil from these plants is not a substitute for drug therapy but rather a composite of the best types of fats from the most commonly used oils. Therefore, these ‘healthy’ oils can be seamlessly integrated into the average American diet using components that are already “generally recognized as safe”.

We have tested these newly formed oils in a mouse model that has the same gene defect as 80% as humans who have colorectal cancer. We have been able to eliminate up to 98% of pre-existing tumors in 6 days following a variety of every day therapies such as modifying the fat content of diets or using aspirin-like drugs (common forms typically used by the average American). We have determined that the mechanism of action is related to the metabolism of a fat, arachidonic acid, whose precursor is primarily found in vegetable oils. We have clearly established that modifying arachidonic acid in tumor cells either by diet or following the use of common over-the-counter anti-inflammatory drugs leads to self-induced suicide of these tumor cells, with no adverse effects on normal cells or tissues.

**Impact:**

Agriculturally-based commodities such as soybeans are relatively rich in alpha linolenic acid, a dietary fat that antagonizes arachidonic acid. Arachidonic acid is a key promotor of intestinal cancer and the most effective anti-cancer fats are those that have the greatest ability to antagonize arachidonic acid. Thus, production of plant products whose lipid content antagonizes arachidonic acid will have the greatest efficacy in reducing pre-existing conditions and reduce the risk of intestinal cancer. We can identify foods rich in fats that antagonize arachidonic acid and easily pass this information on to the public through education of professionals within our program (Department of Nutrition) and out-reach through Extension. In addition, with cooperation of plant geneticists, we should be able to tailor-make



designer oils that possess the optimal composition of fat, thereby developing new commodities for the agricultural industry.

**Funding Sources:**

Hatch, Other (Describe: Department of Defense, American Institute for Cancer Research, and Pharmacia Corporation)

**Scope:**

State Specific

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**Title:**

Emerging Arthropod-Borne Diseases and Their Vectors in Tennessee

**Description:**

Advances have been made on understanding the epidemiology and control of La Crosse (LAC) encephalitis and human monocytic ehrlichiosis (HME), the two most important arthropod-borne emerging diseases in Tennessee.

- ▶ The first ever isolation of the LAC virus from a naturally infected “Asian Tiger Mosquito” was made from mosquitoes collected from the homesite of a child who had contracted LAC in Anderson County. This discovery further implicates this common, backyard mosquito as a vector of LAC, which is averaging 6-10 hospitalized cases per year in eastern Tennessee (4.2 days in hospital @ \$2000.00/day).
- ▶ UT researchers are participated in an active surveillance program for LAC encephalitis in cooperation with regional and local health departments. An epidemiological case comparison study is being conducted between children with confirmed LAC encephalitis and non -LAC patients with similar symptoms. Mosquito breeding habitats, proximity to tree lines, proportion of mosquito species and other environmental factors are being compared. Mosquitoes are being reared and will be analyzed for the presence of LAC and other arboviruses at the CDC laboratory in Ft. Collins.
- ▶ A non-polluting method of Lone Star tick (LST) control using ivermectin-treated corn fed to white-tailed deer has shown to effectively reduce all stages of LST in a Cumberland Co. community. This control method precisely targets LST and greatly reduces chemical residues in the soil that are common with traditional pesticide applications.

**Impact:**

The ultimate goal of the research is to improve the health of human populations through effective control of the mosquitoes and ticks. The first step, however, is isolating the carriers of the diseases. We plan to continue the human case control study with LAC in cooperation with health agencies and to expand it to

include non-human mosquito hosts (chipmunks and squirrels) and their role in the maintenance and spread of the virus. We also plan to evaluate paired communities that have a) low and b) high evidence of HME for population levels of LST and proportion of ticks infected with *E. chaffeensis* (in cooperation with the Vanderbilt University School of Medicine) and to determine the effect of LST control on human seroprevalence of HME in Cumberland Co. Additional plans include developing a surveillance program for arboviruses including LAC and West Nile virus and collaborating with private industry to commercialize the ivermectin - treated corn for tick control.

**Funding Sources:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Mechanisms of Agouti - Induced Obesity

**Description:**

Of interest to the general public, major health organizations, nutritionists, pharmaceutical industry; our studies will provide information on the importance of genes known in rodents to cause obesity in human obesity and associated disorders.

Researchers at the University of Tennessee studied the effects of a gene, agouti, known to cause obesity in rodents in human fat cell metabolism and investigated the interaction between this gene and nutrients to promote fat accumulation.

**Impact:**

The obesity gene agouti increases fat accumulation in human and mouse fat cells by increasing intracellular calcium. In the presence of carbohydrates, this gene promotes conversion of carbohydrates into fat. This demonstrates the importance of diet - gene interaction in health and disease.

**Funding Sources:**

Smith-Lever and State (Describe: Tennessee Agricultural Experiment Station)

**Scope:**

State Specific

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**Title:**

Angiotensin II: Signaling and Regulation of adipocyte metabolism and gene expression

**Description:**

Of interest to the general public, major health organizations, nutritionists, pharmaceutical industry, the objective of this study is to understand the role of fat cells in the development of obesity -related hypertension and determine the role of the fat cell-derived hypertensive hormone Angiotensin II in these disorders.

Researchers at the University of Tennessee demonstrated that fat cells secrete the hypertensive hormone angiotensin II and that this hormone increases fat synthesis and accumulation in both rodents and humans. Specific cellular mechanism involved are under investigation.

**Impact:**

Identification of factors secreted by fat cells and understanding of their function in health and disease is key to both pharmacological and dietary interventions.

**Funding Sources:**

Other (Describe: American Heart Association, National Center)

**Scope:**

State Specific

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**Title:**

Nutritional Regulation of the Human Fatty Acid Synthase Gene

**Description:**

Of interest to the general population, major health and public organizations, nutritionists, Food and plant biotechnologists, our studies will provide information on the role of dietary carbohydrates and fatty acids in the development of obesity and associated disorders.

Researchers at the University of Tennessee studied the effects of dietary carbohydrates and fatty acids on the conversion of carbohydrates into fat and on the function of fat cells.

**Impact:**

Results from these studies will help clarify the effects of dietary fats and sugars on fat accumulation. We have clearly demonstrated that carbohydrates contribute to fat synthesis and this expansion of human fat tissue.

**Funding Sources:**

Hatch, National Research Initiative

**Scope:**

State Specific

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**Title:**

Understanding Dietary Supplements

**Description:**

Dietary supplements, including nutrients, make up a large portion of food/supplement market and economy, with claims and counter claims resulting in an agenda for regulation of this industry. A scientific database is needed so consumers and the government can make good decisions about the products.

University of Tennessee researchers have studied choline, carnitine and caffeine sold as supplements and also abundantly present in foods like soy/soy products, milk/meats, and coffee/tea, respectively. We have documented that carnitine protects against toxic effects of environmental chemicals such as alcohols, aflatoxins, and carbon tetrachloride, choline modulates carnitine effect and the combination of carnitine, choline and caffeine enhances body fat loss in animal models, which also appears to be the case in humans, based on our preliminary data.

**Impact:**

The results of this project can help the public, health professionals and government agencies to make informed decisions in regarding the use of choline, carnitine and caffeine as dietary supplements and to formulate recommendations for foods rich in these compounds (milk, meat, soy and coffee), and thus impact agribusiness.

**Funding Sources:**

Hatch Act

**Scope:**

State Specific

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**Title:**

Retention of Low Bone Mineral Density in Adult Women Who Had an Adolescent Pregnancy

**Description:**

There is a general consensus that the best time to prevent osteoporosis in later life is to optimize peak bone density prior to growth cessation, which occurs sometime in the third decade of life. In an earlier study (TN AES 006), we found that bone mineral density (BMD), as assessed by dual energy x-ray absorptiometry (DEXA), was significantly lower ( $p \leq 0.05$ ) in 16-19 year-old girls who had an adolescent pregnancy compared to their never pregnant peers. DEXA assessments were done 6-24 months postpartum/post lactation when, in adult women, bone recovery would be complete.

In the current study we are again comparing bone density in the two groups, now ages 22 to 25 years. This study will identify dietary and environmental factors related to enhancement of bone density in the years following an adolescent pregnancy. Possible factors believed to enhance BMD include exercise patterns and dietary intake of calcium and other minerals needed for bone formation; negative factors include repeated pregnancies, sedentary lifestyles, smoking, and nutritionally inadequate diets.

**Impact:**

Obesity is an increasing problem in the United States and other developed countries and may be a special problem following pregnancy. DEXA also provides assessment of body fat. We will specifically investigate the negative relationship between dietary calcium and body fat, which we have reported in young children, and which also has been reported in animal studies at UT by other investigators.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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## **GOAL 4: Greater harmony between agriculture and the environment.**

### **Overview**

Major program/research areas included under Goal 4 of the Tennessee Agricultural Research and Extension System Plan of Work included: land use/soil erosion, pesticides, fire ants, water quality, waste management, forestry (including wood products) and wild life and natural resources and the environment. The following describes the projects and programs conducted by the UT Agricultural Experiment Station, the UT Agricultural Extension Service and the TSU Cooperative Extension Program in addressing these areas. More specific information related what was done and what impacts were achieved in each area is included under the Key Theme section.

#### *Land Use/Soil Erosion:*

A University of Tennessee Extension agricultural engineer developed a six -hour course for site engineers, construction contractors and heavy equipment operators on the fundamentals of erosion prevention and sediment control on construction sites. The course was presented nine times in 2001 to over 500 participants. Program evaluations showed an increase in knowledge of the participants on the program topics.

The University of Tennessee Biosystems Engineering & Environmental Science Department has been at the forefront of no-till research and education for many years. The Tennessee Agricultural Statistics Service reports that 61% of acreage of corn, soybeans, cotton, grain sorghum and wheat was planted with no-till practices in 2001, up from 56% in 2000 and from 44% in 1999. The greatest benefit from no-till is reduced erosion, which benefits all Tennessee citizens through reduced siltation of streams and lakes, and reduced expenses to maintain roadways and right-of- ways across our state. Based on estimates of erosion reduction using the RUSLE prediction model, the use of no - till and minimum tillage systems in corn, cotton, soybeans, and grain sorghum is estimated to be reducing soil erosion from Tennessee cropland by 24 million tons per year, equivalent to a one - inch thick layer of soil covering approximately 166,000 acres.

#### *Pesticides:*

Research in sprayer technology and optics produced a “smart” weed sprayer that can distinguish between plants (weeds) and bare soil, and that interfaces with a mapping system developed by the team. The field-based electronic mapping system is being used to evaluate different weed management systems in sugar cane fields in Brazil, and in cotton fields in Texas and North Carolina. Adoption of this technology will reduce the amount of herbicides used in agricultural production, increasing profits for producers and decreasing the potential for negative environmental impacts.

Extension integrated pest management (IPM) programs has expanded to include a number of new areas for use of IPM methods. In 2001, Extension IPM programs were conducted in the areas of cotton

production, wheat production on-farm grain storage, household and structural IPM, and IPM in child-serving facilities (an extension of the previous “IPM in Schools” program). A Tennessee Pest Management Information Network was also established to collect pesticide usage information from Tennessee producers to provide the U.S. Environmental Protection Agency with accurate usage data to assist in decisions that are made for labeling pesticides for use in Tennessee.

Currently, twenty-nine counties along Tennessee's southern border and more are infested with fire ants. Three biological control agents, a microsporidian and two species of phorid fly, have been released against imported fire ants in previous years. Follow-up studies to determine the viability of these organisms in Tennessee's climate were conducted in 2001. Two other studies were also conducted to determine the efficacy of economical feasibility of chemical control in fire ant mounds. The follow-up study of the protozoan pathogen, *Thelohania solenopsae*, indicated no presence of the pathogen in the treated fire ant colonies. This study will be continued. The chemical treatment studies indicated that two winter applications of bifenthrin gave the fastest and most complete control.

#### *Water Quality:*

A soil-bed bioreactor (SBBR) system has been developed and evaluated by Experiment Station researchers for its effectiveness in evaporating and degrading pesticide rinse water. The system has been laboratory tested using soil columns and successfully degraded and evaporated both herbicide and insecticide rinse solutions. A full-scale system has been designed to include a covered rinse pad coupled with a greenhouse to house the SBBR system. Plans are underway to implement the system on one of the UTIA Experiment Stations. When fully implemented within field sprayer rinse systems, the system has the potential to dramatically reduce the volume of on-farm generated pesticide rinsates. Volume reduction could be as great as 80-90 percent, depending on individual management practices.

The Extension Clean Water Priority Team continued to focus efforts in 2001 on developing and delivering educational programs that: increase Tennesseans' understanding of watersheds and water quality issues; increase farmers' understanding of practices to protect and improve water quality; increase families' understanding of ways to protect and improve water quality and the environment in and around their homes; increase understanding of water quality issues among youth, teachers and volunteers who work with youth. Team members were involved in the following educational efforts:

- d. Creating a handbook of BMPs for agriculture and forestry, a project funded by the Tennessee Department of Agriculture.
- e. Evaluating the economic and environmental impacts of the Environment Quality Incentives Program (EQIP) on three case study farms, a project funded by NRCS.
- f. Developing an educational computer game for youth, a project funded with an EPA grant.

- g. Participating with the Extension Animal Waste Management priority team to plan and conduct five workshops on proposed changes in federal concentrated animal feeding operation (CAFO) regulations.
- h. Conducting the aquatics challenge for nine regional Envirothons and the state Envirothon in addition to assisting with the comprehensive question for the state competition.
- i. Assisting to plan and conduct the first Conasauga River Alliance teacher training workshop.
- j. Participating in the Southern Region Extension Water Quality Planning Committee. Tennessee's part of the Southern Region Watershed Resource Management grant obtained through this regional effort helped support these activities:
  - a) Water quality education at the Ridley 4-H Center
  - b) The East Tennessee Agriculture and Community Expo
  - c) Water quality education at the Green Tennessee Field Day
  - d) Participation in the southern region water quality conference

*Waste Management:*

The Extension Animal Waste Management priority team, in conjunction with the Clean Water in Tennessee Priority Team, planned and conducted five workshops on proposed changes in the Federal confined animal feeding operation (CAFO) regulations. More than 550 producers participated in the workshops and learned what the proposed changes were and how they might impact their operations.

*Forestry and Wildlife:*

Forestry

Extension and Experiment Station forestry programs and projects address a number of different aspects of the forestry industry and a variety of stakeholders. Extension programs address the growing needs of urban forestry and landscape forestry, in addition to the more traditional educational needs of the commercial forestry industry and the private landowner.

Urban forestry is being introduced to the Extension Master Gardener program to help volunteer Extension master gardeners be equipped to address questions related to trees in the urban landscape. Professional arborists also received certification as Certified Arborists or Certified Tree Worker and tree care professionals received continuing education units through participation in Extension urban forestry programs in the East Tennessee region.



A three-week forestry academy short course was conducted for 24 county personnel with the Tennessee Department of Agriculture's Forestry Division. The academy provided 1,728 contact hours of instruction for the 24 participants. Post surveys indicated that the instruction and field exercises provided relevant information that broadened their forestry background, education and experience. The enhanced awareness of forestry principles and practices of Forestry Division county personnel should serve forest landowners with sound forestry information in their respective counties.

The Forest Landowner Education Extension Initiative (FLEEI) focuses on educational programs and resource demonstrations for the over 400,000 non-industrial private forest landowners who own over 80 percent or 11 million acres of forest land in Tennessee. The objective is for landowners to improve the profitability of forest ownership, improve management of the forest resource and understand the ecology of forest development and succession (forest biology). The following are sub-parts of the initiative:

- In 2001, eight new county forestry associations (CFA) were formed, doubling the total number of associations to 16. Seven hundred and fifty (750) landowners now belong to CFAs. The county associations are becoming autonomous, setting their own agendas, and seeking some assistance from the UT Extension Service for programming and communication. Many associations have become quite active, writing articles for their local newspaper, holding forestry poster contests for school children, soliciting speakers for meetings, planning their own field days, collecting dues, writing their legislators and inviting them to speak, etc.
- A state Extension Forest\* A\* Syst (FAS) program for landowners was initiated in 2001.
- A work plan was completed in 2001 to develop demonstration areas for forest practices.
- County forestry brochures were printed and distributed across the state.

A Master Tree Farmer Forest Landowner Satellite Short Course, part of a 10-state Extension educational program, was broadcast live via satellite from Clemson University to 9 locations in Tennessee in February and March, 2001. The program was a 7-night, 3 hours per night forest landowner short course. Eighty-five landowners attended the short course for a total of 1,785 contact hours.

As part of the UT Extension Service's Tennessee Master Logger Program (TMLP) in 2001, fourteen (14) 5-day workshops, consisting of 40 hours of instruction per workshop, were planned and conducted. Three hundred and sixteen (316) loggers graduated from the program in 2001 with a total of 12,600 contact hours. These loggers impact an estimated 79,000 acres of forest land, consisting of 200 million board feet of timber, with a value of \$32 million to landowners. Sixteen (16) continuing education classes of one day each were also planned and conducted with 357 participants for 2,850 contact hours. A research study was also conducted that indicated that there was a substantial

association between the implementation of best management practices and participation in logger training.

Forest Process Certification (FPC) is a process of assuring responsible and sustainable forestry by tracking forest products from the forest to the finished product. In 2001, Tennessee Extension conducted two FPC training programs for 19 professional foresters. Those who completed the program became qualified to certify forests of private landowners for FPC status. Landowners whose forestland is certified will gain access to better forest products markets and will be able to generate additional income above traditional markets.

### *Wood Products*

The forest products industry in Tennessee employs approximately 70,000 people, pays wages of over a billion dollars per year, and produces goods worth an estimated \$4.8 billion annually. The forest products industry is a major contributor to the states economy; therefore, educational programs, technical assistance, and published materials are required to assure that the hardwood industry remains competitive and successful.

Several workshops and short courses, onsite mill studies and cooperative research/extension projects were undertaken to improve the processing efficiency of hardwood sawmills. A regional project to reduce the target thickness of lumber using statistical process control and increase financial performance was continued with cooperators from the Agricultural Extension Service, the Tennessee Forest Products Center, and the USDA Forest Service's Northeastern Experiment Station. Several log grading workshops were conducted with the assistance of the Tennessee Forestry Association. These workshops introduced the concepts of log grading, optimized log bucking and value estimation to over 73 loggers.

Several onsite evaluations of drying and manufacturing operations were conducted. A basic hardwood lumber drying course teaching new drying operators quality methods for drying hardwood lumber was offered. A project to determine the effect of precision end trimming practices on kiln capacity, lumber degrade, and rough mill yields was continued. Results from this work were presented at both professional and industry meetings. Research on the effects of lumber length on part yields in gang-rip-first rough mills operations was conducted and presented at professional and industrial meetings. This research determined that gains in rough mill efficiencies could improve up to 5% by utilizing longer lengths of lumber for producing dimension parts. The information has been presented at professional and industry meetings.

The information presented at hardwood lumber drying courses led to a 25 percent increase in knowledge and impacted 12,170,000 board feet with an estimated value of \$10,262,000. Log grading and scaling training impacted over seventy-three loggers and producers with an estimated impact on over 56 million board feet per year. It is estimated that with greater knowledge of log grades and values that loggers can increase the value of their product by 2-5 percent. The regional project to reduce

target lumber thickness through reducing sawing variation has been estimated to save approximately \$250,000 at one facility.

Research studying the effects of various lumber stacking methods in drying operations determined that by using a particular stacking method, rough mill yields could be increased by 2 percent, and dry kiln capacity by 12 percent. A study to determine the impact of lumber length on rough mill yields determined that yields can be affected by as much as 5 percent by using longer-length lumber. One example of the impact of the technical assistance provided to lumber drying industry is the resulting change in air-drying practices is estimated to reduce lumber degrade by \$137,000 per year.

Forest products research at the University of Tennessee has exhibited significant application in enhancing harmony between production and the environment as well as improving the competitiveness of the forest industry. The Tennessee Quality Lumber Initiative (TQLI) includes a number of management practices which have resulted in cost savings of \$180,000 to \$210,000 per sawmill. In other research, the development of wireless microwave moisture sensors that work over a wide range of moisture contents will have immediate and widespread application in the lumber drying industry. Commercialization of these sensors will result in savings of lumber drying time and drying energy.

Research has shown that near infrared spectroscopy coupled with multi-variate statistical analysis offers the ability to assess the basic chemical, physical and mechanical properties of wood. This development provides the opportunity to select stands of trees for utilization in specific end-products, leading to much more effective and efficient use of forest trees.

To meet the needs of the secondary wood products industry a basic hardwood lumber drying course teaching new drying operators quality methods for drying hardwood lumber was offered. A project to determine the effect of precision end trimming practices on kiln capacity, lumber degrade, and rough mill yields was begun in two large cabinet manufacturers. A project in cooperation with the University of Tennessee Center of Industrial Services was undertaken to demonstrate that wood waste could be used as a soil amendment.

Information and knowledge about the production and use of wood products was passed on to the industry through workshops, on-site visits, telephone calls, email, and information packets. Onsite visits were made to 12 hardwood sawmills located in 11 counties. A hardwood lumber grading workshop was attended by 10 individuals from 4 different industrial operations and impacted over 18,000 board feet of hardwood lumber production this year. A drying short course attended by 14 individuals impacted 9 lumber drying operations that combined dry approximately 400 million board feet of lumber per year. Ten individuals attended an edging and trimming workshop that impacted the production of over 20 million board feet of hardwood lumber production each year. 137 individuals were educated on how to care for the wood around their homes through telephone consultations and the mailing of information.

## Wildlife

The Eastern subspecies of the North American elk originally ranged throughout Tennessee, however, the last elk were recorded in the State in the late 1800s. In December 2000 and February 2001, 86 elk were released in Tennessee. Tennessee researchers undertook the research involved with this release. All animals were fitted with telemetry collars and ear tags for monitoring. Researchers have evaluated the survival of the released elk and the range and habitat.

Five years of field work have been completed on a research project to study the population ecology of black bears in the Okefenokee Swamp-Osceola ecosystem. More than 100 bears have been handled and thousands of radio locations have been obtained. The bear population at Okefenokee appears stable and represents the largest concentration of *U. a. floridanus*. Our findings at Okefenokee were relied upon by the U.S. Fish and Wildlife Service in their 1998 decision not to list the subspecies as a Threatened subspecies.

Extension programs were initiated this past year addressing many issues dealing with wildlife management on private lands in Tennessee. Over 40 presentations were given at various gatherings including field days, landowner meetings, county co-op seminars, county fairs and in-service training seminars for county agents. Other forms of information dissemination included on-site visits, demonstrations, publications, newsletter and newspaper articles, television shows, as well as telephone, telefax, and e-mail communication. Primary programs in the last year concentrated on the establishment and maintenance of native warm-season grasses, quality deer management, silvicultural methods designed to improve woodlands for wildlife, wildlife food plots, habitat improvement practices designed to benefit farm-wildlife, and methods to reduce and manage wildlife damage. Over 2,000 people were given information concerning various wildlife management topics during on-site oral presentations at meetings, seminars, short courses, and demonstration sites. More than 50 landowners were given personal attention via on-site visits to discuss needs and plans concerning wildlife management, as well as assistance associated with wildlife damage. More than 10 landowner cooperatives were formed across the state in an effort to manage deer herds under quality deer management guidelines. Approximately 150 students and natural resource professionals learned how to establish and maintain food plots for wildlife from the demonstration plots. Over three thousand landowners were provided publications after requesting information on how to establish and maintain wildlife food plots on their property. Landowners interested in improving habitat for small game converted more than 5000 acres of tall fescue to native warm-season grasses.

The 4-H Wildlife and Fisheries Program was initiated in 1972 and now includes grade-level wildlife and fisheries projects, wildlife habitat judging, and the Food And Cover Establishment (FACE) project, the annual Jr. High Wildlife Conference, and wildlife instruction at 4-H camps. Delivery methods include direct instruction of youth, training of Extension agents and volunteer leaders, and distribution of publications and videos. This past year, the UT Agricultural Extension Service hosted the National 4-H Wildlife Habitat Evaluation Program. A total of 15,620 4-H youth participated in the Wildlife Judging Project. The Annual Jr. High Wildlife Conference consisted of 4 days of intensive training for 186 junior high-aged 4-H youth and 32 of their adult leaders representing 72 TN counties. This year, test

scores increased from an average of 52.3% on a pre-test given at the start of the week to 63.2% on an exam given at the end of the conference. The 4-H FACE (Food and Cover Establishment) plot contest is sponsored each year by the Tennessee Wildlife Resources Agency (TWRA). Each year, TWRA provides seed for planting the plots, personnel to assist in judging plots, and prize money for contest winners. This year, 1,845 4-Hers entered the FACE Contest, of which at least 891 members planted wildlife food plots in 88 of Tennessee's 95 counties. This program enhanced approximately 13,365 acres of small-game habitat in Tennessee. An additional 10,000 youth received instruction on basic information concerning wildlife and fish at summer camps. Teams from 24 states (964 4-Hers) participated in the National 4-H Wildlife Habitat Evaluation Program contest.

### *Natural Resources and the Environment*

Tennessee is experiencing rapid growth and environmental changes which can dramatically affect the accessibility and quality of natural resources. Natural Resources and the Environment is a Tennessee Extension 4-H Priority Program. Educational efforts included school year programs at 4-H Centers, camps and conferences, outdoor learning laboratories, judging teams, service learning projects and classroom programs. In 2000-2001, nearly 3,500 youth participated in school year environmental education programs at three Tennessee 4-H Centers. Evaluations from the environmental programs show that as a result of participation, teachers and students reduced, reused and recycled; planted trees, shrubs, flowers and gardens; enhanced wildlife habitat, incorporated educational activities into classroom curriculum; and presented community programs. More than 6500 youth in grades 4-6 participated in Junior Camp programs which featured Tennessee Heritage. The theme focused on participants developing an understanding about the importance and history of the natural environment and an appreciation for Tennessee's resources. A summer camp staff member at each of the four 4-H Centers, provided additional natural resource and wildlife activities for more than 7500 Junior and Junior High Campers. The annual week-long State Wildlife Conference was attended by 140 Junior High youth and 32 leaders.

The Wildlife Judging Contest included 4 district contests and 1 state event. Youth involved in this event included 138 4-Hers. Sevier County, the Senior High State winner also placed third in the national wildlife judging contest.

Four hundred and sixty-seven 4-Hers from 31 counties entered the FACE (Food and Cover Establishment) contest. Contestants planted a total of 325 food plots enhancing approximately 4,875 acres of small-game habitat.

More than 600 high school students and 125 coaches, many of them 4-H members or leaders, participated in the Enviro-thon, an environment evaluation contest. Participants and coaches learned about water quality issues and alternative ways to protect and improve water resources.

Senior High 4-Hers are encouraged to complete service learning projects as a requirement for All Star membership. These youth and others assisted in the development of the Cumberland Trail, and a

multitude of projects ranging from recycling to site beautification and habitat enhancement. Statewide, 12,103 youth and 399 adults donated 17,117 hours in serving 21,298 community members through 128 different environmental service projects.

A one-week workshop for K-12 teachers was held in Jackson, TN during the summer of 2001. Content of the workshop included outdoor laboratories, visits to forest industries and training in Project Learning Tree module. UT Extension and Experiment Station personnel, with the cooperation of the Tennessee Forestry Association and forest industry, provided leadership and training for the workshop. The workshop was offered to participating teachers for college credit or inservice credit. Twelve (12) teachers, representing 440 contact hours of instruction, completed the workshop. These teachers will use information gained from the workshop in their classes with an average of 200 students per year, representing 2,400 students.

The market for “environmentally certified” food and fiber products is emerging as consumers desire more environmentally friendly products. The market for certified products will be economically viable, despite potentially higher production costs, if consumers are willing to pay a premium for certified products. A survey of 1614 residents in Tennessee and Pennsylvania show that 44 percent of consumers would support environmental certification of hardwood products by paying more for them, 46 percent support certification but would not be willing to pay a higher price, and 10 percent do not support certification regardless of the costs. On average, consumers were willing to pay 11 percent more for a \$199 oak chair and 17 percent more for a \$29 oak shelving board.

#### **Allocations for Goal 4 Projects and Activities:**

##### UT 1862 Research:

- Hatch - \$620,247
- Multistate - \$343,658
- McIntire-Stennis - \$18,246
- State Outlays - \$2,262,450

##### UT 1862 Extension:

- Smith-Lever b and c - \$833,837
- Smith-Lever d - \$246,717
- State and County Allocations - \$3,906,108

##### TSU 1890 Extension:

- Smith-Lever b and c - \$130,000
- County Allocations - \$25,000

#### **FTE's for Goal 4:**

UT 1862 Research - 12.7

UT 1862 Extension - 45.5

TSU 1890 Extension - 2.0

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**KEY THEME - LAND USE/SOIL EROSION**

**Title:**

Tennessee Fundamentals of Erosion Prevention and Sediment Control on Construction Sites

**Description:**

The majority of the Tennessee streams listed on the 303-D report are impaired due to sedimentation. Sedimentation is the result of upland soil being eroded and transported into aquatic systems. Soils that have been disturbed by agricultural practices or construction activities are highly susceptible to erosion. Streams impaired by silt lose their biological diversity and are more prone to localized flooding.

It is recognized that Soil and Water Conservation Engineers have tremendous expertise in erosion control. This expertise has been developed through many years of researching solutions to soil erosion in agricultural production fields. The technology that has been developed for agriculture can also be employed for soil erosion control on construction sites. A six-hour course has been developed to explain the fundamentals of erosion prevention and sediment control on construction sites. This course consists of a series of electronic presentations that explain why erosion and sedimentation is a problem, the soil erosion process, the sediment transport process, structural best management practices to maximize the capture of sediment, and vegetative practices to minimize soil erosion.

**Impact:**

During 2001, this course was delivered nine times at five locations across the State of Tennessee. Greater than 500 site engineers, construction contractors, and heavy equipment operators have attended this course. Evaluations of this course indicated that the participants gained a better understanding of erosion and sedimentation processes. This attainment of fundamental knowledge will lead to improved placement and maintenance of erosion and sediment control practices, and will further lead to the reduction of non-point source pollution from construction sites.

**Funding Source:**

Smith-Lever and State

**Scope:**

State specific

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**Title:**

Improving Soil Erosion Prediction

**Description:**

Soil erosion is a major threat to both soil and water resources, as the removal of soil particles damages the soil’s productivity and diminishes the quality of the water bodies where that sediment may be deposited. We know how to stop erosion by limiting tillage or by implementing other best management practices. That knowledge is of little use unless we can help the agricultural producer, logger, mine reclamation expert, or other conservationist compare alternatives to get the best conservation information at the least cost. The best tool for carrying out these comparisons has proven to be a computer-based erosion prediction model. The RUSLE erosion prediction model is an improvement on the Universal Soil Loss Equation (USLE), which has been used for such estimates for almost 40 years. RUSLE brings soil erosion prediction technology up -to-date. Although versions of RUSLE have been in use for conservation planning by the USDA -NRCS since 1991, RUSLE technology itself must be brought up-to-date through better, friendlier programming with broader applications.

Work on RUSLE has continued under a Cooperative Agreement between USDA-ARS, the University of Tennessee, and USDA -NRCS. Substantial improvements have been made to the RUSLE erosion science, both to increase its applicability to a wider variety of settings, and to provide answers more useful in estimating water quality impacts of the eroded science. In addition, work has continued on the computer interface for the RUSLE program, yielding a Windows© -based interface that can easily be modified for various users and uses. This new program, dubbed RUSLE2, has just undergone major testing by USDA-NRCS and is being implemented nationwide by NRCS with a target completion date of Dec. 2002. At this point, the program will also be made available to the general public.

**Impact:**

Older versions of RUSLE are currently in use in over 2500 field offices of the USDA -NRCS for conservation planning. In addition, almost 1200 copies of the program have been delivered by USDI-Office of Surface Mining to mine reclamation and construction site experts over the past three years. RUSLE is taught in many soil and water conservation curricula across the country, and is often used as the benchmark in scientific studies seeking to improve erosion prediction. The new version of RUSLE is so much easier to use and provides so many more answers that it is expected to quickly assume the place of earlier versions, as well as expanding the ability to do erosion calculations to many new users.

**Funding Sources:**

Hatch, USDA-ARS Cooperative Agreement, USDA-NRCS Cooperative Agreement, USDI-Office of Surface Mining, Soil and Water Conservation Society, U.S. Army Corps of Engineers

**Scope:**

State Specific

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## **KEY THEME - WATER QUALITY**

### **Title:**

Clean Water in Tennessee Priority Program

### **Description:**

Water quality is a leading concern throughout Tennessee documented by focus groups held in every county and other citizen surveys.

Water quality is a state priority program. An inter-disciplinary team of specialists, program leaders and county agents has been formed to give leadership to educational programming in collaboration with the animal waste management (AMW) priority. Educational activities and programs include:

- d. Creating a handbook of BMPs for agriculture and forestry, a project funded by the Tennessee Department of Agriculture.
- e. Evaluating the economic and environmental impacts of the Environment Quality Incentives Program (EQIP) on three case study farms, a project funded by NRCS.
- f. Developing an educational computer game for youth, a project funded with an EPA grant.
- g. Participating with the AWM priority team to plan and conduct five workshops on proposed changes in federal concentrated animal feeding operation (CAFO) regulations.
- h. Conducting the aquatics challenge for nine regional Envirothons and the state Envirothon in addition to assisting with the comprehensive question for the state competition.
- i. Assisting to plan and conduct the first Conasauga River Alliance teacher training workshop.
- j. Participating in the Southern Region Extension Water Quality Planning Committee. Tennessee's part of the Southern Region Watershed Resource Management grant obtained through this regional effort helped support these activities:
  - a) Water quality education at the Ridley 4-H Center
  - b) The East Tennessee Agriculture and Community Expo
  - c) Water quality education at the Green Tennessee Field Day
  - d) Participation in the southern region water quality conference

- h. More than \$250,000 in outside funds were obtained by the priority team for investment in these programs.

**Impact:**

The impacts of these educational activities and programs include:

- 1) Twenty thousand copies of the BMP handbook, “Conservation Practices for the Farms and Forests of Tennessee”, have been distributed. If each one is read by only three people on average, 60,000 Tennesseans will increase their knowledge and understanding of practical ways to protect and improve water quality.
- 2) The EQIP case farm study developed economic and environmental impact estimates on three representative Tennessee farms. Fifteen thousand copies of the study are being distributed to Tennessee farmers through NRCS offices.
- 3) The computer game, Home Hazards Hunt©, is targeted to 4th - 6th graders. In 2000, about 124,000 4th - 6th graders were registered in the Tennessee 4-H program. If 50% use the game, 62,000 Tennessee youth will learn practical ways to protect and improve water quality and the environment in and around their homes.
- 4) More than 550 members of Tennessee’s agriculture community learned about the proposed changes in CAFO regulations and how they could be effectively involved in these policy decisions as a result of their participation in the workshops. Several thousand more were made aware of the issue through newspaper and magazine articles and other media.
- 5) Over 600 high school students and their teacher-coaches learned about water quality issues and alternative ways to protect and improve water resources through their participation in the Envirothon program.
- 6) Eighty-five Tennessee and Georgia teachers increased their knowledge and abilities to teach about natural resource issues and stewardship through the two day Conasauga Alliance workshop. Each teacher received a Home Hazards Hunt© CD and a set of teaching modules plus hands-on training during the workshop. With an average class size of 25 students, 2,125 youth will increase their knowledge of ways to protect and improve water quality and to be better environmental stewards as a result.
- 7) As a result of the grant funds available through the regional project:
  - a) A total of 1,655 adults and students learned about water resources, wetlands and water quality through hands-on education at the Ridley 4-H Center. In written evaluations, 61% said they learned more about water quality and 55% said they know more about wetlands. Planned changes in behavior they reported included using water wisely and protecting water quality.

b) More than 500 farmers and their families as well as civic leaders participated in the East Tennessee Expo. They participated in farm tours that featured ways to protect and improve water quality in poultry, vegetable and dairy enterprises and in farm forest management. Approximately 60 people also took part in an urban -suburban water quality seminar also.

c) The 2001 Tennessee Green Industry Field Day held at the Tennessee State University Nursery Crop Research Station stressed water quality and wise water management. Over 650 people and 72 exhibiting companies increased their awareness and knowledge of these issues through their participation.

d) Fourteen agents and specialists attended the Southern Region Extension Water Quality Conference to increase their knowledge, skills and abilities to develop, deliver and evaluate water quality education. Programs in 2002 and beyond will benefit as a result.

**Funding Source:**

Smith-Lever, State and external contract and grant funds

**Scope:**

Multistate Extension - Southern Region States (AL, AR, TX, OK, LA, KY, TN, MS, GA, NC, SC, VA, FL, PR)

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**Title:**

Economics Consequences of ONRW Designation of Tennessee Waterbodies

**Description:**

Designating waterbodies as Outstanding National Resource Waters (ONRW) represents conferring Tier 3 status on water. Under the Clean Water Act, waterbodies with Tier 3 status cannot have water quality indicators degraded in any permanent or measurable way. ONRW status can potentially restricts future development and/or use of water having that designation. Because ONRW designation can potentially affect community and industrial development, the issue is of importance to policymakers. It is also of importance to communities and industries that currently use “high quality” water, and that also expect increasing use of water in the future.

As of the year 2000, Tennessee had designated seven ONRW regions in the state. From an economic perspective, the primary questions answered in this report were (1) what elements constitute the benefits of ONRW designation and how might one measure them, (2) what element constitute the costs of ONRW designation and how to measure them and (3), to conduct an empirical study of the Citico Creek/Tellico River watershed in Monroe County, Tennessee.

The project report synthesized the theoretical bases for conceptualizing and measuring benefits and costs. Empirically, the study region within was nearly all located on Forest Service land, so that little industrial development was forecast for the region. Thus, costs associated with restrictions on industry were nil. The only real costs would be on new homes locating in the region that would require higher quality septic systems. For the region, the present value of costs over 20 years would be \$480,000. Benefits were primarily in the form of increased recreation in the region. A telephone survey of 828 east Tennessee residents found that recreation expenditures in the region would increase the annual value of output by \$925,000 per year, resulting in an additional 15 full-time equivalent jobs. The present value of the economic surplus of recreation visits (with an estimated net economic value of \$21.98 per trip) would be \$33.6 million over 20 years.

**Impact:**

Research results were presented to the State Water quality Control Board, and have been featured on the TDEC website and in numerous local publications. It is anticipated that the study report will provide a blueprint for economic analysis of all future ONRW nominations. No decision on ONRW nomination for the study region has been made.

**Funding Sources:**

Hatch, Local (Describe: East Tennessee Development District)

**Scope:**

State Specific

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**Title:**

Using Genetic Fingerprints to Determine the Source of Contaminants

**Description:**

Farms are frequently blamed for contamination of water sources with a variety of pollutants, including biological agents such as *Listeria*. Data collected by the University of Tennessee show that the particular farm evaluated was not the source of these bacterial pathogens.

*Listeria monocytogenes* were isolated by researchers with the University of Tennessee Agricultural Experiment Station from dairy cattle and their environment and then subjected to a genetic fingerprinting technique called Ribotyping to determine the epidemiological relationships of *Listeria* isolated from cows and those isolated from the environment and river adjacent to the farm.

**Impact:**

Genetic fingerprinting of *Listeria* isolates from a Tennessee dairy farm and the river/lake adjacent to the farm showed that the *Listeria* in the river and the *Listeria* found on the farm were from different genetic groups. It is suspected that these disease-causing bacteria had entered the river through human sewer contamination, the near-by sewage treatment facility or from dumping of waste from pleasure craft on

the river/lake. Farms are frequently blamed for contamination of water sources but these data show that the farm evaluated was not the source of these bacterial pathogens. Genetic fingerprinting may be one method of evaluating pollution sources in the future.

**Funding Sources:**

Hatch Act, Institution Challenge Grants

**Scope:**

State Specific

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**KEY THEME - WASTE MANAGEMENT**

**Title:**

Disposable Nonwovens Incorporating Cotton And Other Natural Fibers

**Description:**

Consumers and government should be interested in the environmental benefits gained by producing nonwovens products that will degrade naturally in landfills.

Nonwovens of cotton and cellulose acetate fiber blends have been produced and shown to be biodegradable and compostable. The nonwovens fabrics have physical properties that are compatible with consumer expectations and needs.

**Impact:**

Nonwovens fabrics containing blends of cotton and cellulose acetate have been produced that have tensile strengths and comfort characteristics required as coverstock for diapers or incontinence products. The integrity of the nonwoven is produced by thermal calendaring because cellulose acetate is thermoplastic. Thermal calendaring is an efficient and environmentally friendly process. The replacement of cellulose acetate with additional thermoplastic and environmentally friendly fibers like polyactic acid or modified cellulose acetate may provide the opportunity for even more efficiently producing biodegradable and compostable products for consumer needs.

**Funding Sources:**

Hatch, Cotton Incorporated

**Scope:**

State Specific

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**KEY THEME - INTEGRATED PEST MANAGEMENT**

**Title:**

## Tennessee Cotton Integrated Plant and Pest Management (IPM)

### **Description:**

According to the University of Tennessee research, the primary limiting factors to the approximate 149,159 acres of cotton in six-county area of west Tennessee are soil fertility, insects, disease and weeds. When these economic limiting factors or pests reach an economic damaging level, they must be controlled in an efficient manner for cotton producers to maintain the highest economic return for their crop.

A six-county educational booklet and slide data have been used in the past and will be used again this year in the six-county area, addressing the topics of insects, weeds, disease, soil fertility and other related IPM materials which concern plant and pest management programs in Dyer, Obion, Lake, Lauderdale, Weakley and Gibson Counties. Weekly in-field training sessions and farm visits were used to educate producers, scouts and other private enterprise concerning the objectives of IPM programs so that yields could be maintained and/or increased in Dyer and Lauderdale Counties where county IPM programs still function. Lake, Gibson, Obion and Weakley Counties' cotton IPM programs have become privatized to the extent that most field and other types of educational correspondence is done on an as needed basis or by phone. Three (3) western district scouting schools were made available for the six-county area. Also, 2,870 western district IPM newsletters were utilized in Dyer, Lauderdale, Lake and Gibson Counties and made available to Obion and Weakley Counties to keep producers informed regarding current plant and pest management problems and how to solve them efficiently and effectively. One hundred five (105) news articles were used to show producer s the benefits of following recommended IPM practices.

### **Impact:**

The cotton IPM program offers producers an educational scouting and management service which deals with primary yield limiting factors. Producers on the program receive a weekly comprehensive report regarding these pests and a weekly letter related to pest problems which are occurring and the correct recommendation to use to control these problems. UT Extension and private monitoring programs which promote IPM principles pointed out to producers where boll weevil eradication was doing an adequate or inadequate job.

According to the latest cotton producers survey and other available information, approximately 78% of all cotton producers in the six county area are using some degree of IPM practices which has resulted in pesticide reduction of 31%. This represents a total savings of approximately \$2,374,538.90 for cotton producers in Dyer, Obion, Lake, Gibson, Lauderdale and Weakley Counties or \$19.72 per acre.

Eighteen (18) cotton producers in Dyer and Lauderdale Counties enrolled approximately 5,122 acres in the U. T. Agricultural Extension Service cotton IPM program. Results from the Dyer and Lauderdale County IPM programs pointed out that 4% of the acres on the program needed at least one treatment of insecticide for bollworm -budworm pressure and 7% of the acres needed treatment for thrip. Additionally, 1% of the acres on the programs reached threshold levels due to plant bug populations

and less than 1% of the acres received treatment due to stinkbug pressure. Soil sample results from the Dyer County IPM program showed that 57% of the fields on the program needed lime. No cotton fields monitored were in the low to medium range in phosphorus and potash. Also, IPM data from the Dyer and Lauderdale County IPM programs pointed out to producers that square retention averaged 96% from the third week of squaring until the first bloom growth stage of cotton.

One hundred seventy (170) cotton producers in Obion, Lake, Weakley and Gibson Counties enrolled approximately 40,598 acres of cotton in privately monitored types of IPM programs which have been involved in U.T. Agricultural Extension Service IPM educational programs.

**Funding Source:**

Smith-Lever (3d and 3b&c) and State

**Scope:**

State Specific

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**Title:**

Fire Ants

**Description:**

Currently, twenty-nine counties along Tennessee's southern border and more are infested with fire ants which can inflict a painful sting, build large mounds that can interfere with agricultural machinery, attack ground-nesting birds, newborn cattle and seedlings, and damage electrical power lines and other electrical equipment. Three forms of fire ants occur in Tennessee. The black imported fire ant (*Solenopsis richteri*) occurs mostly in the western part of the state, while the eastern region is occupied by black X red hybrid fire ants. The red imported fire ant (*S. invicta*) dominates the southern US, but only isolated populations of *S. invicta* occur in Tennessee. Tennessee areas under the fire ant quarantine have expanded during the last decade and now cover 7,836,527 acres. More than 1.7 million Tennesseans live in infested areas and are affected by these pests. Fire ants cause more than 1.5 million dollars in damage and control costs in Tennessee, and threaten 677.5 million dollars of farm and nursery production (28% of state total). If fire ants spread into the nursery and sod producing areas we can expect control costs of \$620,000 per year to this industry.

In Middle Tennessee, in-field nursery products like B&B are predominantly shipped during fall/winter months after trees have entered dormancy. Quarantine treatments need to remove all fire ants from stock prior to or during the shipping season. Presently, there is only one in-field treatment approved for usage by the federal fire ant quarantine program. None of the approved treatments for field B&B are economically or logistically practical.

It has been speculated that the imported fire ants' success is due to a lack of natural enemies. Although three biological control agents, a microsporidian and two species of phorid fly, have been released

against imported fire ants, none of these agents have established in Tennessee. Biocontrol efforts were halted in Tennessee due by extreme mortality that occurred this spring. Between 70 and 75% of the imported fire ant mounds in research pastures were presumably dead due to extreme temperature fluctuations encountered in March. Three media releases pertaining to the effect of cold on fire ants were made and an educational fact sheet was released in print and electronic form (The Two Step Method: Managing Fire Ants Around Homes and in Neighborhoods (SP419)).

Sites where the protozoan pathogen, *Thelohania solenopsae*, was introduced were monitored for the presence of the pathogen and ant populations. *T. solenopsae* was detected in one nest in Hamilton Co., TN in 2000, but was not detected in 2001 and no other signs of *T. solenopsae* infection have been confirmed in TN. The protozoan is established in sites in 7 other states (AR, AL, FL, GA, LA, MS, NC) and preliminary samples indicate that infections also occurred in OK and SC. Polygyne (multiple - queen) fire ant populations maintain *T. solenopsae* infections more consistently. The AL and NC infections in monogyne (single - queen) sites have not been detected continuously after initial observation. Pitfall traps, placed into the soil to collect ants and other crawling insects, and bait stations, placed in a grid pattern over the plots, will determine if fire ant populations have suffered any effects due to *T. solenopsae*, but results are not yet known.

Two studies were conducted to help identify efficacious and economical treatments potentially useful to the fire ant quarantine program. The objective of one study was to find effective surface treatments for imported fire ant during winter months in Tennessee. The study was conducted by Jason Oliver, Tennessee State University with our aid and replicated by Dr. Anne-Marie Callcott in Gulfport, MS. The second study determined the effect of fipronil 0.0143 G applied as a broadcast treatment on black imported fire ant populations.

**Impact:**

Establishment of *T. solenopsae* in several fire ant populations in the USA indicates that this pathogen can survive conditions in this county. Surveys on related projects have revealed natural *T. solenopsae* infections only in multiple-queen red imported fire ants in FL, OK, and TX. Continuous spread of this disease may help control the fire ant populations by decreasing the egg-laying capacity and colony vigor, perhaps making infected colonies more susceptible to extreme environmental conditions.

Winter applications of two rates of Talstar (bifenthrin) gave the fastest control and was the only chemical in the study to completely eliminate fire ants from the mound using individual mound treatments. Fire ant reduction attributable to broadcast fipronil applications probably never exceeded 80% reduction during the year-long test, although mortality due to spring temperature fluctuations complicated interpretation of the results. Results of these studies should have implications for fire ant management in ball and burlap nurseries.

**Funding Source:**



Smith-Lever (3d and 3b&c), State, USDA Regional (Southern) IPM Grants Program, grant from the Tennessee Nurseryman's Association, two grants from National Biocontrol Institute (NBCI) and a grant from Aventis Environmental Science.

**Scope:**

State Specific

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**Title:**

Integrated Pest Management in Child-serving Facilities

**Description:**

Pest management programs in schools need to balance the risk of unnecessary exposure to pest control products with the health risk associated with the pests. Integrated Pest Management (IPM) can help accomplish this goal. An IPM in Schools Program was initiated in the spring of 1996 as a joint venture between The University of Tennessee and The Tennessee Department of Agriculture, Division of Regulatory Services. Our IPM program has been promoted throughout the state. In 1997, results from a school system survey indicated 11.7% are using IPM. Phone calls were made in 1999 to those 10,000 or more student school systems that were classified as not using IPM to determine if their pest management practices had changed. Results of the 1999 phone survey reveal three additional school systems are trying IPM. Our latest estimates raise the percentage of school children in schools using IPM to 38%.

Our IPM in Schools Program was expanded this year to include all child-serving facilities and a new team was formed, UT YEAH (Youth, Environment and Health) to include members from Family and Consumer Science, College of Social Work and Department of Health and Safety Sciences. This year's efforts included conducting meetings for 140 stakeholders in Knoxville, Nashville, Jackson, Chattanooga, Jonesborough and Memphis to discuss improving the well-being of Tennessee's children by reducing risks associated with pests and pesticides; and to increase understanding and action among local, regional, state and federal stakeholders with a focus on schools, child care facilities and other facilities where children spend a considerable amount of time. In addition to the 173 attendees of the Tennessee Parent Teacher's Associations, at least 229 pest management professionals attending pesticide applicator training in category 7, 22 pesticide applicators attending recertification meetings, and 268 Master Gardeners and Master Gardner trainers were exposed to the concepts of school IPM.

Extension agent cross trainings of agricultural agents and family and consumer science agents were conducted in 2 (Cumberland and Western) of 4 Extension Districts. Cross training will help agents with different responsibilities network to create local teams that could support the IPM in child-serving facilities program. A logbook for IPM recordkeeping, along with model bid specifications, were distributed to 41 agents.

A demonstration project initiated at one of the UT Child Development Labs will record pesticide use under our IPM program. Data collected will be compared with pesticide-use records and complaints from previous years to determine the advantages and disadvantages of IPM versus traditional pest management programs.

**Impact:**

Impact of the new research team will be realized next year as school and other child-serving facility surveys are conducted.

**Funding Sources:** Extension Smith-Lever 3d and 3b and 3c and the following grants: US EPA Region IV Urban Initiative. \$84,000. UT SWORPS subcontract=\$8,680; UT Waste Management Research and Education Institute's policy grant. \$29,731; UT Environment and Natural Resources Research Council. \$10,000.

**Scope:**

State Specific

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**Title:**

Household and Structural IPM

**Description:**

Our urban pest management programs directed at the pest management professional (PMP), county Extension agents, Master Gardeners and the public can potentially impact every resident of this state. According to the FY2001-02 Revenue Options, the Tennessee pest management industry is estimated to represent revenues of approximately \$150 million annually. Greater than 5631 pest management technicians are certified to provide urban pest services to the 5.5 million residents of the state. Adoption of integrated pest management (IPM) in and around structures will balance the risk of unnecessary exposure to pest control products with the health risk associated with the pests, provide effective pest control and sustain the pest management industry.

A Master Gardner train-the-trainer session provided 30 Extension agents/Master Gardeners a notebook containing three powerpoint presentations on CD, a script, a handout of the presentations and other educational materials on *Managing Insect Pests In and Around the Home*. These trainers will provide educational sessions to Master Gardeners throughout the state. IPM and Home Insect Lectures were provided to 238 Master Gardeners in 4 counties. Master Gardeners in Davidson and Williamson Counties were surveyed prior to and after training to determine the practices they plan to adopt.

In addition, 229 pest management professionals were trained in IPM through 32 videotaped and interactive TV sessions for pesticide applicator training in category 7. Ants have been identified as the number one plague of the pest management professional. Thirteen formal presentations or workshops that emphasized ant and termite management, urban pest identification or IPM were provided to over

866 PMPs. Also, 3 presentations on urban IPM were presented to 75 extension agents. A new training program was developed for pest management professionals to prepare them for the Department of Agriculture's licensing examinations in wood -destroying organisms (WDO) and general rodent and pest control (GRC). Twenty-three PMPs were trained in 2001. Demonstrations in ant and termite control were conducted to explore new strategies for controlling these pests.

Pest identification is one of the key steps to managing pests. Before management decisions can be made, the pest must be properly identified. Over 225 household, structural, landscape and vegetable pests were identified in the Urban IPM lab or through the UT Agricultural Extension Service Distance Diagnostics Web Site for agents, homeowners and pest management professionals.

In addition to the educational processes listed above, IPM information was also disseminated through publications (printed and electronic), mass media (newspaper, radio and television), phone calls, e-mails, office visits and other meetings.

**Impact:** Integrated Pest Management (IPM) reduces pest populations around structures by removing their access to food, water and harborage and decreases the risk of pesticide exposure to people, pets and the environment. Results from Davidson County Master Gardener questionnaires conducted before and after training indicated that 91% understand what IPM stands for, 79% now inspect for pests regularly, 88% will seal penetrations into the structure, 97% will seal edges of doors, 91% will trim shrubs to keep them from touching the house, 91% plan to remove standing water to control container-breeding mosquitoes, 85% will trap or vacuum pests, 88% store insect-free food in pest-proof containers and find and remove pantry pest's food, and many other IPM practices will be adopted. We can assume a reduced risk of pesticide exposure to these residents and their subsequent contacts as they answer phones and disseminate information for the University of Tennessee Agricultural Extension Service.

**Funding Source:**

Smith-Lever (3d and 3b&c), State and donations

**Scope:**

State Specific

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**Title:** IPM in Wheat Production in Tennessee

**Description:**

To increase the knowledge of managing insect pests in wheat by use of recommended pesticide usage and integrated pest management (IPM) techniques to control insects for producers, agents and agribusinesses.

Ten county demonstrations, using the most up-to-date techniques of insect control, were conducted in counties. Aphid monitoring using special traps were used to alert producers the best times to use insecticides or to incorporate at planting insecticides for prevention of aphid feeding on wheat. Through the use of seed treatments producers can prevent disease transmission of wheat viruses to the plants. Diagnostic identifications were used to identify insects in wheat and relay via faster transmission of answers through the internet so producers could make timely applications for control of these pests.

**Impact:**

Producers who used these recommendations were able to save \$12 to \$15 per acre by not having to apply unnecessary pesticides for aphid control in wheat. Producers who had armyworm infestations this season were able to control the pests on a more timely basis saving losses of yields. Several producers saved an average yield of 10 bushels per acre by preventing damage to grain which would have resulted in at least 50% losses through head clipping by armyworms.

**Funding Source:**

Extension funds; chemical company grant and donated product; Southern Region IPM grant to study wheat in storage facilities.

**Scope:**

State Specific

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**Title:**

Integrating IPM Strategies in On-Farm Stored Grain

**Description:**

Industry concerns over grain quality, coupled with the growth of speciality, identity-preserved and food grade production has placed increased focus on grain quality and storage issues. Many grain producers in Tennessee and Kentucky often find that the market value of their grain is reduced because they fail to understand the ecology of the grain storage system and that grain storage management is the organized long term approach to maintaining the post-harvest quality of grain.

Biosystems engineers, entomologists, plant pathologists and agricultural economists from the Universities of Tennessee and Kentucky have established a post harvest stored grain protection program to assist producers and grain handlers in maximizing stored grain quality and profits using Integrated Pest Management (IPM) principles. A series of on-farm demonstrations in Tennessee and Kentucky were set-up to collect performance data on the effectiveness of implementing the S.L.A.M. (Sanitation, Loading, Aeration and Management) strategy for preventing grain quality losses from on-farm stored wheat, white corn and yellow corn. This information will be used in an educational effort this coming year to demonstrate the effectiveness of using the S.L.A.M. concept to maintain grain quality.

**Impact:**

Based on the data collected from the on-farm demonstrations to date, temperatures in the center of the grain mass in the demonstration bins where the S.L.A.M. concept has not been applied will remain warm enough throughout the winter months in Tennessee and Kentucky to sustain insect activity and mold growth. The information gained from the on-farm demonstrations clearly indicates the importance of implementing proper stored grain management techniques to maintain grain quality throughout the storage period. A series of multi-state meetings are planned to train extension agents, producers and grain handlers on how to prevent grain storage losses by effectively implementing the S.L.A.M. concept.

**Funding Source:**

Southern Region IPM Grant Program

**Scope:**

Multistate Extension - TN, KY

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**Title:**

Plant and Pest Management (Cotman)

**Description:**

The Cotman program has opened new avenues in the cotton growing industry in the areas of entomology and plant physiology and is proving to be extremely valuable. Cotman is a production technique used to evaluate four key growth components of the cotton plant in determining square retention (thresholds), elongation (growth regulators), termination of insecticides, and defoliation. Management decisions and applications are made based on measurements taken during the plant growth stages.

**WHAT HAS BEEN DONE:**

The Plant and Pest Management program has demonstrated a savings to growers by using the overall program of Cotman. In 2001, an Extension area plant and pest management specialist in west Tennessee accomplished the following in his educational efforts:

1. Conducted IPM educational training sessions and workshops in West Tennessee through IPM Management of Cotman for various levels I, II, III (I - beginner, II - basic, III - advanced) for growers, consultants, industry personal, scouts, and other agents.
2. Educated agents and producers of the Cotman program in the West Tennessee region through the various components - Plant growth stage, square retention, soil conditions, plant populations, variety, soil condition, irrigation, NAWF + 5 = heat units, insect termination and defoliation.
3. Established and developed a Private Plant and Pest Management Association (Consultants) to lay out and develop efficient of Plant Management (Cotman) in West Tennessee.
4. Monitored and Collected data on genetically engineered cotton varieties versus the standard conventional varieties.
5. Collected county data for education and demonstrati on information.

6. Incorporated and updated Cotman management reporting to the existing IPM scouting report forms.
7. Provided hands-on assistance to all cotton related individuals on the four major components of Cotman.
8. Combined Cotman data into the existing IPM newsletter that is sent out to all cotton related clientele on a weekly basis.

**Impact:**

The Plant and Pest Management team has demonstrated the technology resulting in producers acceptance of the Integrated Pest Management (IPM) programs. Data indicate that using components of Cotman can result in a savings of \$1,914,000. This could be reduced costs per acre, increased yields, increased quality, reduced pounds of pesticides, fewer sprays, increased returns, or other measure of impact or change. It's estimated that over 290,000 acres were involved in the 6-county west Tennessee area and that 55 percent of the producers or acres were impacted in 2001, a net savings of \$12 dollars an acre.

**Funding Source:**

Extension Funds, Local Chemical Companies and Suppliers, and Demonstration and Research Grants.

**Scope:**

State Specific

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**KEY THEME - PESTICIDE APPLICATION**

**Title:**

Improving Spraying Technology to Reduce Agricultural Chemical Usage

**Description:**

Farmers and the general public are interested in reduced usage of agricultural chemicals. Reasons include both economic and environmental concerns. New sprayer technology developed at the University of Tennessee is being used by industry to address these concerns.

Spray application technologies require the balance between reduced spray drift and satisfactory spray coverage. Researchers with the University of Tennessee Agricultural Experiment Station addressed this problem using the latest available venturi nozzle and high -speed, boom-type ground sprayer technologies that are designed for high performance (capacity) spraying. Drift-reducing venturi nozzles were investigated at different sprayer speeds and boom heights to examine the variation in spray deposits within the field. The large droplets from drift reducing nozzles generally decreased the uniform application of spray reaching the pest across the field. Ratio of over -dose to under-dose of spray reaching the plane of the field varied as high as a factor of two along the boom for some combinations of venturi nozzles and boom heights, compared to 1.2 for extended range nozzles. Sprayer speeds up to approximately 26 kmh<sup>-1</sup> did not reduce quantity or increase variation in field spray deposit across a

27.4-m boom when using venturi -type nozzles, provided spray pressures of at least 276 kPa were used. Droplet volume median diameters ( $D_{v0.5}$ ) in excess of 600 microns resulted in decreased spray coverage from approximately 20 to 14%. Overall, field-applied coefficients of variation (CV) in deposit ranged from approximately 13% to 21% for all nozzles compared to around 4% to 16% for a static spray pattern uniformity test. The static test determined an optimum nozzle height, based on minimization of CV, of 71 cm for venturi 110° fan angle nozzles, which was higher than 41 cm for the extended-range nozzle.

**Impact:**

Nationwide nozzle and sprayer manufacturers used the data to redesign spray systems and adjusted company-wide recommendations in nozzle designs and pressures, boom heights, and application speeds. Chemical companies, custom applicators, Extension engineers, and farmers across the U.S. used the data in matching spray systems with their particular crop production system and pest to be controlled. Results are applicable to the average consumer or private industry with landscape maintenance requiring the application of chemicals. The research benefited society as a whole by reducing the environmental impact of chemicals used to grow and protect food, fiber, and ornamental plants.

**Funding Sources:**

Hatch Act, Other: Research Grant Support by Sprayer and Nozzle Manufacturers

**Scope:**

State Specific

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**Title:**

Tennessee Pest Management Information Network

**ISSUE:**

Tennessee producers could lose many currently used pesticides if information concerning their usage is not made available to the Environmental Protection Agency (EPA). Without proper usage information the EPA may take steps to eliminate the usage of products needed by producers to obtain economic returns on their crops.

**What has been done:**

Tennessee has obtained funding to assist with obtaining information concerning pest management strategies used in Tennessee. Currently, Tennessee is in the process of obtaining information concerning tomato, cantaloupe and pumpkin production. This information can aid the EPA in determining pest management needs of Tennessee producers. Tennessee is also posting information concerning pesticide re-registration on its website. This information is made available to state specialists, county personnel, grower groups and individual growers. Information can be found at <http://web.utk.edu/~extepp/rnn/rnn.htm>. Tennessee has also submitted information to USDA

concerning the use of benomyl and thiophanate methyl. Benomyl is going to be discontinued and thiophanate methyl may lose some agricultural uses.

**Impact:**

Currently, the EPA has limited labeled uses for chlo rpyrifos and diazinon on many crops grown in Tennessee. These products were previously used on many crop and non-cropping sites. Reducing labeled uses of these organophosphate products will help reduce possible exposure risks to infants and/or the environment, which achieves the intentions of the 1996 Food Quality Protection Act (FQPA).

**Funding Sources:**

Smith-Lever 3 b and 3c Extension funds and NAPIAP (3d) funds

**Scope:**

State Specific

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**KEY THEME - NATURAL RESOURCES MANAGEMENT**

**Title:**

Natural Resources and the Environment

**Description:**

Natural Resources and the Environment

**Description:**

Tennessee is experiencing rapid growth and environmental changes which can dramatically affect the accessibility and quality of natural resources. It is the youth of today who will be most impacted by a change in Tennessee’s natural resources. To make informed decisions, Tennessee youth who will become the leaders of the future, must understand the interconnectedness between human and natural resources. Opportunities for exploration, education, evaluation and application must be provided.

Natural Resources and the Environment is a Tennessee 4-H Priority Program. Opportunities for youth and adults to explore their environment, examine the interconnectedness of human and natural resources, develop outdoor classrooms, apply the knowledge they have gained, improve the environment and address environmental issues have been provided. Educational efforts include school year programs at 4-H Centers, camps and conferences, outdoor learning laboratories, judging teams, service learning projects and classroom programs.

**Impact:**

Inservice training in water quality issues for youth and/or outdoor classrooms was held in 2 districts and will be offered again in the upcoming year. Results from the water quality training show that all areas of the training were rated 4.2 or above on a 5 point scale in terms of knowledge gained, quality of



presentation and content. Six agents reported using the lesson plans in classroom 4-H club meetings immediately following the training. Follow-up surveys from the outdoor classroom inservice show that 12 of 16 counties made plans to begin or continue work on outdoor classrooms in schools, parks and community centers.

In 2000-2001 nearly 3,500 youth participated in school year environmental education programs at the W. P. Ridley, Clyde York, and Clyde Austin 4-H Centers. Evaluations from the environmental programs show that as a result of participation, teachers and students reduced, reused and recycled; planted trees, shrubs, flowers and gardens; enhanced wildlife habitat, incorporated educational activities into classroom curriculum; and presented community programs.

Written evaluations from the Ridley 4-H Center show that 61% of the participants learned more about water quality and 55% learned more about wetlands. Planned changes in behavior include using water wisely and protecting water quality.

More than 6500 youth in grades 4-6 participated in Junior Camp programs which featured Tennessee Heritage. The theme focused on participants developing an understanding about the importance and history of the natural environment and an appreciation for Tennessee's resources. Evaluations show that more than 80% of the participants rated the educational project sessions and special programs as excellent or good.

A summer camp staff member at each of the four 4-H Centers, provided additional natural resource and wildlife activities for more than 7500 Junior and Junior High Campers.

The annual week long Wildlife Conference was attended by 140 Junior High youth and 32 leaders. Average test scores were 45 percent (pre-test) and 69 percent (post-test) representing an increase in knowledge of 53 percent.

The Wildlife Judging Contest included 4 district contests and 1 state event. Youth involved in this event included 138 4-Hers. Sevier County, the Senior High State winner also placed third in the national contest.

The FACE (Food and Cover Establishment) contest was entered by 467 4-Hers from 31 counties who planted 325 food plots enhancing approximately 4,875 acres of small-game habitat.

More than 600 high school students and 125 coaches, many of them 4-H members or leaders, participated in the Enviro-thon - an environment evaluation contest. These participants and coaches learned about water quality issues and alternative ways to protect and improve water resources.

Senior High 4-Hers are encouraged to complete service learning projects as a requirement for All Star membership. These youth and others assisted in the development of the Cumberland Trail, and a multitude of projects ranging from recycling to site beautification and habitat enhancement. Statewide,

12,103 youth and 399 adults donated 17,117 hours in serving 21,298 community members through 128 different environmental service projects.

**Funding Source:**

Smith-Lever, State, special grants and gifts

**Scope:**

State Specific

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**Title:** Environmental Education Program

**Description:**

The revised Tennessee Science Standards K-12 Guidelines is based on the premise that, "students learn science by doing science." The Tennessee Science Framework's Vision statement states, "Not all science learning takes place in the schools. Experiences with the natural and cultural environment greatly enhance scientific literacy." Based on these statements and input from Tennessee teachers there is a need for hands-on science education. The Environmental Education Program at the Ridley 4-H Center provides hands-on, experiential learning activities in an outdoor learning laboratory for students in grades K-8, teachers and volunteers.

During the Fall of 2000 and Spring 2001, the following hands-on educational classes were offered to students in grades K-8: Agriculture, Entomology, Forestry, Global Connections, Heritage Skills, Man & Machines, Pioneer/Outdoor Cooking, Team Building, Water/Soil, Wilderness Dangers, Wilderness Survival and Wildlife. Various learning strategies such as games involving team initiatives and conflict resolutions were used allowing participants to experience different environmental situations, enhance critical thinking skills and help them develop their own conclusions about how to approach or attempt to solve environmentally related problems. The Program's curricula addressed State Department of Education Science Curriculum Objectives. On-site and follow-up evaluations were conducted to measure impact of the program.

**Impact:**

2,831 students, teachers and volunteers participated in the Environmental Education Program. The following information was provided as a result of evaluations/surveys conducted:

67% of the participants rated the classes they attended while at the 4-H Center as excellent

80% of the adults rated their visit to the 4-H Center as excellent

75% of the students rated their visit to the 4-H Center as excellent

As a result of what you have learned at the 4-H Center, what will you do differently when you return home?

**Campers:** "read more books; start recycling; respect wildlife; tell my family about 4 -H; tell everyone what I did and learned; use water wisely; do what I was taught and learned at camp; work as a team"

**Adults:** "inform more students about recycling; continue teaching environmental awareness to my students; come back to camp; start a recycling program with my daughter; integrate learning from camp; let other kids know about 4 -H; use team building activities with classroom"

Follow-up Evaluation/Survey to teachers:

How have you incorporated the information provided by the Environmental Education Program at the Ridley 4-H Center into your classroom curriculum?

Teachers replied that they had discussed activities and ideas taught at the 4 -H Center with their students and they had continued the study of plants and animals in the classroom.

**Funding Sources:**

Smith-Lever, State

**Scope:**

State Specific

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**Title:**

Teacher Conservation Workshops

**Description:**

K- 12 teachers desire further training and hands-on, current information about forest biology, ecology and management. Participants learn by demonstration and practical exercises (field trips) how current forest conservation practices can be integrated into classroom work and student projects.

One week workshop for K- 12 teachers was held in Jackson, TN during the summer of 2001. Content of the workshop includes outdoor laboratories, visits to forest industries and training in Project Learning Tree module. UT Extension and Experiment Station personnel, with the cooperation of the Tennessee Forestry Association and forest industry, provided leadership and training for the workshop. The workshop was offered to the participating teachers for college credit or inservice credit.

**Impact:**

Twelve (12) teachers, representing 440 contact hours of instruction, completed the workshop. These teachers will use information gained from the workshop in their classes with an average of 200 students per year, representing 2,400 students. Teachers spend one week away from home during the summer to attend the workshop with the room and board on a college campus provided free of charge by the financial sponsors. Evaluations of the workshop by participants have consistently averaged between 4.8 and 4.9 on a 5.0 point scale.

**Funding Source:**

Smith-Lever, State and financial support from Tennessee Forestry Association; Memphis Lumberman’s Foundation; Appalachian Hardwood Manufacturers Assoc.; TN Sustainable Forestry Initiative

**Scope:**

State Specific

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**KEY THEME - FOREST RESOURCES MANAGEMENT**

The recently hired TSU Extension forestry Extension specialist is collaborating with several agencies, departments and individual farmers to meet the needs of forestland owners in Tennessee.

**Title:**

County Forestry Associations

**Description:**

Little recognition has been given to the importance of private forest landowners to the state of Tennessee. With 55 percent of the Tennessee’s land base covered with forests, and 79 percent of that base owned by private landowners, and the direct and total forest industrial effect on the Tennessee economy annually reaching \$17.1 billion, it is apparent that private forest landowners are a critical force in the state’s economic well-being. The impetus begins with those who own the trees. Yet traditionally, landowners have been an independent group, failing to work collectively toward common interests. This is changing. With the introduction of several environmental bills over the past years which would restrict the right for landowners to practice forestry, landowners and those employed in the forest products industry are uniting to form local County Forestry Associations.

Tennessee benefitted from the creation of an additional eight County Forestry Associations (CFA) in 2001, doubling the total to sixteen. A statewide CFA Committee has been formed (with a UT Extension forester serving as chair) which has established clear goals for expanding and sustaining CFAs. Trips to study the success of neighboring states with their associations has also occurred. Regional coordinators have been formed to track the state’s progress. A landowner database was created (held by the Tennessee Forestry Association) for use in promoting forestry educational opportunities and to inform landowners on legislative issues.

**Impact:**

Seven hundred and fifty landowners now belong to CFAs, owning nearly 200,000 acres of forestland. These landowners are being educated on responsible forest management through involvement in workshops, seminars, field days, newsletters and neighbors telling neighbors. Knowledge continues to build on knowledge. Forestry is being brought to a higher profile and its image is improving. Through the work of local CFAs and the Tennessee Forestry Association, twelve legislative bills, unfavorable to

forestry, were defeated in 2001. A coalition of supporters beyond the forestry complex is developing, including Farm Bureau, area Chambers of Commerce, Natural Resource Conservation Service and others. CFAs are now positioned very well not only for expansion, but magnified positive impact on Tennessee's natural resources and the states' citizens.

**Funding Source:**

Smith-Lever, State and Tennessee Forestry Association,

**Scope:**

State Specific

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**Title:**

Urban Forestry

**Description:**

All counties in the Smoky Mountain Extension District of Tennessee are becoming more urban as the urban areas continue to spread into areas that were once rural. The impacts of this urbanization can have adverse effects on water quality, wildlife habitats, soil resources, storm water management, and wildfire control.

Urban forestry programs were presented to Master Gardeners in Knox, Anderson, Hawkins, and Sullivan Counties covering urban forestry issues, regulations, citizen advocacy, landscape practices, and available resources. Presentations were given at the UT Grounds Management Short Course and Tennessee Urban Forestry Conference on pruning standards, lightning protection, cabling and bracing, microinjection, and certification programs. Presentations were given at Extension agents in-services in the Smoky Mountain and Central Extension Districts on maintenance standards and certifications. Certification exams were given twice for Certified Arborists and Certified Tree Workers. Senior author of publication SP 572, Transplanting Trees and authored a series of articles for local newspapers, newsletters for the Tennessee Urban Forestry Council and International Society of Arboriculture Southern Chapter. Served as co-chair of the beautification committee of the Nine Counties, One Vision effort.

**Impact:**

As a result of participating in Extension programs, professional arborists received certification as Certified Arborist and Certified Tree Worker and continuing education units resulting in improved professionalism and quality of work by tree care professionals. Master Gardeners were made aware of the field of urban forestry and its associated issues and increased their knowledge of proper urban forestry practices resulting in decreased negative impacts to the environment and increased citizen advocacy for urban forestry issues.

**Funding Sources:**

Extension

**Scope:**

State Specific

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**Title:**

Tennessee Master Logger Program (TMLP)

**Description:**

Best Management Practices (BMPs) should be implemented on logging operations to protect water quality using a non-regulatory program.

During calendar year 2001

1. 14 workshops of 5-days each, consisting of 40 hours of instruction per participant were planned and conducted
2. 16 continuing education classes of one day each were planned and conducted
3. A research project to determine the effectiveness of logger training and BMP implementation rate was also completed.

**Impact:**

The Tennessee Master Logger Program (TMLP) graduated 316 loggers (12,600 contact hours of training), impacting an estimated 79,000 acres of forest land consisting of 200 million board feet of timber harvested with a value of \$32 million to landowners. The continuing education program with 16 classes (8 hours of instruction per class) had 357 participants and 2,850 contact hours.

Results from the research study indicate that there was a substantial association between BMP implementation and logger training, i.e., those loggers who received training from the TMLP were more likely to implement BMPs during logging operations than those loggers who were not trained. Thus, the TMLP has contributed to improved implementation of BMPs by loggers in Tennessee.

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Tennessee Forestry Academy

**Description:**

Tennessee Forestry Academy

Many of the non-degree county forestry personnel with the Tennessee Department of Agriculture, Forestry Division do not have the training to answer basic forestry questions from the public.

A three-week forestry short course (96 hours) was held for 18 county personnel with the Tennessee Department of Agriculture’s Forestry Division at the UTK campus consisting of classroom training and field exercises. UT-Department of Forestry, Wildlife and Fisheries (FWF) faculty (Extension, research and teaching) provided instruction and FWF Extension personnel coordinated the course.

**Impact:**

There were a total of 1,728 contact hours of instruction for the 24 academy participants. Post surveys of participants indicated that the instruction and field exercises provided relevant information that broadened their forestry background, education and experience. The enhanced awareness of forestry principles and practices of Forestry Division county personnel should serve forest landowners with sound forestry information in their respective counties.

**Funding Source:**

Smith-Lever and State (including a contract from Tennessee Department of Agriculture Forestry Division)

**Scope:**

State Specific

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**Title:**

Master Tree Farmer 2001 Forest Landowner Satellite Short Course

**Description:**

Eighty percent, or over 11 million acres, of forest land in Tennessee is owned by non-industrial private landowners. These landowners desire research-based information on how to practice sustainable forestry and how to manage their land to meet their objectives. Considering that nearly 200,000 people own 10 or more forested acres in Tennessee, the Extension Service was seeking a forestry short course that could be broadcast statewide through distance learning techniques.

A 7-night, 3-hours per night forest landowner short course (21 hours of instruction) was broadcast live via satellite from Clemson University to 9 locations in Tennessee in February and March 2001 as part of a regional 10 state program. 85 landowners attended the short course (1,785 contact hours). County Extension personnel in Bradley, Scott, Wayne, Hickman and Humphreys Counties coordinated workshops. Regional experts presented information in the following subjects: Introduction to Forestry and Forestry Terms; Basic Forest Finance, Estate Planning, Taxation; Pine Management; Hardwood

Management; Marketing, Timber Harvesting, Timberland Security; Wildlife Management; and Forestry Services and Programs for Landowners.

**Impact:**

- A. 50% of participants had never attended an Extension program
- B. 60% of participants had never attended a forestry education program
- C. 35% of participants were absentee landowners, a previous untapped audience for natural resource Extension programs
- D. Participants owned an estimated 32,000 acres of forest land
- E. Participants were primarily college graduates, owned a home computer with internet access and would attend additional satellite short courses
- F. Satellite, distance learning technology was an effective method to conduct a statewide forestry short course. Cost was less than \$6.00 per contact hour. Participants were enthusiastic about the short course and were eager for even more information
- G. Participants were most interested in finances (investments, taxes and estate planning), marketing, hardwood and pine management and wildlife.
- H. We are in process of mailing followup surveys to short course participants to determine knowledge retention from the program and whether practices have been planned or implemented based on information gained from the short course
- I. An advanced program will be offered in 2002

**Funding Source:**

Smith-Lever, State and regional grants

**Scope:**

Multistate Extension

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**Title:**

Forest Landowner Education Extension Initiative (FLEEI)

**Description:**

FLEEI focuses on educational programs and resource demonstrations for the over 400,000 non-industrial private forest landowners who own over 80 percent or 11 million acres of forest land in Tennessee. The objective is for landowners to improve the profitability of forest ownership, improve management of the forest resource and understand the ecology of forest development and succession (forest biology).

A four-year plan of work was formulated and implemented. Mechanisms to achieve objectives include a curriculum-based program of forest and wildlife short courses for enhanced education of landowners, formation of county forestry association for landowners, demonstration of forest practices on state forests, experiment stations and forest industry lands. A series of forest practices demonstrations were



initiated at two locations in 2001, the Forest\*A\*Syst program manual was published and county forestry brochures with current county resource information were also formulated and distributed.

**Impact:**

For calendar year 2001

- 8 county landowner associations were formed
- A work plan was completed for development of demonstration areas for forest practices
- Inservice training completed on the topic of timber sale procedures.
- The Extension Forest\*A\*Syst program for landowners was initiated
- County Forestry Brochures printed and distributed

**Funding Source:**

Smith-Lever and State

**Scope:**

State Specific

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**Title:**

Wood Products

**Description:**

The forest products industry in Tennessee employs approximately 70,000 people, pays wages of over a billion dollars per year, and produces goods worth an estimated \$4.8 billion annually. The forest products industry is a major contributor to the states economy; therefore, educational programs, technical assistance, and published materials are required to assure that the hardwood industry remains competitive and successful.

The hardwood sawmill industry faces new challenges as raw material costs increase at a greater rate than the final product value, resulting in a reduced profit margin. Production costs continue to rise and more efficient machinery is becoming increasingly expensive. Hardwood sawmills need methods to increase manufacturing efficiency and product value without large capital expenditures.

Secondary forest products manufacturers are facing increased competition from foreign producers with lower labor costs and face increasing raw material costs. Therefore, they are seeking new methods to reduce raw material losses and production costs. This industry requires information and technical assistance to increase yields and efficiency in all aspects of their operation. Small gains in production for this industry usually translate in to large financial returns and increased competitiveness.

Several workshops and short courses, onsite mill studies and cooperative research/extension projects were undertaken to improve the processing efficiency of hardwood sawmills. A regional project to reduce the target thickness of lumber using statistical process control and increase financial performance

was continued with cooperators from the Agricultural Extension Service, the Tennessee Forest Products Center, and the USDA Forest Service's Northeastern Experiment Station. Several log grading workshops were conducted with the assistance of the Tennessee Forestry Association. These workshops introduced the concepts of log grading, optimized log bucking and value estimation to over 73 loggers.

Several onsite evaluations of drying and manufacturing operations were conducted. A basic hardwood lumber drying course teaching new drying operators quality methods for drying hardwood lumber was offered. A project to determine the effect of precision end trimming practices on kiln capacity, lumber degrade, and rough mill yields was continued. Results from this work were presented at both professional and industry meetings. Research on the effects of lumber length on part yields in gang-rip-first rough mills operations was conducted and presented at professional and industrial meetings. This research determined that gains in rough mill efficiencies could improve up to 5% by utilizing longer lengths of lumber for producing dimension parts. The information has been presented at professional and industry meetings.

**Impact:**

The information presented at hardwood lumber drying courses lead to a 25 percent increase in knowledge and impacted 12,170,000 board feet with an estimated value of \$10,262,000. Log grading and scaling training impacted over seventy-three loggers and producers with an estimated impact on over 56 million board feet per year. It is estimated that with greater knowledge of log grades and values that loggers can increase the value of their product by 2-5 percent. The regional project to reduce target lumber thickness through reducing sawing variation has been estimated to save approximately \$250,000 at one facility.

Research studying the effects of various lumber stacking methods in drying operations determined that by using a particular stacking method, rough mill yields could be increased by 2 percent, and dry kiln capacity by 12 percent. A study to determine the impact of lumber length on rough mill yields determined that yields can be affected by as much as 5 percent by using longer-length lumber. One example of the impact of the technical assistance provided to lumber drying industry is the resulting changed in air-drying practices is estimated to reduce lumber degrade by \$137,000 per year.

**Funding Source:**

Smith-Lever, Hatch, State, U. S. Forest Service, and grants and contracts

**Scope:**

Integrated Research and Extension

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**Title:**

Forest Product Certification

**Description:**

Forest Product Certification (FPC), a process of assuring responsible and sustainable forestry by tracking forest products from the forest to the finished product, is gaining in popularity. FPC is an international phenomenon that involves the U.S. forestry community and the general consumer. There are numerous certification programs - though certification of land and forest products is not currently a requirement. Much confusion remains among professional foresters on implementing this new program.

Two FPC training programs (under the American Tree Farm System) were conducted for professional foresters from both Tennessee and Kentucky. Participants became qualified to certify the forests of private landowners, making landowners eligible for FPC.

**Impact:**

This train-the-trainer approach directly reached 19 professional foresters, who will collectively impact 68,400 acres of forestland annually. In time, landowners whose forestland is certified, will gain access to better forest products markets, and this acreage will generate to the landowner, an additional \$5 million above traditional market prices.

**Funding Sources:**

Extension funds and funds through the Tennessee Forestry Association Tree Farm Committee.

**Scope:**

Multistate Extension - TN, KY

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**Title:**

Consumer Willingness to Pay Premium for Eco - Labeled Hardwood Forest Products

**Description:**

The market for environmentally certified food and fiber products is emerging as consumers desire more environmentally friendly products. The market for certified products will be economically viable, despite potentially higher production costs, if consumers are willing to pay a premium for certified products. This study addresses whether consumers will pay more for environmentally certified hardwood products and estimates the premium amount for a certified oak shelving board and an oak chair. The results from this study are of interest to the forest products industry and to forest policy makers.

A survey of 1,614 residents in Tennessee and Pennsylvania was conducted. Estimates of market participation, determining who would be willing to pay a premium for environmentally certified hardwood products, were obtained. Additional estimates determining the premium levels that consumers would pay for a certified oak shelving board and an oak chair were obtained. Profiles of consumers most likely to participate in the market for certified hardwood products were developed.

**Impact:**

This study provides estimates of market potential for environmentally certified hardwood products, profiles of those deemed most likely to pay a premium for certified products and the premium amounts for specific products. Results from the study show that about 44 percent of consumers would support environmental certification of hardwood products, 46 percent support certification but would not be willing to pay a higher price and 10 percent do not support certification regardless of the costs. Among all consumers, the estimates of premiums consumers were willing to pay were 11.4 percent on a \$199 oak chair and 16.8 percent on a \$28.80 oak shelving board.

The results suggest a variety of causes, such as female gender and urban area, play import roles in market participation. Also correlative to results was the participant's interest in environmental issues and consumer awareness, as demonstrated by label readership, recycling, and contribution to environmental organization. Frequent use of forests for recreation also has a positive influence on market participation. The scope of the certification, either partial (growing and harvesting only) or full (market channel) certification, does not appear to influence support, market participation or amount willing to pay in a significant or consistent way, suggesting that either consumers are primarily interested in certification at the harvest level or that further education efforts may be needed regarding the scope of certification.

**Funding Sources:**

Hatch, USDA Forest Service Wood Education and Resources Center FastTrack Grants Program

**Scope:**

State Specific

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**Title:**

How Much Wood Do Wood Processors Chuck?

**Description:**

In Tennessee, the wood and paper products industries account for nearly \$12 billion of the state's economy. Product loss in the processing of raw materials in composites manufacturing, a major component of the wood products industry, can run as high as 5 percent.

Researchers with the Tennessee Forest Products Center at the University of Tennessee are using advanced spectroscopy of wood and wood composites in efforts to reduce product loss during manufacturing. Data from near infrared spectroscopy has been used to predict the mechanical and physical properties of medium-density fiberboard through innovative, statistical analysis methods. This technology has a potential application in process monitoring sensors to measure quality control and quality assurance in composites manufacturing.

**Impact:**

The inherent variability of the raw material used by the wood products industry creates a difficult processing challenge. The ability to monitor the response of the raw material to the process is critical for minimizing product losses, which currently can be as high as 5 percent. This will improve company profitability and ultimately reduce pressure on the forest resource.

**Funding Sources:**

Hatch, Other (Describe): USDA, Forest Service

**Scope:**

State Specific

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**Title:**

TSU Cooperative Extension Program Forestry, IPM, Lawn and Landscape Care, and Youth Environmental Education Programs

**Description:**

With the increased shift of population between rural and urban or semi -urban locations, agriculture is facing more challenges to adapt environmentally friendly production practices. People moving to rural areas are complaining about the smell of farm waste, farm chemicals and other related concerns. People moving to urban areas are interested in learning about safe lawn and landscape practices, appropriate pesticide use, gardening and other environmental education concerns. Small woodland owners are interested in learning better management practices to make their small forests economically viable and beneficial.. Small and limited resource forest landowners are also interested in exploring alternative enterprises to suit their situations, such as Shiitake Mushrooms to supplement their income. Urban foresters or urban residents are interested in learning about the benefits of urban and community forestry and how to implement that program in their communities.

An agroforestry training workshop was conducted by the TSU forestry extension specialist as a *Third Tuesday Field Day* on the TSU campus. The main themes of the agroforestry training workshop were: An introduction to five major agroforestry practices, alley cropping, silvo -pasture, riparian buffers, tree farming and wind breaks; and cost effective practices used to establish alternative crops. Case studies were presented from the University of Missouri, Agroforestry Center.

Small woodland owners and farmers participated in Shiitake Mushroom workshop. This was a collaborative effort between TSU Cooperative Extension Program and Sponsored Research. The Tennessee Division of Forestry supplied 20 white oak logs for educational demonstration.

Pesticide information was provided in several agricultural educational workshops throughout the year by the TSU small farms and IPM specialists.

In Rutherford County, demonstration plots of 25 different turf grass cultivars or blends were established . Each cultivar or blend is available through local retailers and was marketed to consumers. An

additional five plots were added this fall. The plots provide clients the opportunity to see and compare different turf grass cultivars before spending money on them.

In Shelby County, special emphasis programs from plan of work with considerable depth included: livestock shows, farm tours, exhibits, school science club activities, Jr. Vets project group and service learning forestry clean-up project for a traveling Kansas 4-H group.

Shelby County 4H'ers also participated in the following activities: livestock exhibits at Norris Elementary, Vance Middle, Messick Day School; Ducks Unlimited Great Outdoors Festival, Greenwing Activities; October 4-H club program; Record book workshop at Honor Club meeting; Leadership activities at Honor Club meeting: teen leader demonstrations at livestock exhibits at Norris Elementary, Vance Middle and Messick Day School; and Career Pursuit activity at the county level. Other activities included; six Roundup participants; Resume workshop for Mid-South Fair Career Pursuit participants; Honor Club officers leading Awards Banquet Program; public speaking/poster arts contest; demonstration/photography contest; bicycle rodeo

**Impact:**

In the area of agroforestry, thirty-five people attended the workshop. The participants indicated an interest in obtaining more information on available agroforestry practices and marketing of various alternate crops. Ten forest landowners attended the *Master Tree Farmer 2001* satellite broadcast program on best management practices and forest stewardship information. Eighteen people attended the urban and community forestry satellite broadcast. Participants indicated a dramatic increase in their knowledge level about items such as ordinance development, GIS and Tree City USA Grants that can be used to assist communities.

In Shelby county, observable results of knowledge, attitude and skill changes included:

- 43 students learned to make good decisions and choices and to do the right thing
- 8 learned skills valuable in getting along with others and working as a team
- 6 learned to set goals and try to reach them
- 34 of 40 participants in seminar increased knowledge of leadership development
- 31 of 43 students could list 3 characteristics of leadership
- 24 of 24 4th grade students could define "barter"
- 48% of 4th and 5th graders at E.E. Jeter Elementary learned how to give speeches
- 36% of 4th graders at Kate Bond Elementary learned how to give speeches
- 2/3 of 6th graders at Collierville Middle School learned how to give speeches

New culturally diverse and/or disadvantaged audiences reached include:

- Participants at the Great Outdoors Festival (new)
- Home school families participating in the farm tour (new)
- Participants in Kids and the Wolf River (new)
- Participants in the Messick Day School Livestock Exhibit (new)
- Participants in the Norris Elementary livestock exhibit (new)

- Vance Middle School Science Club.

In Rutherford County, a post program survey was conducted. The survey showed the following: 100% of the participants understood the best time to plant cool season grasses; 50% of the participants understood that grass herbicides would not control broadleaf weeds; 25% of the participants know to raise the height of their mower before stress periods; and 70% of the participants surveyed reported that they will follow the University's recommendation for fertilizing their lawn.

**Funding Source:**

Tennessee State University Cooperative Extension Program, CSREES/USDA , local county governments

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**KEY THEME - WILDLIFE MANAGEMENT**

**Title:**

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**Title:**

Establishing and Managing Native Warm - season Grasses for Wildlife

**Description:**

Habitat degradation and changing land-use practices have led to a decline in quail and rabbit populations over the past several years. In particular, clean -farming practices and the establishment of tall fescue pastures have limited the amount of nesting and escape cover available to small game. Establishing native warm -season grasses (NWSG) is an excellent way to improve habitat for quail, rabbits, and other wildlife species.

Demonstration plots of four species of NWSG were established on three University of Tennessee Agricultural Experiment Stations. NWSG were planted both conventionally and with no -till methods. Plots were established with and without the use of Plateau herbicide. Data continue to be collected on these plots to determine the best planting method and the effectiveness of Plateau herbicide in establishing these grasses. Information gathered as a result of these tests was presented at six training workshops attended by a total of 205 people including landowners and natural resource professionals.

**Impact:**

Natural resource professionals with the UT Agricultural Extension Service, Natural Resources Conservation Service, and the Tennessee Wildlife Resources Agency, as well as landowners, learned the latest techniques concerning seedbed preparation, seeding, and herbicide treatments used to establish native warm -season grasses. The techniques taught can help landowners improve wildlife habitat, reduce sedimentation, and control erosion. Those who attended can impact additional landowners interested in improving habitat for wildlife.

**Funding Sources:**

Extension Smith-Lever, and BASF Chemical

**Scope:**

State Specific

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**Title:**

Looking Beneath the Surface

**Description:**

Ground-penetrating radar is being applied by researchers at the University of Tennessee for many uses in agriculture and natural resources. A new application has the potential to help law enforcement agencies, too.

A significant nonpoint source of water quality degradation is offsite movement of waterborne pollution. Our extensive research on loessial soils in West Tennessee shows that it is possible to locate and observe areas of subsurface waterborne pollutant movement using noninvasive surveying. Two-dimensional “snapshots” of subsurface images reveal dynamic patterns of subsurface pollution movement. The research tools developed helps to ensure a multi-state clean water source, which affects all users of groundwater resources in the Lower Mississippi Valley. Researchers with the University of Tennessee Agricultural Experiment Station are training undergraduate students, state agricultural officials, USDA-NRCS agents, and private service providers in high-technology subsurface surveying equipment. They are also currently advancing the ground-based surveying protocol into a more rapid airborne surveying protocol.

An additional use of the technology has also been determined. Rapid, non-invasive detection of buried human corpses is of great interest to law-enforcement agencies and recovery teams. Ground-penetrating radar (GPR) technology has supplied invaluable assistance in numerous criminal investigations. However, field personnel desire further development such that the technology is rapidly deployable, and that it provides both a simple user interface and a sophisticated target identification. To assist in the development of target identification algorithms, our efforts involve using our soil mapping expertise for the gathering of background GPR data for the various soil conditions and circumstances that often typify clandestine burials. For this study, UT forensic anthropologists established burial plots at the University of Tennessee Anthropological Research Facility (ARF) that contained cadavers lying in various configurations and depths. Each plot contained a fleshed cadaver with assorted combinations of human skeletal remains, construction material, and backfill. Biosystems engineers with the University of Tennessee Agricultural Experiment Station scanned the plots using two GPR systems. The first system is a multi-frequency synthetic-aperture unit (GPR-X) developed by the Department of Energy’s Special Technologies Laboratory (STL), Bechtel Nevada. The second system is our “state-of-the-art” commercial system (SIR-20) manufactured by Geophysical Survey Systems, Inc. (GSSI). Monthly



scans assisted in relating GPR imagery to target decomposition.

**Impact:**

Subsurface surveying technology is expanding to address a variety of society's problems, including waterborne pollution and law enforcement technology.

**Funding Sources:**

Hatch Act, National Research Initiative

**Scope:**

State Specific

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**Title:**

Quality Deer Management

**Description:**

The white-tailed deer is the most popular big game animal in Tennessee and the conterminous United States. Through restocking efforts and regulated hunting, white-tailed deer populations have rebounded from all-time lows in the early twentieth century to approximately 33 million animals today. A major reason for this success was a restriction on the doe harvest, allowing only bucks to be killed during the hunting season. This process was expedited in that the majority of deer predators (e.g., red wolves, gray wolves, mountain lions, bobcats, and black bears) had been extirpated from the majority of the whitetail's range. As deer populations became re-established, states began to allow limited antlerless hunts; however, in some regions, it was too little, too late. By the 1990s, deer populations had exceeded carrying capacity in many areas, especially in the South and Northeast. The continued restriction on doe harvest created skewed populations favoring does with few mature bucks in most places. In Tennessee, yearling bucks have comprised 70-80% of the bucks harvested annually over the last 15 years. Overpopulated deer herds with unbalanced sex ratios have created many human/deer conflicts, including forest and crop depredation, increased deer-vehicle collisions, habitat destruction (negatively affecting many wildlife species), and unnatural changes in the timing of reproduction and birth, altering behavior and reduced fawn survival.

Eight educational training seminars and workshops were given to 270 people, representing natural resource professionals, landowners, and students. These sessions concentrated on explaining deer population dynamics and the relationship of the deer herd with habitat conditions and the effect on other wildlife species. Wildlife managers and hunters were instructed how to improve the condition of the deer herd through non-traditional hunting regulations and habitat improvement. In addition, a publication was written so the information could be given to folks at meetings and mailed to them at their request. More than 1,000 publications were mailed or hand delivered.

Demonstration food plots were established to determine germination rates, deer preference, and resistance to browsing. Data collected from these plots were incorporated into two Extension publications. More than 2,000 of these publications were mailed or hand-delivered at meetings and short courses.

Quality Deer Management (QDM) programs were implemented in five areas. These programs are actively taking steps to improve the sex ratio and age structure of the herd. Additional work involves habitat improvement, either through establishing food plots and/or other habitat improvement practices, such as timber stand improvement and the use of prescribed fire in fields and woodlots.

**Impact:**

A quality deer management program, including population management and habitat management, was initiated on a 200-acre private estate in Blount County that had suffered extreme damage by deer browsing on ornamental shrubs and flowers. To date, hunters have killed 45 deer on the property and improved natural food resources for the deer herd by planting food plots, thinning forest stands, and using prescribed fire. Prior to initiation of the project, damage to ornamental plantings was in excess of \$10,000 annually; now, damage by deer is non-existent. The sex ratio of the herd has been improved from 6 does per buck to 2 does per buck, which improves reproductive fitness and timing of birth. A deer census on the area has shown the population has been reduced to the point where the available habitat is better able to support the herd. Other sites are showing similar trends.

**Funding Sources:**

Extension.Smith-Lever, Quality Deer Management Association

**Scope:**

State Specific

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**Title:**

Improving Forest Management for Wildlife

**Description:**

While forest management is normally guided by economics and is rarely concerned exclusively with wildlife, many landowners consider enhancing their forests and woodlots to accommodate wildlife as a primary objective. Most of these stands are covered by a closed canopy, which allows relatively little light into the forest floor. As a result, the herbaceous layer is sparse to non-existent. Also, due to the domination of non-mast producers, mast is often limited. To combat these problems, landowners must be taught forest management skills.

The University of Tennessee has established demonstration sites on two wildlife management areas to show techniques used in managing woodlots primarily for wildlife. In these stands, the technique of thinning and burning was used to improve habitat for a variety of wildlife species. UT graduate students

working on one site studied the effect of such treatments on vegetation composition and food availability for wildlife. Instructional seminars -- attended by more than 350 people, including natural resource professionals, landowners and students -- were given to educate those concerned with wildlife management. Information gathered from the demonstration areas was compiled and provided to those attending the seminars.

**Impact:**

The information and training provided have proven valuable to landowners. Thinning and burning has consistently increased the herbaceous cover within the stands treated. Burning alone appears to stimulate the vegetation response realized when administered after a thinning operation. As the project continues, research is being extended to consider the effects of thinning and burning on vegetation composition, food availability and habitat suitability for a variety of wildlife species.

**Funding Sources:**

Extension, Smith-Lever, BASF Chemical

**Scope:**

State Specific

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**Title:**

Balancing Backyard Wildlife

**Description:**

While many people are eager to learn ways to attract certain kinds of wildlife around their homes, they also face problems with nuisance wildlife. When landscaping areas near the home, finding a balance between provision for invited guests and prohibition for uninvited ones can be a difficult task. Because management of nuisance species and associated damage is a perennial issue, information on the subject is vital to the welfare of both homeowners and animals.

The University of Tennessee conducted seminars offering more than 90 homeowners and natural resource professionals information on ways to attract wildlife around the home while simultaneously managing nuisance wildlife species and the damage they cause. Two Extension publications covering this material were revised and more than 2,000 copies were distributed to interested persons. Two video clips concerning the management of backyard wildlife were also recorded and aired on public television.

**Impact:**

Homeowners learned valuable information, such as selecting which types of bird feeders were most effective and which seeds and other foods attracted various bird species. They were also taught how to landscape around their homes to provide wildlife with food and cover requirements such as trees,

shrubs and herbaceous plants. Those experiencing wildlife damage were given proven methods used in controlling nuisance animals and preventing future problems.

**Funding Sources:**

Extension Smith-Lever

**Scope:**

State Specific

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**Title:**

Quantitative Forest Management in Tennessee

**Description:**

Tools are being developed to facilitate quantitative and objective assessments of forest management activities on forest sustainability in Tennessee and the southern region.

Researchers at the University of Tennessee have proposed to obtain GIS data from several sources and to revise inconsistencies in data and analyses used to examine long-term trends in forest resources in Tennessee. Updated information on forest volume in previous statewide inventories will be utilized to improve projections of future forest resources.

**Impact:**

This project will allow landowners to quantitatively assess the impacts of silvicultural treatments on forest sustainability in Tennessee and the entire southern region. Specific products include: statistical validation of the southern variant of the Forest Vegetation Simulator in Tennessee; series of periodically measured growth monitoring plots to include inter- and intra-specific competition and the effects of pre- and post-crown closure treatments;

- ▶ stand-level diameter distribution prediction and stand-table projection models, including prediction equations for basal area, diameter distribution percentiles and projection equations for survival, dominant height and basal area;
- ▶ distance-independent, individual tree diameter growth functions for hardwoods and pines; and
- ▶ forest inventory and growth and yield software for desktop and handheld computers.

**Funding Sources:**

McIntire-Stennis Cooperative Forestry

**Scope:**

State Specific

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**Title:**

Reducing Agricultural Production Losses to Deer

**Description:**

Concerns about agricultural damage caused by wildlife are growing, particularly damage caused by deer. Without intervention, increased conflicts between humans and deer will continue to directly affect the sustainability of agriculture. Remote sensing has the potential to improve the efficiency and objectivity of deer management programs, thereby reducing the occurrence of such conflicts. However, objective and efficient assessment of deer damage has not been fully utilized, and until factors affecting deer damage are understood, management of deer populations and land use to alleviate conflicts between deer and agriculture cannot be successful.

The white-tailed deer (*Odocoileus virginianus*) is the leading species of wildlife associated with this damage. Our long-term goal is to reduce deer damage to agriculture across the United States. The overall objective of current work is to refine remote sensing techniques to assess deer damage and habitat use objectively and efficiently, thereby adopting an improved, integrated approach to deer management. Our central hypothesis for current research is that a combination of remote sensing tools will provide accurate assessment of deer damage and habitat use and will support the development of deer harvest policy and land use decisions.

Researchers at the University of Tennessee have completed preliminary investigations concerning the application of remote sensing technology to deer management. During winter of 2001, research teams fit ten adult does, all less than eighteen months old, with GPS-tracking collars at Chesapeake Farms in Chestertown, Maryland. By concentrating on the philopatric female population segment, they obtained movement and habitat use data representative of local deer that were responsible for crop depredation. Collars were programmed to store locations every 20 minutes for two-hour intervals at sunrise and sunset and every two hours at other times. They expect frequent, accurate locations (within a mile) during feeding will allow them to quantify deer use of agricultural fields. Collars are currently being collected during the regular hunting season. Preliminary location data for two deer has been recorded. The location fixes achieved a success rate of more than 94 percent. One collar collected 2,164 locations during the period between March 25, 2001 and June 23, 2001. A second collar stored 4,482 locations from March 25 to September 21, 2001. These locations will be compared to soybean yield estimation and geo-referenced using combines outfitted with yield monitors and GPS units. Researchers will then quantify the relationship between deer damage to soybeans and spatial variables such as size and shape of field and surrounding land use habitat types. Combined with aerial remote sensing of plant biomass, data is expected to provide state agencies with innovative tools to objectively and efficiently assess deer damage and direct management actions to agricultural system integrity and quality hunting opportunities.

**Impact:**

White-tailed deer are an important component of our natural heritage, and provide many economic benefits through hunting and wildlife watching. Unfortunately, deer overabundance has caused many new management challenges. The research conducted by UT is significant because it prescribes powerful new approaches to quantify deer damage. These tools, when used for managing herds and

making land use decisions, will reduce the economic impact of deer to America's farmers. Once accomplished, the project will allow efficient and objective measurement of deer damage. These measurements will then be used to manage deer populations and agricultural lands in a sustainable manner. The research being conducted is essential for sound deer and land management directed at sustainable and profitable farming operations.

**Funding Sources:**

Hatch Act

**Scope:**

State Specific

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**Title:**

Restoring Elk to the Northern Cumberland Plateau Area of Tennessee

**Description:**

Historically, elk (*Cervus elaphus*) ranged throughout a large part of North America. As European settlers moved westward across the United, many populations and even subspecies of elk became extirpated. Loss of habitat and unregulated hunting reduced elk numbers nationwide. The eastern elk (*C. e. Canadensis*), which ranged as far south as Louisiana, Mississippi, Alabama, and Georgia, became extinct.

Threatened by the fate of the eastern elk, western states began restoration efforts in the 1930s to reintroduce elk to unoccupied habitats. These elk were given protection, and populations thrived in the expansive habitat. Until recently, not much emphasis was placed on restoring elk to the eastern ranged they once inhabited. Since the date of extinction, the east has become more populated, with significant alterations to the landscape. However, many states have suitable habitat, large undeveloped ranges and public support for restoring native species. In eastern North America, elk restoration efforts are now being conducted in Arkansas, Kentucky, Michigan, Minnesota, Pennsylvania, Tennessee, Virginia, Wisconsin, and Ontario.

In 1999, citizens groups from the northern Cumberland Plateau region of Tennessee expressed their interest in restoring elk to the area. Tennessee Wildlife Resources Agency (TWRA) worked with these citizen stakeholders, developing a plan to restore elk to a 670,000-acre area. TWRA carefully identified the elk restoration zone as a region still suitable for elk. The restoration zone includes acreage in Campbell, Scott, Morgan, Claiborne, and Anderson counties of Tennessee. Research is critical to know how reintroduced elk will adapt to the social, biological and ecological conditions in Tennessee.

Researchers at the University of Tennessee have been establishing movements, mortality, recruitment and habitat use of reintroduced elk in the Cumberland Plateau area of east Tennessee, adding to the knowledge base of elk ecology in eastern North America.

TWRA restored 86 elk to the upper Cumberland Plateau. The elk originated from wild-trapped stock (*C. e. manitobensis*) within the enclosed area of Elk Island National Park, located about 40 miles east of Edmonton, in Alberta, Canada. All animals were fitted with telemetry collars or ear tags for monitoring after transport to Tennessee. The first release, which took place on December 19, 2000, consisted of 50 animals of various sex and age groups. A second release of animals occurred on February 28, 2001, at the same site. This second release consisted of 36 animals, primarily young animals of both sexes and young spike bulls. These were considered hard releases, where animals were captured, transported and released without a period of acclimation. All animals were tested prior to importation for diseases affecting native and domestic ungulates.

Sixteen animals have been confirmed dead since being released, including two animals that died outside of the release zone. All animals tested negative for chronic wasting disease. No communicable diseases have been identified during the necropsies. Most of the deaths appear to be attributable to malnutrition and emaciation, probably associated with translocation myopathy.

The elk generally confined their movements to within a few kilometers of the release area, and almost all movements were confined to the restoration zone. In a few instances, animals were reported or observed outside the zone for a short period of time. Animals from both releases connected to form groups.

**Impact:**

While the release of elk to the area has been successful thus far, restoration of a native species requires continual research and monitoring to ensure that we maintain healthy, productive elk populations in Tennessee while minimizing human -elk conflicts.

**Funding Sources:**

McIntire-Stennis Cooperative Forestry  
Special Research Grants  
Tennessee Wildlife Resources Agency  
Rocky Mountain Elk Foundation

**Scope:**

State Specific

## **GOAL 5: Enhanced economic opportunity and quality of life for Americans.**

### **Overview**

Major program/research areas included under Goal 5 of the Tennessee Agricultural Research and Extension System Plan of Work included: community economic development issues and quality of life issues (personal economic health, workforce preparation; parenting and child care; lifestyle choices, character education and life skills; and farm and home safety). The following describes the projects and programs conducted by the UT Agricultural Experiment Station, the UT Agricultural Extension Service and the TSU Cooperative Extension Program in addressing these areas. More specific information related what was done and what impacts were achieved in each area is included under the Key Theme section.

#### *Community Economic Development Issues:*

Both rural and urban Tennessee communities are facing significant changes in their economic and social environment. The declining economic impact of agriculture and its associated support industries on local economies have left many rural communities concerned about issues related to community well-being such as: jobs and family income, adequate work force for new and existing jobs, and stability of families. Extension specialists in community resources development (CRD) conducted needs assessment to identify communities and individuals that might benefit from educational programs. Extension agents in Dyer and Shelby counties provided educational programs to address some of these issues. An Extension CRD specialist identified several hundred, limited resource, minority farmers and landowners in 22 counties in Tennessee to provide critically needed educational information to teach rights and responsibilities of a landownership. A mailing list was developed to be used for workshops, meetings, fact sheets and newsletters. A community development conference was held to address the needs of identified communities. Over 1400 limited-resource minority farmers and landowners were identified to target educational programs and information regarding the farming, community and economic development, and rights and responsibilities of landownership. A leadership course was offered to youth in several counties to help improve leadership skills, knowledge of citizenship responsibilities, self-esteem and self-confidence.

#### *Quality of Life Issues:*

##### Personal and Economic Health

The Tennessee Department of Human Services (TDHS) continued a \$416,294 contract with The University of Tennessee's Extension Family and Consumer Sciences Department to develop curricula and training for Families First Facilitators in the areas of parenting and financial management. The Parenting and Consumer Education (PACE) team continued training of facilitators in 2001. Eight training sessions were conducted with 257 facilitators completing the training.. Forty additional hours of PACE



curriculum were developed by Extension specialists in 2001, with input from facilitators, DHS personnel, PACE clientele and selected reviewers.

### Workforce Preparation

One of the five basic competency areas identified as essential for adult success is vocational competence. Youth need a broad understanding of vocational options and of steps to act on career choices. They should understand how to prepare for their chosen career and have an understanding of the value and function of work. In 2001, over 25,000 Tennessee 4-H'ers participated in character education programming efforts, focusing on vital employee qualities: trustworthiness, respect, responsibility, fairness, caring, and good citizenship. Another 40,923 young people were involved in 4-H educational programs in workforce preparation programming which focused on the knowledge, skills, and attitudes necessary for a solid cadre of employees in the coming generation. Two summer conferences, "Learning a Living 2001" and "4-H Directions: Career Exploration Conference, Preparing Youth for the 21st Century Workplace" were conducted as intensive summer educational experiences for 80 youth in multiple counties. A week-long day camp involved 13 elementary students residing in subsidized housing projects was also conducted. A new "Ready to Work" curriculum was piloted by Extension with 800 junior high in two Central District counties. Extension agents in more than 30 Tennessee counties work with local job training programs to teach personal skills assessment, resume preparation, job search, and interviewing skills.

### Parenting and Child Care

Persons making the transition from Welfare to work face many personal obstacles to finding and maintaining a job. Among those are issues related to parenting and child care. The Tennessee Extension Parenting and Consumer Education (PACE) program is in its third year with \$416,294 in funding from the Tennessee Department of Human Services. An additional twenty hours of curriculum in Kid Smart, the parent education component of the curriculum, was developed by a team of Extension specialists. Since October 1, 2000, 103 new facilitators were trained in level 1 of the PACE curriculum and 151 facilitators were trained in level 2 of the curriculum. Of 648 Families First participants completing evaluations of the level 1 Kid Smart program, the following changes in behavior were reported:

- 440 (68%) reported trying one or more of the positive discipline techniques discussed in the classes
- average reported use for all 15 techniques was 322 (50%)
- an average of 487 (75%) reported learning a moderate amount or a great deal about the 15 topics covered in the Kid Smart curriculum.

The PACE program received the 2001 Extension Award for Outstanding Extension Program, a national award presented at the American Association of Family and Consumer Sciences (AAFCS) meeting in Providence, Rhode Island, in July of 2001.

Lack of employment opportunities, inadequate levels of education, lack of family support, the number of Food Stamp recipients (20 percent), the number of children on free and reduced lunches (74 percent), and divorce rates (14,835 divorces in Tennessee in 1998 that involved minor children) were factors considered by the coalition/advisory committee in recommending the continuance of the Extension parenting education program in Grundy County, Tennessee.

Parenting education classes were offered weekly during the past year (40 classes, average attendance of 12-15/class), as well as individualized classes (55 classes taught). Co-parenting classes for divorced parents were also offered monthly when at least five persons were enrolled for the class (five classes taught, attendance of 19). The Parenting Resource Center and the Board of Education Family Resource Center merged into one facility, thus expanding educational opportunities to the families in the area. Cooperative networking and program planning by the staff has enabled additional classes to be taught and larger numbers of clientele have been reached. The center continues to provide a variety of resources that may be checked out for assistance in all areas of family and consumer sciences. Follow-up evaluation of co-parenting classes revealed that 77 per cent of the parents felt that the class increased their understanding of why it is important for parents to work cooperatively with each other; 86 percent planned to make a stronger effort to work with the ex-spouse for the child's sake; 90 percent felt the class was worthwhile and helped them to understand how children are affected by divorce.

The Tennessee state legislature recently passed a law requiring all newly hired child care teachers across the state to receive a two-hour pre-service training within their first 30 days of employment. Similarly, the new law requires all directors of child care centers to receive a four-hour pre-service training before their actual start date. Thus, there was a need by the Department of Human Services to contract with an agency that could provide this training state-wide. The University of Tennessee Agricultural Extension Service was chosen to provide the training..

In 2001, 66 of Tennessee's 95 counties provided First Steps child care training on a monthly basis for child care teachers and, eight counties provided the four-hour director training on a monthly basis. A curriculum was developed by a state specialist for both the teacher and director training and distributed to the counties. Approximately 14,000 teachers and 1,200 directors were trained during the year. Program evaluations indicated that the participants demonstrated a significant knowledge gain as a result of the programs.

#### Lifestyle Choices, Character Education and Life Skills

Tennessee teens rank higher than many national averages in at-risk behaviors. Tennessee's teen violent death rate in 1997 was nearly 35 percent higher than the national average. The teen birth rate is higher than the national average (32 percent) at 39 percent per 1,000 females ages 15-17. Teen dropout rates are high in Tennessee at 13 percent compared to the national average of 9 percent. 69 percent of the sample group reported using alcohol at some point in their lives. The drugs that followed behind alcohol were cigarettes, with 63 percent reporting use; any illegal drug, at 43 percent; and marijuana, at 38 percent over a lifetime (State of the Child, 2000). Teens participating in these behaviors risk taxing the already overburdened state budget if programs are not in place to prevent costly life style choices. 4-H

is teaching many of Tennessee's youth to make the right choices in childhood and adolescence. In fact, 4-H reaches almost one in five young people ages 9-19 in Tennessee. Research shows that young people involved in 4-H do perceive themselves to be better leaders than those who are not (Boyd, Herring, Briers, Journal of Extension, 1992). 4-H teaches many aspects of leadership including communication, public speaking, teaching others, learning about self and community, decision making and technology. Some of the Tennessee 4-H programs and activities that taught these skills at the county, district or state levels in 2001 were:

- Public Speaking
- Educational Demonstrations
- Honor Club
- County Leadership Academies
- Officer Training
- Judging Teams
- Character Counts
- Volunteer Leader Training
- Technology Training

In 2001, the Tennessee Extension 4-H Program received a grant from the Tennessee Commission on National and Community Service to develop a program to encourage youth to participate in service learning opportunities. As a result of this grant, the Seeds of Service (S.O.S.) Program was developed and unveiled in 2001. Service learning, coordinated through the 4-H Seeds of Service program, became a major focus of 4-H programming across the state. Designed as a resource for youth and adults, 4-H S.O.S. provides education and resources that enable youth to develop life skills and a service ethic through activities on the county, district, and state level. In 2001, reports show that 64,646 4-H'ers and 4,677 adults conducted more than 1,160 service learning projects. Nearly 500 youth and adults participated in service learning workshops.

### Farm Safety

Agricultural workers and their families experience higher rates of injuries and illnesses related to their employment than other occupations, and agriculture is consistently ranked by the National Safety Council as one of the three most hazardous occupations in the United States. Estimated economic impacts of farm injuries and occupational illnesses may exceed \$300,000,000 annually, or 16 percent of Tennessee's gross farm receipts of \$2.4 billion (1996 receipts as reported by National Agricultural Statistics Service). In 2001, more than 1,700 persons received information and training through Tennessee Extension farm safety programs and workshops, plus thousands more received information through displays and mass media. Collaborative youth farm safety education through the Progressive Farmer Farm Safety Day Camps has been increasingly popular in recent years. These programs target youth primarily in the 8 – 13 year old range. Four camps were held in Tennessee during 2001, reaching approximately 500 youth, plus their parents. Topics include basic tractor safety, fire safety, safety with outdoor power equipment, safety around large animals, and hearing and eye protection.

**Allocations for Goal 5 Projects and Activities:**

UT 1862 Research:

- Hatch - \$91,573
- Multistate - \$46,681
- State Outlays - \$455,501

UT 1862 Extension:

- Smith-Lever b and c - \$2,201,620
- Smith-Lever d - \$20,000
- State and County Allocations - \$9,060,891

TSU 1890 Extension:

- Smith-Lever b and c - \$245,000
- County Allocations - \$50,000

**FTE's for Goal 5:**

UT 1862 Research - 2.1

UT 1862 Extension - 225.3

TSU 1890 Extension - 5.5

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**KEY THEME - COMMUNITY DEVELOPMENT**

**Title:**

TSU Cooperative Extension Program Community and Economic Development Programming

**Description:**

Both rural and urban Tennessee communities are facing significant changes in their economic and social environment. The declining economic impact of agriculture and its associated support industries on local economies have left many rural communities concerned about issues related to community well-being such as: jobs and family income, adequate work force for new and existing jobs, and stability of families. Extension specialists in community resources development (CRD) conducted needs assessment to identify communities and individuals that might benefit from educational programs. Extension agents in Dyer and Shelby counties provided educational programs to address some of these issues.

Community Economic Development – The CRD Extension specialist identified several hundred, limited resource, minority farmers and landowners in 22 counties in Tennessee to provide critically needed educational information to teach rights and responsibilities of a landownership. A mailing list was developed to be used for workshops, meetings, fact sheets and newsletters. A community development conference was held to address the needs of identified communities.

**Impact:**

Over 1400 limited-resource minority farmers and landowners were identified to target educational programs and information regarding the farming, community and economic development, and rights and responsibilities of landownership. A leadership course was offered to youth in several counties to help improve leadership skills, knowledge of citizenship responsibilities, self esteem and self confidence.

**Funding Source:**

USDA/CSREES and Tennessee State University Cooperative Extension Program

**Scope:**

State Specific

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**Title:**

Analysis of economic impacts of and opportunities for Tennessee agri - industry development

**Description:**

Estimates of the economic impacts of agriculture and forestry in the state are important for conveying the economic importance of the industry to policy makers. Estimates are also important for projecting how an industry expansion might impact an area's economy within the state.

Estimates of the economic impacts of agriculture and forestry on the state's economy and regions within the state have been conducted. Estimates are that the economic impacts from agriculture and forestry in Tennessee total \$56 billion per year. These impacts are directly from output from agriculture and forestry, from the activity generated in sectors that supply agriculture and forestry, and for expenditures generated because of the incomes earned from these industries.

**Impact:**

These estimates have been used by the Tennessee Department of Agriculture Commissioner's office and the Tennessee Farm Bureau. The estimates are used to convey the importance of the industry to policy makers in the state.

**Funding Sources:**

Hatch Act

**Scope:**

State Specific

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**Title:**

Limited-Resource Community Development/Landownership Program

**Description:**

Two community development regional conferences were held to address the needs of identified communities.

The TSU Extension Program CRD Extension specialist also identified several hundred limited resource, minority farmers and landowners in 22 counties in Tennessee to provide critically needed educational information including the topic of the rights and responsibilities of landownership.

**Impact:**

Over 1400 limited-resource minority farmers and landowners were identified by the TSU CRD Extension specialist to target for educational information regarding farming, community and economic development issues and rights and responsibilities of landownership. Landownership fact sheets are being developed.

**Funding Source:**

Smith-Lever

**Scope:**

State Specific

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**KEY THEME - PERSONAL ECONOMIC HEALTH**

**Title:**

Extension Personal Economic Health Programming

**Description:**

Personal economic health is a major issue facing Tennesseans. The state of Tennessee currently ranks second in the nation in bankruptcy rates. This information indicates that families desperately need information and assistance in dealing with financial management. In the report, *Coming to Terms: The Problems and Possibilities of Our Community*, based on the 1993/94 Assessment of Human Needs in Chattanooga-Hamilton County, in 1990, the percentage of people in poverty in Hamilton County was the same as it was ten years earlier. The rate of poverty in the inner city is much higher than for Hamilton county as a whole, and large numbers of our children and single parents live in poverty. One of the stated goals in this report is to invest in families. It says that “the community should address the problem of disadvantage through a combination of economic development and the development of our

human resources.” The Family and Consumer Sciences Advisory Committee as well as youth and community leaders have voiced a concern for economics empowerment of the inner city families especially as they prepare for the world of work.

Several county agents conducted educational workshops in money management. In Lauderdale County, three Chapter 13 Bankruptcy training programs were conducted with 45 bankruptcy filers who were in their third year of court. An Education Edge Committee consisting of business, industry and education was formed. Job Shadowing program conducted with junior high and high school students.

Consumer education training sessions were facilitated with more than 460 Families First Facilitators through the state through the PACE Program Initiative. One newsletter was written.

The Career To Work Consortium conducted a series of (5) training sessions targeting students, business, civic, community workers. District and county financial management trainings were conducted with PACE facilitators in 23 counties in West Tenn.

In Hamilton County, the Mini - Society program was started on April 10, 2001 to teach entrepreneurial education to a sixth grade class at John P. Franklin School (21 sessions) and various grades at Eastdale Recreation Center (4 sessions). The Mini - Society is an experience based instructional system targeted primarily for teaching entrepreneurship, economics, and citizenship concepts to students ages 8 to 12. It was developed by Dr. Marilyn Kourilsky in the early 1970s and has been refined and extensively tested over a period of three decades. The knowledge and skills acquired through Mini - Society also incorporate and enhance other subject such as: language arts, math, government, law, ethics, and cooperative learning.

There were 13 youth at North Chattanooga recreation Center who participated in the “We Mean Business Program” that is designed to teach entrepreneurial concepts through a board game that provides opportunity for the participants to own and operate a business. The businesses were: computer store, gift shop lawn care, pet grooming, T-shirts, ice cream shop, and a day care center. They learned concepts such as: assets, collateral, in the red, inventory liabilities, gross/net income, profit/loss and unfortunately, bankruptcy.

**Impact:**

Lauderdale County, the following results/impacts were documented: 100 percent of participants developed a family spending plan; 85 percent set three or more personal spending goals; 10 percent certified to purchase a used car; and 100 percent could express how they felt about money.

Evaluation comments made by the director of Education Edge.. ." One of the greatest strength of the Career To Work Program is that industry and schools came together for the first time. School staff and students were exposed to the business and industry work. Through the use of Partnership grant, new career guidance materials were purchased in the elementary schools throughout the county. A Job Shadowing Program was implemented throughout the county.

Families First Facilitators with PACE said One of her participants went to work fulltime on a night shift; but she still came to PACE classes, whether or not she received a FF check. Also, she has a guest speaker from the Extension Service to come to her class to give a presentation on shaking, hitting, and spanking what to do instead. Participants were very excited to receive alternatives discipline methods.,Another, PACE facilitator trained FF participants at night who had never owned a car to become certified for the First Wheels Program.

In Hamilton county, sixteen youth enrolled in Mini -Society program at John P. Franklin School and twelve at Eastdale Center. All sixteen students worked through the program during the social studies period and ten actually set up their business on May 29. The businesses included: T-shirt/sport store, nail care, gift shops, bakery (with real baked goods), and real estate. The businesses included sole ownerships and partnerships. An evaluation tool was used at the beginning and at the end to measure the knowledge as they practiced hands on activities for setting up their business. On April 26, the evaluation showed that 15 youth would tell someone else about the program and 11 said they think they will start a business. On May 29, 8 out of 10 gave correct answers to #1: Five steps to get started in business” compared to 5 out of 16 who gave correct answers to #1 on April 26. They even understood the demand curve better on May 29th along with concepts such as: allocation, scarcity, supply and demand, profit/loss, choosing business locations, banking terms, marketing and business plan.

They practiced developing job descriptions, applying for a job, job interviews (interviewer and interviewee) and hiring. They also named their business country, decided on the type of government, designed the currency and denomination, designed and made the flag. The East dale group got as far as learning about allocation, supply and demand, naming their country and making their flag but they were having too many interruptions and it was decided to postpone their sessions until a more feasible time. This program is an excellent way to experience even more than we had to time to do for learning about owning a business in a fun way.

“We Mean Business” was a great program through a board game that led to the participants setting up mock businesses with actual items to represent their businesses (even the ice cream that had the greatest number of sales but not profit--just enjoyment). During the board games experience all 13 participants learned about paying taxes, liability insurance, rent, utilities and other cost of owning a business. On the last day, all eight of the of the business had positive comments about entrepreneurship as an alternative source of income. One youth, whose father owns a business, commented that this program helped her to understand more about the business expenses that her father has to pay.

**Funding Source:**

CSREES/USDA, Tennessee State University Cooperative Extension Program, local county governments, and Mini-Society grant from Kaufman Foundation.

**Scope:**

State Specific



## **KEY THEME - YOUTH DEVELOPMENT/4-H**

### **Title:**

4-H Citizenship – Service Learning and 4-H Seeds of Service

### **Description:**

The goal of the 4-H program is to equip youth with leadership, citizenship, and other life skills that will make them successful, contributing members of society. One method of doing this is service learning, a process whereby youth learn and develop as they participate in service that meets real community needs.

Service learning, coordinated through the 4-H Seeds of Service program, became a major focus of 4-H programming across the state. Designed as a resource for youth and adults, 4-H S.O.S. provides education and resources that enable youth to develop life skills and a service ethic through activities on the county, district, and state level. Reports show that 64,646 4-Hers and 4,677 adults conducted more than 1,160 service learning projects across the state of Tennessee in 2001.

### **Impact:**

Evaluations, reflection activities, and service activity reports show that 4-Hers developed a wide variety of skills and knowledge through their service, from teamwork and concern for others to plant identification and masonry skills. Their service learning activities benefitted more than 117,800 people and met true community needs, including the 128 projects to help the environment, 309 projects to aid the underprivileged, and 190 projects to benefit the elderly. 4-H youth and adults committed more than 98,576 hours to the community. This time, if calculated by a minimum wage of \$5.15/hour, is valued at over \$507,666.

Service learning activities at State 4-H Congress, Junior High Academic Conference, Teen Adventure Weekend, and Roundup enabled teens to expand their citizenship skills by participating in service that they could replicate in their home counties. Delegates to Congress donated over 525 books to benefit the 1400 children enrolled in Davidson County Head Start centers. At Academic Conference, junior high 4-Hers reinforced skills learned through 4-H project work as they spent 350 hours serving at 11 sites in Knox County. Campers at Teen Adventure Weekend helped “stomp” the Cumberland Trail and worked with TNCEP (Extension’s Tennessee Nutrition Consumer Education Program) staff to construct lesson plan bags to teach literacy and nutrition to preschoolers. Delegates to the State 4-H Round-Up event donated school supplies which they assembled into 150 back-to-school kits for low-income children involved in Knoxville’s Lonsdale Area Mentor Program.

Nearly 500 youth and adults participated in service learning workshops. In addition, at two in-service trainings, 25 Extension staff members from 20 counties learned about the service learning cycle and explored ways to infuse more service learning into county 4-H programming. The evaluation results showed an average knowledge increase of 1.32 on a five-point scale where 5 = highest, with “youth voice,” “reflection,” “meaningful action,” and “service learning in 4-H” as the areas of greatest increase.

Participants self-reported an average of 3.84 for “overall knowledge gained” and ranked the overall training at 4.07 on a five-point scale.

**Funding Sources:**

ExtensionSmith-Lever, Learn & Serve America grant through an agreement with the Tennessee Commission on National and Community Service

**Scope:**

State Specific

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**KEY THEME - LEADERSHIP TRAINING AND DEVELOPMENT/VOLUNTEERS**

**Title:**

4-HLeadership In Tennessee: Learning by Doing

**Description:**

As responsibilities for programs to benefit Tennessee’s youths shift from the federal to state level, the state budget is inevitably tightening. Many of these programs are vital as we strive to make Tennessee a healthy and productive place to raise children. However, Tennessee teens rank higher than many national averages in at-risk behaviors. Tennessee’s teen violent death rate in 1997 was nearly 35 percent higher than the national average. The teen birth rate is higher than the national average(32 percent) at 39 percent per 1,000 females ages 15-17. Teen dropout rates are high in Tennessee at 13 percent compared to the national average of 9 percent. 69 percent of the sample group reported using alcohol at some point in their lives. The drugs that followed behind alcohol were cigarettes, with 63 percent reporting use; any illegal drug, at 43 percent; and marijuana, at 38 percent over a lifetime (State of the Child, 2000). Consequently, teens participating in these behaviors risk taxing the already overburdened state budget if programs are not in place to prevent costly life style choices.

4-H is teaching many of Tennessee’s youth to make the right choices in childhood and adolescence. In fact, 4-H reaches almost one in five young people ages 9-19 in Tennessee. Furthermore, young people involved in 4-H do perceive themselves to be better leaders than those who are not (Boyd, Herring, Briers, JOE, 1992).

4-H teaches many aspects of leadership including communication, public speaking, teaching others, learning about self and community, decision making and technology. Some of the Tennessee 4 -H programs that teach these skills are:

- Public Speaking
- Educational Demonstrations
- Honor Club
- County Leadership Academies
- Officer Training

- Judging Teams
- Character Counts
- Volunteer Leader Training
- Technology Training

**Impact:**

In 2001:

- Over 100,000 4-H'ers participated in public speaking contests.
- Almost 18,000 youths were enrolled in the public speaking project.
- 4th- 12th grade students benefitted from over 61,500 educational programs.
- 4-H club officers conducted more than 46,000 club meetings and activities.
- 1,900 4-H teens successfully completed 4-H Leadership Training programs to enable them to serve as project, camp, and club and community leaders.
- 200 teen camp leaders conducted 600 educational project sessions.
- 1,350 4-H'ers demonstrated decision making skills on family and consumer science judging teams.
- 2,250 4-H'ers demonstrated decision making skills on livestock judging teams.
- 25,000 4-H'ers participated in character education programs.
- Almost 230,000 contacts were made in the area of strengthening leadership.
- The first Tennessee 4-H Technology Camp was conducted in the Summer of 2001 where teens reported learning how to construct a web page, and create and edit digital pictures.
- Teens learned how to use PowerPoint and Word Perfect at Learning a Life 2001 Career Camp.
- Tennessee 4-H submitted its first nominee for the National 4-H Technology Team.
- 4-H Technology teams are being formed in each district with Smoky Mountain District being the first established Tennessee Technology Team.
- The Smoky Mountain District 4-H Technology Team developed skills to teach seniors basic computer skills as a part of a joint effort with USDA 4-H technology during a 2 day workshop.

**Funding Sources:**

Extension Smith-Lever, 4-H Foundation Endowments, and other grants received by county programs

**Scope:**

State Specific

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**Title:**

Extension Volunteer Training

**Description:**

Volunteers have traditionally been used to assist in the development and delivery of extension programs. While the majority of extension volunteer usage over time has been associated with youth development

programs, specifically 4-H, there has been a growing trend toward using well-trained volunteers to deliver educational programs in a number of other extension subject matter areas. Extension Family and Community Education (FCE) members provide volunteer services in subject matter areas related to family and consumer sciences. Trained extension master gardeners commit volunteer time to provide answers to requests for home horticulture and gardening questions in county extension offices. The use of trained volunteers in these and other situations helps stretch extension resources in delivering effective educational programs. It has been determined that fresh fruits and vegetables are nutritional and can reduce and prevent disease, cancer, and diabetes. Studies have shown that people who eat fresh fruits and vegetables and exercise, in most cases, lead a healthier life.

The Shelby County program advisory committee recommended continued participation in Memphis Urban Garden Program (MUGP). As a result, the extension agent developed a MUGP marketing brochure and made TV appearances to market the Urban Garden program. Presentations were made to Memphis City Beautiful Commission to replace empty vacant city lots with community vegetable gardens. The city of Memphis provides \$41,000 annually to support the urban gardening program in Memphis. Forty-two volunteers, including a 24 member advisory committee assist in the leadership and implementation of the MUGP. Quarterly educational meetings are conducted in the areas of vegetable production and nutrition. Visits were made to City of Memphis Housing and Community Development office, which sponsors MUGP funds on a regular basis. Educational events and activities were planned to keep participants interested and trained.

TSU Extension agents in Rutherford, Lawrence, Franklin and Dyer counties provided training for several dozen volunteer Master Gardeners.

**Impact:**

The City of Memphis continued to provide funding( \$41,000) to support the Urban Garden Program. In 2000-2001, 1,350 participants were enrolled in MUGP. Fifty volunteer leaders assist with planning and implementing MUGP. Because the majority of gardeners are over 65 years of age, the Extension agent believes that eating fresh fruits and vegetables from their gardens and exercise contribute to their longevity. Seventy-five gardeners participated in a leadership development program. Fifty gardeners participated in educational meetings related to nutrition and production of fruits and vegetables. Seventy gardeners participated in the vegetable garden judging contest. Over 200 gardeners exhibited fresh fruits and vegetables in the fresh fruit and vegetable canning contest. One-half million dollars is saved by gardeners in food costs as a result of the Memphis Urban Garden Program.

The Home Horticulture Programming Team composed of TSU county extension agents and the home horticulture extension specialist offered several educational workshops throughout the state. Home Garden demonstrations were conducted in Tipton, Franklin, Shelby, Hardeman, Lawrence, and Rutherford counties. The Master Gardener training program was offered in Cheatham, Hardeman, Franklin, Dyer, Lawrence and Rutherford counties and trained 125 volunteers. These volunteers contributed 2,670 hours of volunteer time by providing educational information, materials or programs in their communities.

**Funding Source:**

USDA/CSREES, TSU Cooperative Extension Program, and City of Memphis.

**Scope:**

State Specific

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**KEY THEME - CHARACTER/ETHICS EDUCATION**

**Title:**

Lifestyles Choices Programs

**Description:**

Violence is a serious public health issue. Though violence by and against children is declining nationally, recent outbreaks of violent behaviors by teens have pushed this issue to the forefront. In 1996, 944 juveniles were arrested for violent crimes in Tennessee. Much of the youth violent behavior is associated with the use of alcohol and other drugs and with gang involvement. According to the Children’s Defense Fund, development of extracurricular and after school programs that fill the hours when juvenile violent crime peaks (3-7 p.m.) with positive activities and caring adults can limit opportunities for lawbreaking and can promote academic and personal achievement of participants. Programs that teach principles of positive lifestyle choices, character education, and development of life skills may help reduce the incidents of violent behavior. Such programs showed significant effects on the behavior of youth offered by the TSU extension specialists and county extension agents in Davidson, Crockett, Hamilton, Lauderdale, Lawrence, Henderson, Rutherford, Cheatham and Shelby counties. In Henderson County the teen pregnancy rate was 19.2 in 1998. The rate increased to 22.4% in 1999. The juvenile violent crime arrest rate was at 26% last year. Low self-esteem and a decline of the family unit were major concerns of advisory groups.

In Henderson County five parenting classes were taught to four Head Start parents to increase their knowledge of basic parenting skills. Five news articles were written to stress building character in the community. Six pillars of character (respect, responsibility, trustworthiness, fairness, citizenship, and caring) were taught in summer day camps at seven sites in the county. Eighty -two youth were involved. Thirty after-school youth learned character through hands-on activities at two housing project sites. Seventy-three mother/daughter participants were enrolled in *Girl Talk* classes and were taught to help young girls increase their self-esteem. *Talking with TJ* (a self esteem building curriculum) was taught to 3<sup>rd</sup> grade classes to increase self-esteem and fairness. A financial management class was taught to 11 low-income families to help them to increase their knowledge and skills of money management. Fifteen day-care providers participated in a Character Counts training to use in their centers.

**Impact:**

Statewide, 12,500 youth participated in various youth development activities as a result of TSU Cooperative Extension programming.

In Henderson County, an evaluation survey of 70 children who participated in character building activities showed that 27 children learned character skills and had made a commitment to themselves that they would not cheat on exams. A evaluation survey of 13 parents of youth who participated in summer day camp, showed that 13 children learned some character skills. In other counties, 850 youth, enrolled in after - school activities and summer day camps learned about character skills through hands-on activities. Seventy-three mother/daughter teams learned to respect their bodies and used better communication skills with each other. Fifteen day care providers learned methods they could use to teach character in children. Twelve participants in a youth exchange with seniors activity learned to respect each other and to be responsible for their partners.

**Funding Source:**

USDA/CSREES and TSU Cooperative Extension Program

**Scope:**

State Specific

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**KEY THEME - PARENTING AND CHILD CARE**

**Title:**

TSU Parenting and Child Care Issues

**Description:**

In 1995, Tennessee ranked 12<sup>th</sup> in the U.S. in teen birth rate and ranked 48<sup>th</sup> in collection of child support payments. Also in 1995, there were 6,520 children under the age of 18 years in foster care. In 1998, there were 10,045 confirmed cases of child abuse or neglect. Tennessee ranked 4<sup>th</sup> in the nation in divorce rate. The Annual Report of the Tennessee Judiciary, in 1998 -99 there was 36,351 divorces in the state of Tennessee. About half of those divorces involved families with children. Tennessee's divorce rate has been among the highest in the nation in the last few years. Researchers have found that children whose parents divorce are more likely than children whose parents remain married to have emotional or behavioral problems, which most seem to be related to ongoing conflict between the parents after the divorce. Also research shows that about 85% of all children who exhibit behavioral disorders in the U.S. come from fatherless homes. Improved parenting and childcare skills might help to reduce these multiple risks for Tennessee children.

According to the 2000 Census report Crockett County has a population of 13,378 and 3257 or 24.32% are children under 18. According to Kids Count 2000, 32% live in single parent families. The Chancellor for Crockett, Haywood, and Gibson Counties approved the class material and has required parents to take a parenting class before they have their final court date. Referrals are made by the lawyers, and the court.

In Henderson County, teen pregnancy statistics show that the pregnancy rate per 1000 females aged 10-17 years is at 17.3%. Henderson county has the highest number of divorces filed in the western district. Adolescent Pregnancy Initiative reported that there were 14 teen mothers at High School in December of 1999.

In Crockett County, the Co-Parenting classes were taught once per month. The participants were state mandated to attend. Classes were taught to those participants from Crockett, Gibson and Haywood counties. The purpose of this law and class was to help divorcing parents learn how to work together to reduce the trauma children experience when their parents divorce. Each class consisted of one four hour sessions. At the end of each class an evaluation tool was given. Issues discussed during co-parenting meetings were: Child Stress, Adult Stress, Grief and Divorce, Stress and Anger, Communication and Mediation, and Domestic Violence.

In Henderson County, extension coordinated six parent/child workshops that impacted 50 children and 44 parents. Parents spent eight hours in training in order to aid their child's healthy development and learn how to improve communication about sexual issues. Children spent six hours in training with parents to give them the knowledge needed to make healthy decisions about growing up. Nine co-parenting classes were taught to divorcing parents. Three talking with TJ classes were conducted for 3<sup>rd</sup> grade children to help them learn ways to get along with others. Extension coordinated Project Celebration to help youth make better choices for a Healthy Lifestyle; Visit to a Farm for local Day Care Children that included help from 15 volunteers; S.T.O.P. (Students Talking Out Problems) Committee at Lexington High School.

A series of classes for young teen mother's; Job skill classes; Tutoring class at 1 Elementary School; Home visits to help with parenting, health, nutrition and improving consumer skills; Continued After School Tutoring at the Montgomery Community Center

In Rutherford County, A class was developed to teach and train children basic first-aid, age appropriate snacks, games and toys, and the basic techniques for caring for an infant. The class was designed for children between the ages of 10 and 14. Three learning centers were set up for hands-on learning. The first center talked about first-aid and also included home safety. The second center dealt with age appropriate snacks and developmental stages of children. The students talked about nutrition, food safety and then made several fun snacks. The last center showed students "how" to take care of an infant. A notebook was provided for each participant to help them be responsible and organized as a babysitter.

In Lauderdale County, extension developed partnership with the Department of Human Service to conduct Parenting and Consumer Education Programs. A team of Family and Consumer Science personal were assigned to this initiative. Curricula was developed. The instrument was tested with a select targeted group. Focus group meetings were conducted in each district with DHS staff, Families First Participants. Train The Trainer facilitating technique was implement with more than 460 facilitators. Follow-up training sessions (3) were conducted with more than 125 participants in the western district. County observation visits made in 22 counties.

Six parenting classes conducted with Juvenile Court ordered parents.  
Regular meetings were held with Teen Health Council. Teen Health Forum was conducted county wide.  
Nine Child Care Providers Trainings "First Step" conducted with approx. 65 child care providers.

Baby Think It Over Dolls (infant simulators) were placed in one FCS high school class and in one junior high school Health and PE class. Classes were conducted weekly during the school year.

Mass media education: 2 newsletters 750 participants; 3 handouts developed reaching 3000; 2 sets radio/TV spots listening viewing audience estimated 20,000, 2 fairs/exhibits 750 contacts; 3 newspaper articles reaching estimated 2,500 - 3,000 people.

In Crockett County, the parenting class provided parents with information that will help them support their children's adjustments to the divorce.

- \*Help parents understand how and why conflict between them creates stress for children.
- \*Encourage parents to work hard to decrease conflict.
- \*Encourage parents to cooperate with each other to reduce the amount of conflict their children see.
- \*Encourage parents to understand that children need a meaningful relationship with both parents.
- \*Parents were able to develop techniques that would stabilize the home environment.

There were 59 participants that attended the class. Of the 59 evaluations given, 69% said they would make a stronger effort to work with their ex-spouse, 27% agreed to make a strong effort, and 0.4% was unsure if they would try harder. Two of the written comments that were given "Maybe have 2 classes, 1 for newly divorcing couples, and one for longer divorced couples 5 - 10 years.

In Henderson County, evaluations of parent/child workshops showed that 35 parents out of 50 parents spent more time talking to their children about sex. 80% of the parents completing the workshop felt more comfortable talking about sex as a personal and family issue. 100% of the children completing the class indicated having learned "some" or a "lot" of new and useful information. The evaluation also revealed all of the children indicated they felt more comfortable about talking with their parents about sexuality.

Evaluations of co-parenting class revealed that 40 out of 41 parents learned techniques for effective communication with their children and former spouse. 40 parents said the workshop helped them understand how children are affected by divorce. 39 parents said they would work with their ex-spouse for children's sake.

Evaluations from "Talking with TJ" classes showed that 45 students out of 55 would not hurt feelings. 47 of the 55 said they would work together as a team. All teachers said they had seen a positive change in students since the class.

- \* Sixty-four students participated in Project Celebration and heard speakers discuss topics geared to youth.
- \* Fifty-nine day care children visited the farm and learned where our food comes from.



\* Extension coordinated activities to involve approximately 12 students in planning Teen Talks for Lexington High School. The Teen Talks were student led. Youth heard speakers discuss healthy life choices.

Nine of the 1st Steps Day Care Trainings were taught. Thirteen out of seventeen students (76%) learned that children should not play with toys that are not age appropriate. Students also learned other safety issues as well as learning developments of the young child.

Three young teen mothers in the 8th grade learned parenting skills and made a decision about waiting before having other children. Forty Tennessee Technology students in a class on job skills were shown how to dress for the job. Six students who participated in a satellite tutoring program at an elementary school were able to improve grades at least one letter grade. Approximately 15 home visits a week are made to help clients improve consumer choices, parenting skills, health and nutrition.

In Rutherford County, through the baby sitting class, 55 (3B-50W-2A-52F) students were able to handle emergencies, as well as the day-to-day necessities of caring for themselves and others. These students demonstrated a working knowledge of first-aid and infant care. Participants gained life saving skills, problem solving skills and conflict resolving skills.

In Lauderdale County, 100 percent of Families First Facilitators trained.

98 percent FF participants trained. PACE program reached a diverse audience - ranging from less than high school graduate to college master's degree. Participants learn best through hands on teaching methods. Facilitating teaching methods works best with adult audiences. Trust was established between leader and facilitator. Post -Test scores for participants attending Child Care Providers Trainings improved by 97 percent.

Comments made by Child Care Trainees: "Time Out" for children too young to understand is not effective. After attending the CC sessions, I found several ways to correct myself and better teach my class

**Funding Source:**

USDA/CSREES, Tennessee State University Cooperative Extension Program and local county governments.

**Scope:**

State Specific

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**Title:**

Parenting and Consumer Education (PACE)

**Description:**

Persons making the transition from Welfare to work face many personal obstacles to finding and maintaining a job. Among those are issues related to parenting and child care.

The Parenting and Consumer Education (PACE) program is in its third year with \$416,294 in funding from the Tennessee Department of Human Services. An additional twenty hours of curriculum in Kid Smart, the parent education component of the curriculum, was developed by a variety of Extension specialists and myself. Four two-day sessions of PACE Level 1 training and three two-day sessions of Level 2 training for PACE facilitators were conducted across the state by the training team with my assistance for most of the sessions. Follow-up training sessions were held in the spring at eight sites using ITV technology. Additional follow-up sessions at eight sites were held in the fall of 2001. Evaluations of the program were summarized and evaluation forms were revised to streamline paper work for PACE facilitators.

**Impact:**

Since October 1, 2000, 103 new facilitators were trained in level 1 of the PACE curriculum and 151 facilitators were trained in level 2 of the curriculum. The Kid Smart portion of the level 2 curriculum was rated as excellent by 109 facilitators and as good by 42 facilitators after they received training. The overall ratings of the training were 4.5 out of 5 for level 1 and 4.4 out of 5 for level 2. Of 648 Families First participants completing evaluations of the level 1 Kid Smart program, the following changes in behavior were reported:

- 440 (68%) reported trying one or more of the positive discipline techniques discussed in the classes
- average reported use for all 15 techniques was 322 (50%)
- an average of 487 (75%) reported learning a moderate amount or a great deal about the 15 topics covered in the Kid Smart curriculum.

Individual success stories from PACE participants and facilitators can be viewed by visiting the PACE web site at <http://www.utextension.utk.edu/pace/success.htm>. The PACE program received the 2001 Extension 2000 Award for Outstanding Extension Program, a national award presented at the American Association of Family and Consumer Sciences (AAFCS) meeting in Providence, Rhode Island, in July of 2001.

**Funding Source:**

Extension Smith-Lever and contract with the Tennessee Department of Human Services for \$416,294.

**Scope:**

State Specific

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**Title:**

State Strengthening Grant (Parenting Education)

**Description:**

Lack of employment opportunities in the county, inadequate levels of education, lack of family support, the number of Food Stamp recipients (20 percent), the number of children on free and reduced lunches (74 percent), and divorce rates (14,835 divorces in Tennessee in 1998 that involved minor children) were factors considered by the coalition/advisory committee in recommending the continuance of parenting education in Grundy County.

Parenting education classes have been offered weekly during the past year (40 classes, average attendance of 12-15/class), as well as individualized classes (55 classes taught). Additionally, co-parenting classes for divorced parents were offered monthly when at least five persons were enrolled for the class (five classes taught, attendance of 19: 9M, 10F). Monthly visits to preschool--grade 3 classes were made to teach nutrition education (44 classes/month with average attendance of 798). The lessons were shared with parents in the weekly classes, as well as with the parents of the Head Start children. The Parenting Resource Center and the Board of Education Family Resource Center merged into one facility, thus expanding educational opportunities to the families in the area. Cooperative networking and program planning by the staff has enabled additional classes to be taught and larger numbers of clientele have been reached. The center continues to provide a variety of resources that may be checked out for assistance in all areas of family and consumer sciences.

**Impact:**

Follow-up evaluation of co-parenting classes revealed: 77 percent of the parents felt that the class increased their understanding of why it is important for parents to work cooperatively with each other; 86 percent planned to make a stronger effort to work with the ex-spouse for the child's sake; 90 percent felt the class was worthwhile and helped them to understand how children are affected by divorce.

Comments from parents who attend the weekly scheduled classes indicate concepts learned: "I have learned how to take care of my child in ways that are safe and caring." "I have learned to budget our money that we use to buy food, pay weekly expenses, and other bills. I used to spend over \$250 a week on groceries; now I spend between \$100 and \$150." "I am a mother of two and stepmother of five. Parenting classes have encouraged me to try new foods and recipes. My children enjoy the new foods and do not become bored with the same menus anymore." "I have learned how to prepare nutritious meals and snacks for me and my daughter. I have also learned that eating nutritious and balanced meals is better for you." "The importance of selecting and preparing economical food has been helpful to me and my family. I also have learned the importance of food safety in our daily lives." "Communicating with your children builds a bond." "Using positive words when your child misbehaves will do more good than yelling." "Sharing time with your child each day is important for understanding their behavior." "There are more ways to deal with misbehavior than spanking or physical punishment."

**Funding Sources:**

Extension funds, 1890 Extension, Strengthening Community Program Grant, collaborative efforts with the Board of Education, Food Bank, SETHRA, County Officials, Health Department

**Scope:**

State Specific

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**Title:**

First Steps – State Mandated Child Care Training Program

**Description:**

Recently, the state legislature passed a law requiring all newly hired child care teachers across the state to receive a two-hour pre-service training within their first 30 days of employment. Similarly, the new law requires all directors of child care centers to receive a four-hour pre-service training before their actual start date. Thus, there was a need by the Department of Human Services to contract with an agency that could provide this training state-wide. The University of Tennessee Agricultural Extension Service was chosen.

During the 2001 calendar year, 66 of Tennessee’s 95 counties provided First Steps training on a monthly basis for child care teachers and, eight counties provided the four-hour director training on a monthly basis. A curriculum was developed by a state specialist for both the teacher and director training and distributed to the counties. Approximately 14,000 teachers and 1,200 directors were trained during the year.

**Impact:**

A pre- and post-test was given to 14,000 teachers during the calendar year. Results show that before the training teachers know about 45% of correct answers and 95% of the correct answers once they take the post-test. This resulted in a 50% knowledge gain. Directors have very similar results.

**Funding Sources:**

Extension Smith-Lever and Tennessee Department of Human Services

**Scope:**

State Specific

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**KEY THEME - FAMILY RESOURCE MANAGEMENT/CONSUMER MANAGEMENT**

**Title:**

Extension Parenting and Consumer Education Program (PACE)

**Description:**

The Tennessee Department of Human Services (TDHS) recognized that the customers who are transitioning from welfare to work face multiple barriers to successful employment. Among those are

securing child care, learning to deal with the demands of parenting while maintaining a job away from home and learning to manage their personal finances. TDHS contracted with Agricultural Extension Service Family and Consumer Sciences Department to develop a program to address these issues. The program is called PACE (Parenting and Consumer Education). A team of two FCS specialists and five county FCS faculty provides leadership to design and implement the program provide new curriculum in *parenting* and *financial management*, to provide training to their facilitators in those curricula, and to provide follow-up and support to those facilitators.

The PACE Program conducted several training sessions in 2000-2001. Four Level 1 training sessions were held for new facilitators. The training sessions were two days with a total of ten hours of instruction at each training. In July and August 2001, PACE held three Level 2 training sessions for the new curriculum. There was also one combined "PACE" training session for three days which covered both Level 1 and Level 2 curriculum. All future training will be "PACE" training for a minimum of three days covering all aspects of PACE and the curriculum. From October 2000 to June 2001, there were 103 facilitators participating in Level 1 PACE training. In July and August 2001, there were 143 facilitators who attended Level 2 PACE training and 11 facilitators who were at the combined "PACE" training. PACE conducted one follow-up training for facilitators in February 2001. The follow-up training utilized the ITV system statewide. John Wancheck with the Center for Budget and Policy in Washington, DC came to Tennessee and presented a program on the Earned Income Credit. Each facilitator received a packet of materials for promoting the Earned Income Credit with their Families First customers. Also on the program was Sherion Holmes with the Internal Revenue Service who works on education with taxpayers. She shared resources of the IRS for educating customers on the Earned Income Credit. Using the ITV system, all the PACE facilitators were able to hear the two programs. In two days, 167 facilitators were trained. In October 2001, PACE presented another follow-up session which addressed the realities of poverty, dealing with difficult teens and an additional lesson on credit. A total of 132 facilitators were trained.

In 2000-2001, an additional 40 hours of curriculum was developed by 10 FCS specialists. The FCS specialists worked with the PACE Trainers to conduct focus groups with PACE facilitators and customers and a curriculum review committee to address additional needs of families moving from welfare to work. The 11 modules are: Parenting Adolescents, Working with Schools, Children's Health, Dealing with Crises, Building Character, Credit Matters, Youth and Money, Housing, The Trip West, My Career Path, and Job Shadowing.

PACE implements a certification process for facilitators. Facilitators complete the requirements for certification which include: 65 hours of work in PACE, submitting participant evaluations, completing self-evaluations, doing a marketing plan and report on PACE and having an on-site visit by the Extension PACE Trainer. By completing the requirements, facilitators are "certified" in the PACE program. They receive a certificate plus a teaching kit of materials to use in their PACE classes. The UT PACE Trainers work with the facilitators to help them complete the requirements for certification. PACE trained 285 people in 2000 with 118 of those being dropped from the potential certified list for reasons such as changing jobs or job responsibilities or no longer having a Families First contract As of

September 30, 2001, 130 of remaining 167 facilitators across the state are recognized as “Certified PACE Facilitators”. With the Level 2 curriculum, the 130 certified facilitators can receive Level 2 certification. All facilitators trained in 2001 and in the future will receive “PACE Certification”. Since the Level 2 training, 15 facilitators have completed the requirements for Level 2 or PACE certification.

**Impact**

PACE has received evaluations from Families First customers participating and completing the PACE program over the last year. Evaluations are submitted by the facilitators to the PACE Project Director.

A statewide representative sample of the evaluations showed the following results:

*On a scale of one (low) to five (high)*

Kid Smart knowledge before PACE class	3.5
Kid Smart knowledge after PACE class	4.6
Money Wise knowledge before PACE class	2.8
Money Wise knowledge after PACE class	4.7

**Usefulness of information**

Kid Smart	4.8
Money Wise	4.7

These numbers reflect an increase in knowledge in these two subject matter areas and a high feeling of usefulness of the information by Families First customers .

**In responding to individual lessons in Kid Smart, 70% to 82% of customers reported learning a moderate or great deal in the following lessons:**

How Children Grow and Develop - 71%	Why Children Misbehave - 77%
How the Brain Develops - 66%	My Parenting Style - 77%
How to Manage Time - 76%	How to Set Reasonable Limits - 78%
Coping with & Reducing Stress - 80%	Using Natural & Logical Consequences - 76%
How to Control Anger - 78%	Different Guidance Tools - 72%
Using Reflective Listening - 80%	About Different Types of Child Care - 67%
How to Use “I” Messages - 78%	Choosing Quality Child Care - 69%
Encouraging Children - 82%	Plan Ahead - Child Care Emergencies - 70%

**Customers were asked to report trying different guidance techniques with their children. Over 50% of customers reported using these practices:**

Time out for child - 60%	Taking away privileges - 59%
Time out for parent - 59%	Reflective listening - 56%
“I” Messages - 57%	Recognizing good behavior - 64%

Monitoring children's activities - 50%    Rewarding good behavior - 68%

**In submitting customer evaluations, facilitators are asked to report the following based on their observation and interaction with customers:**

Customers increasing knowledge	531
Customers increasing skill level	512
Customers demonstrating new behaviors or adopting new practices	470

**From customer evaluations, 80 Families First customers participating in PACE programs reported money saved - \$9313.98. They reported saving money through the following practices:**

- Quit smoking
- Developed a spending plan
- Changed grocery stores and started planning meals
- Cut down on spending money for lunch or snacks
- Spent less on eating out
- Planned meals for the week
- Tried going to second hand stores and Goodwill - this was an excellent source for children's clothes
- Spent less on gas
- Comparison shopping and setting a budget
- Made a grocery list before going to the store
- Used coupons and bought store brand food
- Don't use rent to own stores
- Watched for sales at grocery stores
- Filed for the Earned Income Credit on tax return

**Families First customers report what they are doing differently because they attended PACE classes. Here are a few of the customer responses:**

- I am setting rules
- Made plans with child care provider and have a back-up plan so I won't miss class or work
- My parenting style has changed - I have more patience and understanding. My child seems more calm and cooperative.
- I haven't spanked my child in almost two weeks - I am finding that other methods work.
- I'm spending time with my child everyday - we are getting along great since doing this. Thanks!
- I'm saving on my groceries and after starting different discipline techniques, my youngest son listens to me more than before.
- I've changed grocery stores, planned meals and made a grocery list - it's working.
- I paid off a rent-to-own and will never use one again.
- Before I start yelling or screaming, I count to 10 and relax myself.
- Used "I" messages with my teenager - he responds better and isn't vengeful

After learning about EIC, I filed for the past three years and received over \$2000 Haven't had to pay bank fees for non-sufficient funds since attending Money Wise sessions - saved \$100  
Thanks to PACE class, I have started praising my daughter for good behavior and she hasn't been in trouble for three days  
I saved money for a week, had \$35 before I spent anything.

For the first time, I'm looking at my children as individuals. They are amazing. I have three children and now I'm trying to see their differences. They like having mom spend time one on one and I like it myself.  
My child will be in day care when I go to work. I'm really going to ask a lot of questions before I make a decision.

The PACE Trainers and I conducted four sessions of Level 2 PACE training. In the facilitators' evaluations of the training, 99% rated the trainers, curricula, activities and overall experience as good or excellent. On a scale of 1 (not at all) to 5 (to a great degree), facilitators rated 10 criteria of training. The average rating score for all ten training criteria was 4.41.

**Comments from facilitators' attending the training:**

PACE is a great tool to use with our clients. It is very flexible and can be used in different aspects of our clients' lives.

The Parenting Adolescents section was greatly needed.

It was helpful to have the opportunity to actually see the new material being facilitated for us so that will be familiar with it.

The activities were excellent, they really brought the lessons to life. They were fun and very motivating and encouraged you to look at issues from different perspectives.

I personally have thoroughly enjoyed the training. The trainers were all great!! The second phase of the PACE training is awesome and will be very beneficial and effective to whomever will take advantage of the materials.

I absolute love the PACE program, I am very thankful that I have been given an opportunity to become a certified facilitator.

Love the PACE trainers - they are very knowledgeable and easy to talk to.

I thought the training was well thought out and used all the different learning styles.

The PACE program is well put together and very user friendly.

**Funding Source:**

Smith-Lever and State (Tennessee Department of Human Services)

**Scope:**

State Specific

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## **KEY THEME - WORKFORCE PREPARATION - YOUTH & ADULT**

### **Title:**

TSU Workforce Prep Programming

### **Description:**

Due to a weak economy, the unemployment rate in Tennessee has increased due to closing of several businesses and industries. When the unemployed lack of skills necessary for finding new employment, financial problems and and potential breakup of stability of families can ensure. In some cases, lack of job hunting skills or knowing of how to present oneself appropriately to potential employers can prevent individuals finding jobs for which they are qualified. In some cases, additional job -related training may be needed. Workforce preparation programs that provide job seeking skills, prepare people for the hiring process, or to identify opportunities for these individuals to acquire necessary job -related training can help address these needs.

Lack of communication skills causes youth to have difficulty expressing themselves with parents, teachers, peers and others. This miscommunication problem often leads to a feeling of low self -esteem and discipline problems. The U.S. Secretary of Labor's Commission on Achieving Necessary Skills Report lists the following foundation skills are necessary for communication : reading, writing, arithmetic, science, math, speaking, listening, problem solving, reasoning learning, creative thinking, decision making, self-esteem, integrity, responsibility and sociability. The Davidson County Advisory Committee along with the Davidson County 4-H Club Program Survey and The Metropolitan Nashville -Davidson County Board of Education feels that this issue needs to be addressed.

In Davidson County, 741 4-H members were enrolled in 29 4-H Clubs. Programs were implemented that provided educational experiences for young people to gain knowledge and build self -esteem, develop life skills, think of career choices and form positive attitudes by becoming aware of and utilizing their communication skills. Educational programs in communications were taught in the areas of parliamentary procedure, Who Am I?, public speaking, basic art principle visuals, record keeping and oral self esteem presentations. Participation records were kept to record the number of youth participating in all educational programs in communications after receiving information the month before.

Also in the same county, the second TSU agent enrolled 758 4-H club members in 27 traditional 4-H clubs. The agent developed and presented educational programs in the areas of parliamentary procedure, public speaking and visual, oral and written communication using different teaching methods (group discussions, working in teams, using visuals, handouts, and exhibits).

A program assessment instrument was developed to collect data based on club members participation and teachers observation and interaction with club members.

In Lawrence County, educational programs were presented to 947 members in 26 clubs. Subjects covered were public speaking, visual presentations, and oral presentations using visuals. Videos were produced to allow members to see another, local child give a good speech.

**Impact:**

In Davidson County, 4-H members demonstrated skills learned by participating in communications activities:

	# of students	% of students
Parliamentary Procedure	741	100%
Who Am I ?	625	84%
Public Speaking	497	67%
Basic Art Principles Visuals	472	64%
Demonstrations	405	55%
Oral Communication		
( Parliamentary Procedure )	758	100%
( Public Speaking )	443	58%
( Who AM I ? )	594	78%
Visual Communication		
( Art Poster )	422	56%
Oral and Visual Communication		
( Project Demonstration )	357	47%
Written Communication	427	56%

Some comments made from teachers responding to the communications program assessment about the most valuable aspects of the 4-H communications program for the students in their class includes:

- 4-H exposes the students to many things. It allows them to expand and grow yet be comfortable within their own classroom.
- 4-H promotes critical thinking skills, provides hand -on experiences and provides an opportunity to address a group.
- 4-H'ers have the opportunity to plan ahead for projects and maintain a time line. 4-H'ers have to organize themselves, materials and time. They get to do projects they have not done before. Families are included in many activities.
- 4-H'ers are given opportunities to demonstrate / practice skills that they often do not get to use. They increase confidence that comes with practice. 4-H program gives the students an opportunity to belong to a club and opportunities to exhibit their own individual and unique skills in creative ways while still teaching them to work within guidelines and deadlines.

Teachers observation and interaction with students results include:

knowledge (concept) in the communications areas covered, 93.57%  
skill level (ability) in the communications areas covered, 92.14%  
and percentage of students that they felt exhibited increased  
self-confidence as a result of the 4-H communications program. 91.07%

In Lawrence County, students demonstrated new or improved skills by participating in communication activities. Thirty percent of the members participated in Public Speaking. Forty-two percent prepared an Art Poster. Eighteen percent participated in Demonstrations. One hundred percent of teachers surveyed said that the videos showed the students that they could write and deliver a good speech/demonstration. One teacher mentioned that the quality of work the 4-H members were displaying was better than in earlier years. Also, 67% of the students we took to the district competition, in public speaking, placed first in their division.

**Funding Source:**

CSREES/USDA, Tennessee State University Cooperative Program and the local county governments.

**Title:**

Workforce Preparation

**Description:**

One of the five basic competency areas that have been identified as essential for adult success in vocational competence. Youth must have a broad understanding of vocational options and of steps to act on career choices. They should understand how to prepare for their chosen career and have an understanding of the value and function of work.

- Over 25,000 Tennessee 4-H'ers participated in character education programming efforts, focusing on vital employee qualities: trustworthiness, respect, responsibility, fairness, caring, and good citizenship.
- In the past year, 40,923 young people were involved in 4-H educational programs in workforce preparation programming which focused on the knowledge, skills, and attitudes necessary for a solid cadre of employees in the coming generation.
- Two summer conferences, "Learning a Living 2001" and "4-H Directions: Career Exploration Conference, Preparing Youth for the 21st Century Workplace" were conducted as intensive summer educational experiences for 80 youth in multiple counties.
- A week-long day camp involved 13 elementary students residing in subsidized housing projects.
- The "Ready to Work" curriculum was piloted by Extension with 800 junior high in two Central District counties.
- Extension agents in more than 30 Tennessee counties work with local job training programs to teach personal skills assessment, resume preparation, job search, and interviewing skills.

**Impact:**

- One county linked school and careers for 485 students in a critical thinking/career exploration program.
- An Extension 4-H financial management workforce preparation program for Jr. High students focused on career opportunities, higher education, household income and expenses, taxes, job-seeking skills. The program involved 149 youths in eight sessions. Students applied for fictitious jobs, wrote checks for bills, balanced checkbooks and started fictitious savings accounts.

- A reported 14,286 young people were trained in workforce preparation through 4-H educational programs offered in 45 counties.
- At the State 4-H Academic Conference, 175 junior high students explored careers through experiential sessions conducted by University faculty.
- State 4-HElectric Camp, held on the UT-Knoxville campus, provided opportunities for 244 junior high youths to explore careers in energy, electricity, and basic sciences.

**Funding Source:**

Smith-Lever, State and private donations

**Scope:**

State Specific

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**KEY THEME - FARM SAFETY**

**Title:**

Farm Safety

**Description:**

Agricultural workers and their families experience higher rates of injuries and illnesses related to their employment than other occupations, and agriculture is consistently ranked by the National Safety Council as one of the three most hazardous occupations in the United States. Past studies of farm deaths in Tennessee revealed that tractors and other farm machines are involved in 58 percent of the documented farm fatalities. Tractors are involved in 49 percent of the fatal accidents, and overturns are involved in 27 percent of all fatalities, or 55 percent of the tractor-related fatalities. Falling objects are also a major cause of death, with most of these involving tree-cutting accidents. Estimated economic impacts of farm injuries and occupational illnesses may exceed \$300,000,000 annually, or 16 percent of Tennessee's gross farm receipts of \$2.4 billion (1996 receipts as reported by National Agricultural Statistics Service). The impacts of farm injuries extends to other sectors of the US economy as well since many small farmers also hold off-the-farm jobs, and those employers experience substantial losses from off-the-job injuries and illnesses.

More than 1,700 persons received information and training through these programs and workshops, plus thousands more received information through displays and mass media. Collaborative youth farm safety education through the Progressive Farmer Farm Safety Day Camps has been increasingly popular in recent years. These programs target youth primarily in the 8 – 13 year old range. Four camps were held in Tennessee during 2000, reaching approximately 500 youth, plus their parents. Topics include basic tractor safety, fire safety, safety with outdoor power equipment, safety around large animals, and hearing and eye protection. In addition to direct participation in the events, I support other farm safety events in counties by providing ideas during planning and assistance in locating other support.

The Internet has become a very useful and efficient method of providing farm safety education, and the server logs show that this site was visited 17,826 times during 2001. Tennessee Farm Safety Online (<http://bioengr.ag.utk.edu/Extension/ExtProg/Safety>) is a collection of safety related materials categorized into the areas of:

- Tractor Across Tennessee special project
- Disasters
- Environmental hazards
- Fire
- Hazardous materials (pesticides, chemicals)
- Highway safety
- Personal Protective Equipment
- Tractors and machinery
- Misc. Links

**Impact:**

The actual impacts of farm safety programs are difficult to directly measure because there is no tracking system to effectively monitor injuries and illnesses among agricultural workers. However, based on National Safety Council cost estimates for work-related injuries and deaths, savings resulting from prevented each work-related death and injury are approximately 980,000 and 28,000 dollars each, respectively.

**Funding Source:**

Smith-Lever (3d farm Safety Funds and 3b&c) and State

**Scope:**

State Specific

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**B. STAKEHOLDER INPUT**

Each department continues engagement in strategic programmatic planning. In each case a wide range of stakeholders groups are represented. Individuals from these groups are invited and encouraged to participate in the process.

The UT Agricultural Extension Service completed its strategic plan in 2000, but continues the implementation of the plan. Extension program planning continues to involve program stakeholders at the local county level through the use of advisory groups as outlined in the Plan of Work. The Extension organization as a whole receives guidance and input from a State Extension Advisory Council whose members represent various programmatic and regional interests.

The Agricultural Experiment Station is in the process of completing its own strategic planning process. The Experiment Station plan and the Agricultural Extension Service strategic plan will be melded with a strategic plan now being developed for the UT Institute of Agriculture. Input from stakeholders and Institute personnel have been collected and summarized for this purpose.

Departments are in various stages of the programmatic planning process. Some are in the initial stages, while others have advanced to the point of having appointed standing advisory stakeholder committees. Programmatic planning is a continuous process that is dependent on variation in clientele and organizational needs, availability of resources, and the abilities and skills of personnel in the organization.

The means of identifying stakeholder groups and individuals, naturally, varies among disciplines. In the case of Forestry, Wildlife and Fisheries Science, for example, interest groups ranging from environmental advocates, landowners, forest product companies and others were identified. From the identified groups, a balanced set of individuals were selected for intensive input solicitation. These were invited to meetings on campus for the purpose of evaluating plans. Later, the group was formed into a standing advisory group which meets regularly and provides counsel on Extension, teaching and research issues. For example, stakeholders provided impetus for developing a Ph. D. in the department.

The process for consolidating departmental stakeholders into an Experiment Station wide organization is being planned.

The UT Agricultural Extension Service and TSU Cooperative Extension Program continue to use the network of county advisory committees that was described in the FY 2000-2004 Plan of Work. Both Extension organizations also continue to involve and utilize statewide advisory committees to provide direction for broader organizational issues.

In FY 2001, the UT Agricultural Extension Service continued the implementation of the strategic planning process. Six action planning task forces have met and developed action plans for each task force's assigned strategy. Three task forces were initiated at the end of 2000 and three more task forces commenced their activities in 2001. Task force members include Extension personnel and stakeholders. The task forces developed plans that identified actions necessary to achieve identified goals from the strategic plan. The task forces also developed time frames for the actions and identified those who will be responsible for accomplishing the actions.

#### C. PROGRAM REVIEW PROCESS

The program review process outlined in the FY 2000-2004 Plan of Work has not been changed.

#### D. EVALUATION OF THE SUCCESS OF MULTI AND JOINT ACTIVITIES

The multistate, multi-institutional and multidisciplinary and joint research and extension activities, as in the past, were valuable in addressing the strategically important areas of needed focus. The annual planning sessions between research faculty and extension specialists are critical in developing research and education programs which effectively serve the Institute's clientele. Extension specialists, as a result of their ongoing contacts with clientele, contribute an awareness of strategic issues which need to be addressed. Moreover, research faculty contribute an awareness of scientific progress which has been made not only in their own laboratories but also within the scientific community at large. This latter awareness is greatly aided by their own participation in multi-state and interdisciplinary efforts.

By expanding the scope of joint activities, research programs have included more interaction with Tennessee State University. This interaction has led to a greater incorporation of minority clientele. Moreover, inclusion of broad advisory groups has expanded the scope of interest to other groups, including but not limited to environmental groups and production interests between agricultural producers and consumers.

The extent to which planned programs described expected outcomes and effects varied by the maturity of the effort. The growing joint program in Food Safety described the desired outcomes in detail within a business plan. Alternatively, programs which incorporated new clientele were more general in nature.

Multi and joint activities by their nature direct programs toward greater effectiveness by incorporating various disciplines and functions into the planning process. Excellent examples may be found in the food safety program and the fruit and vegetable program. In these cases, the expertise of scientists from many disciplines and organizations were able to plan for the desired goals, helping assure that errors of exclusion were avoided. Moreover, the shared effort of multi-state programs such as precision agriculture consolidate the efforts of scientists with different but related interests and expertise to help assure rapid consolidation of developments.

## E. MULTISTATE EXTENSION ACTIVITIES - Tennessee

### Summary Attachment

Beef Cattle Management and Marketing Systems - Beef cattle producers are experiencing many changes in the beef supply chain, and information is becoming a critical part of the management and marketing of cattle. A Fund for Rural America regional Beef Systems Computer Software Project. This project is a multi disciplinary cooperative project between The University of Tennessee Agricultural Extension Service and the University of Georgia Cooperative Extension Service provided an opportunity to help insure that beef producers exercise good forward planning in making beef management decisions.

Beef cattle record keeping software has been developed and distributed to 296 users in 27 states. Enterprise budgets were developed for beef cattle and forage enterprises and distributed to 2,000 producers. This production and economic data is enabling more beef cattle producers in Tennessee to improve their business management skills. Improved livestock records allow beef cattle producers to improve their efficiency. A quote from a user of the beef cattle record keeping software being distributed: "I use your software every day, and don't make any decisions without first checking my printouts. I can't manage my cow herd without this information."

4-H Character Education Initiative - To equip Extension faculty to facilitate change in affective, cognitive and psychomotor domains of character development, The University of Tennessee 4-H program partnered with The Josephson Institute of Ethics to conduct two intensive, simultaneous 36 -person Character Counts! Trainer Certification Seminars followed by a two and one half day Invitational Character Education Conference for parents, teachers and community leaders. Participants have reported community coalition formation, inservice training for teachers, organization of task forces, parent training, teen training, new audience involvement (pregnant teens, prison women, grandparents, judicial referrals), camps and retreats, sports training and community wide training. The greatest impact to date is the formation of numerous community coalitions to develop and conduct character education programs in the counties, with Extension serving in a leadership role in the coalitions' formation, and the increased awareness of the need for character education.

Multi-State Burley Tobacco Expo - County Extension agents and tobacco specialists from TN-VA-NC planned and conducted a tri-state Burley Tobacco Expo held in January at Kingston, TN. Over 300 people from Kentucky, Virginia, North Carolina and Tennessee participated in the Burley Tobacco Expo.

Northeast Tennessee Beef Expo - Presented by the UT Agricultural Extension Service and the Tennessee Agricultural Experiment Station at the Tobacco Experiment Station at Greeneville, this cooperative beef field day was planned and conducted to aid producers in identifying and understanding new technologies and information already available that will improve the overall competitiveness of the Tennessee Beef Industry. Expo sessions and exhibits helped producers learn first hand from Extension



specialists, industry leaders, and researchers about new methods and techniques that can help achieve more efficient and profitable operations. A trade show featured sponsors and the products they offer to make beef operations more profitable. For those producers who wished to pursue the certification process for Beef Quality Assurance training, an opportunity to take the test for certification was offered during the Expo program. The 2001 Beef Expo attracted approximately 300 beef producers from Tennessee, North Carolina, and Kentucky for a day of demonstrations and discussions of practical ways producers can improve their operations and their security in a quickly transforming marketplace.

Multi-County/Multi-State Hay Day - Hay Day 2001 was held in May 24 in Benton County, TN. 150 producers, agents and equipment dealers participated. The field day consisted of 6 educational stops, educational displays and numerous hay equipment exhibits and demonstration. Hay Day is planned and conducted by Extension agents in nine Tennessee Counties with assistance from agents in neighboring state counties. Agents from Kentucky also provide assistance in years when the Hay Day is held in northwestern Tennessee counties.

Milan No-Till Field Day - The Milan No-Till Field Day is a cooperative endeavor between Extension and Experiment Station faculty and staff from Tennessee, with participation and assistance from Extension and Experiment Station personnel from various neighboring states, including Mississippi, Kentucky, Arkansas and Missouri. In 2001, over 5,200 people participated in the No-Till Field Day. Visitors to the 2001 field day came from 81 Tennessee counties, 20 states, and 5 foreign countries: Mexico, Australia, Kenya, Argentina, and the Philippines. The subjects covered included: Precision Farming, No-Till Wheat, Soybeans, Cotton and Corn, Soil Fertility and Lime Management, Bull Leasing, Cow-Calf Management Practices, Measuring the Stocking of Hardwood Forest, Marketing Your Hardwood Crop.

A Comparison of Demographic Variables, Food/Nutrient Intakes, Level of Food Security, and Food/Nutrient Changes with Intervention Among Food Stamp and Non-Food Stamp Recipients in South Carolina, Tennessee, and Virginia - This study, conducted with funds from a Southern Rural Development Center grant supplemented by Smith-Lever funds, examined the role of food assistance, nutrition education, and mother's workforce participation on the dietary patterns of rural households in South Carolina, Tennessee, and Virginia. The researchers utilized data collected from participants in the Expanded Food and Nutrition Education Program (EFNEP) and the Food Stamp Nutrition Education Program (FSNEP) in the three states during the 1999 reporting year. Data on intake of foods and nutrients and food-related behaviors were used to compare Food Stamp recipients with non-Food Stamp recipients on relative dietary adequacy, recommended food-related behaviors, and other factors. The individual states conducted data collection and analyses which provided state-specific information. In Virginia, dietary and food-related behavior data were used to compare participants on the effect of workforce participation. South Carolina examined the feasibility of using the state's Electronic Benefits Transfer system (EBT) to examine the food purchase patterns of Food Stamp recipients, and to compare these purchasing patterns with those of non-Food Stamp participants. Using two different instruments, South Carolina and Tennessee researchers explored the nature and extent of food insecurity and hunger among EFNEP and FSNEP recipients in those states.

The Changing Rural Health System: Education for Consumers and Providers - Southern Regional Extension and Research Activity Information Exchange Group (SERA - IEG) 19. The information exchange group brings together professionals in the land grant system, office of rural health, medical and nursing schools, and state health departments, allowing bridges to be built between the disciplines. The objectives of the SERA-IEG are to exchange current information on the status of new research findings and extension programs related to rural health and safety issues, to gain regional perspective on current rural health problems, and to consider joint activities that might be proposed. The SERA 19 group conducted a Southern Extension Health Institute in October in Canton, Mississippi. The Tennessee Extension health specialist served as chair -elect of the SERA, helped plan and served as an instructor for the institute.

Master Tree Farmer 2001 Forest Landowner Satellite Short Course - A 7 night, 3 hours per night forest landowner short course (21 hours of instruction) was broadcast live via satellite from Clemson University to 9 locations in Tennessee in February and March 2001 as part of a regional 10 state program. 85 landowners attended the short course (1,785 contact hours). Regional experts presented information in the following subjects: Introduction to Forestry and Forestry Terms; Basic Forest Finance, Estate Planning, Taxation; Pine Management; Hardwood Management; Marketing, Timber Harvesting, Timberland Security; Wildlife Management; and Forestry Services and Programs for Landowners. Short course participants were surveyed to determine knowledge retention from the program and whether practices have been planned or implemented based on information gained from the short course.

UT Agricultural Development Center (ADC) - The ADC is involved with The Southern Rural Development Center in exploring e-commerce and its impact on rural southerners. The Southern Rural Development Center is exploring the possibility of developing an e-commerce curriculum to educate businesses, consumers and local governing bodies. The curriculum plans to address the role of e-commerce on rural businesses, local governments and residents. The Southern Region Extension and Experiment Station Directors established a task force (SERA - TF11) to link all of the value-added or development centers in the southern region by internet. The search engine is managed by Mississippi State University. This link promotes cooperation and sharing of resources among the participating Universities in their efforts to assist agricultural businesses. Future effort will be directed toward identifying an area of need for the entire region and seeking funds that would address that specific need.

UTK Clean Water in Tennessee Program - The Water Quality Research Team has installed monitoring wells throughout a watershed at Ames Plantation -- a UT Agricultural Experiment Station facility including more than 18,000 acres. Soil cores from the wells have been analyzed and the effects of different agricultural practices on water quality are being measured. The Clean Water in Tennessee Extension program provides leadership for developing, delivering and evaluating educational programs to protect and improve water quality and the environment. The program focuses on three issues: watershed management and protection; clean water in agriculture and environmental quality in and around homes. Team members were involved in the following educational efforts:

- Writing a handbook of best management practices for agriculture and forestry. This project is supported by a contract with the Tennessee Department of Agriculture for \$156,000.
- Creating a Home-A-Syst CD-ROM for middle-school aged youth. This project is supported by an EPA 319 grant of \$51,000.
- Planning, conducting and evaluating five agent training programs with a total of 159 participants. Extension agents are now better prepared to assist their clientele protect and improve water resources as a result of participating in training opportunities.
- Introducing the use of the Internet in agent training.
- Analyzing the economic and environmental impacts of the Environmental Quality Incentives Program (EQIP) on three representative Tennessee farms. This project was supported by a NRCS/USDA contract for \$17,000.
- Developing and conducting the aquatics challenge for area and state 4-H Envirothon competitions and collaborating on preparing the comprehensive question for the state competition. Over 600 high school students and 115 teachers/coaches increased their knowledge and understanding of water and other environmental issues, through participation in the Envirothon program.
- Participating in planning and conducting three field days. Two of these field days were multi-state events. Over 500 farmers, agency personnel, local officials and interested citizens learned first hand about water quality protection and improvement during the three field days.
- Writing five proposals for extramural grant funding: Almost \$120,000 in external funds were obtained to support more effective water quality educational programming..

Southern Region Program Leadership Committee - Nine Extension staff and faculty participate in the activities conducted by the Southern Region Program Leadership Committee (PLC). These individuals take part in regular meetings, either face-to-face or by teleconference, of the PLC or one of its constituent subcommittees.

One Extension staff development specialist serves as a member of the development team and, subsequently, the management team for the Financial Security in Later Life National Extension Initiative .

## F. INTEGRATED RESEARCH AND EXTENSION ACTIVITIES - Tennessee

### Summary Attachment

The Food Safety program is an initiative within the UT Institute of Agriculture. Some 40 faculty and Extension specialists are involved. Notably, faculty from across UT and scientists from the Oak Ridge National Laboratory are also engaged. It recently received a \$5,000,000 grant. The initial work is directed toward post harvest food quality and milk quality.

The Precision Agriculture integrated program is a broad research/extension effort in which excellent progress is being made in sensory technology and refining nutrition and pesticide treatments to take advantage of more accurate field data.

The Efficiency of Production program is a consolidated research/extension effort of applied production efficiency research and educational programs directed toward improving the production efficiency of farmers in Tennessee. Annual Commodity meetings assist in directing the research and education programs.

The Protection of Environment program is a consolidated effort to reduce the environmental effects of production agriculture on air, water and soil quality. Current efforts center on determining the fate and transport of chemicals in the soil.

The Fruit and Vegetable program is an applied research/extension effort designed, in part to provide alternatives to current tobacco producers in the State. Annual faculty and specialist meetings assist in setting the agenda for the program.

The University of Tennessee Vegetable Initiative was started to assist area vegetable producers with planning, production and marketing information in addition to research and extension work currently underway on vegetable and related topics. The Initiative is a team effort with personnel from several departments within the Institute of Agriculture cooperating. These departments include Agricultural Economics and Rural Sociology, Agricultural and Biosystems Engineering, Entomology and Plant Pathology, Food Science and Technology and Plant and Soil Sciences. Experiment station personnel at the Knoxville Plant Sciences Unit, the Plateau Experiment Station, the Highland Rim Experiment Station, the Middle Tennessee Experiment Station, and the West Tennessee Experiment Station cooperated with research work at each location. Both research and extension personnel have cooperated with work on experiment stations and private farms. Initiative team members are also working with state agencies and markets to further utilize available resources. Team members have been active in recruitment of agribusiness to Tennessee to enhance market availability to producers. Reports were produced by initiative members in 2001 for use by vegetable producers.

Tennessee Forest Products Center - The mission of the Tennessee Forest Products Center (TFPC) is to solve problems for Tennessee forest products producers and provide leadership in research and

education to ensure future competitiveness and sustainability of the industry. The TFPC is focused on providing research and education for the forest products industry in Tennessee, the region and beyond. The following Extension publications were produced: Understanding Log Scales and Log Rules, Tree Crops For Marginal Farm Land - White Pine and Crop Tree Release in Precommercial Hardwood Stands. Three editions of the TFPC newsletter, "Wood Bin" were produced and distributed to primary and secondary Tennessee wood products producers, research partners and other organizations and individuals interested in the forest and wood products activities conducted by the TFPC.

Tobacco IPM program - Tobacco farmers have multiple insect problems every year resulting in economic loss of their crop. Many have not been utilizing an IPM insect control program and have lost money by spraying too many applications of insecticides. In a cooperative effort between UT Extension entomology specialist and a UT research entomologist, recommendations have been updated from insecticide tests that were performed at two Experiment Stations in the state. An IPM school was held to train tobacco interns to scout tobacco. Seven interns were trained to scout multiple fields in seven different counties. Approximately 65 acres were scouted. A weekly report was sent to all tobacco counties to alert agents of the most current pest problems on tobacco. The agents were then able to alert their farmers of the current pest situation and what the best IPM approach they should be taking. Grant money from Philip Morris Tobacco Company supported the tobacco interns.

Vegetable Production Field Day - The 2001 field day focused on important issues in greenhouse management and production, with emphasis on tomatoes, both for production in the greenhouse and in the field. Presenters at the field day included researchers and Extension specialists. More than 100 commercial vegetable producers and other growers participated at the field day program.

Beef and Forage Field Day - The 2001 Beef and Forage Field Day program was devoted to current and emerging issues affecting the efficiency and profit ability of beef operations. Topics addressed focused on Tennessee operations and also had relevance to the surrounding region. The field day, presented cooperatively by UT's Agricultural Experiment Station and Agricultural Extension Service, attracted producers and visitors from across Eastern and Middle Tennessee and featured presentations by UT Extension specialists and research scientists on scheduled calving seasons, effects of color patterns on marketability of feeder cattle, on management considerations for feeding corn gluten feed and control of buttercups in hay fields and pastures. The field day objective was to give operators practical and timely information they could use to improve their operations. Proceedings from the event were placed on the Experiment Station Website for access by producers.

Tobacco Production Field Day - In July, 2001, a field day was conducted at the UT Highland Rim Experiment Station focusing on tobacco production efficiency. More than 200 growers and others with ties to the industry joined us for the event. Stops included research information on value of foliar treatments, status reports on studies of no-till tobacco, information on controlling plant pests and threats, and side-by-side comparisons of treatments on dark-fired and burley tobacco. In addition, there was a

demonstration of floatbed production of tobacco plugs. The event culminated with talks by tobacco industry representatives on allotments and market expectations.

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UT Dogwood Group - The mission of the University of Tennessee Dogwood Group is to improve and protect the dogwood tree and its relatives through breeding, research, and public communication. The UT Dogwood Group has initiated a breeding program, with the objective of producing disease-resistant cultivars of flowering dogwood. The focus is on development of new cultivars that are resistant to dogwood anthracnose, powdery mildew, and combined resistance to both diseases. Our first release is Appalachian Spring, which should be available in 2001.

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