

TENNESSEE AGRICULTURAL RESEARCH
AND EXTENSION SYSTEM



REPORT OF ACCOMPLISHMENTS AND RESULTS
FY 2004

The University of Tennessee Extension

The University of Tennessee Agricultural Experiment Station

and

Tennessee State University Cooperative Extension Program

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I. Introduction

Tennessee's two land-grant universities comprise the Tennessee Agricultural Research and Extension System, conducting Research and Extension programs that serve the needs and interests of Tennessee's 5.2 million people. The University of Tennessee Extension and the University of Tennessee Agricultural Experiment Station comprise the 1862 institution and the Cooperative Extension Program and the Institute for Agricultural and Environmental Research of Tennessee State University comprise the 1890 institution. This FY 2004 Report of Accomplishments and Results represents the combined efforts of the University of Tennessee Extension, the University of Tennessee Agricultural Experiment Station, and the Tennessee State University Cooperative Extension Program. This report includes results and accomplishments of FY 2004 planned programs, stakeholder input, program review, multistate, and integrated research and extension activities.

II. Certification

Our signatures certify that this is the USDA-CSREES Annual Report of Accomplishments and Results for FY 2004 for the University of Tennessee Extension, the University of Tennessee Agricultural Experiment Station, and the Tennessee State University Cooperative Extension Program of the Tennessee Agricultural Research and Extension System.

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III. Planned Programs

This report represents the performance goals established in the FY 2000-2004 Plan of Work submitted to USDA-CSREES on April 1, 1999, and/or the research and education needs identified through extensive stakeholder input conducted since submission of the FY 2000-2004 Plan of Work.

The results and accomplishments from Tennessee's FY 2004 Extension and Research planned programs have been organized by the five USDA-CSREES National Goals. A brief overview of outcomes in each National Goal includes resource allocations. Planned programs are delineated by 27 different key themes. Key themes are organized by six-part impact statements:

- title;
- issue or need present (issue);
- response to the issue or need (what has been done);
- outcomes of the Research and Extension responses (impacts);
- funding source(s); and
- scope of impact (state specific, multistate and/or integrated).



Goal I – An Agricultural System that is Highly Competitive in the Global Economy

1.0 Overview

1a. Results

In FY 2004, the Tennessee Agricultural Research and Extension System focused on meeting the needs of Tennesseans by building an agricultural system that was profitable and competitive in production, processing and marketing. The educational contacts for Goal One projects and activities numbered 537,378. Areas of major emphasis included beef cattle management and marketing, forages, crop research/production, fruit and vegetable production, horticulture and outreach to the state's limited resource and small farmers.

In livestock production and marketing alone, Extension made 13,552 educational contacts through farm visits, clients' visits to the local Extension office, telephone calls and letters, group meetings and demonstrations. Over 20% of livestock production and marketing contacts were with farmers representing racial/ethnic minority groups.

In 2004, UT and TSU Extension made 32,224 educational contacts in commercial horticulture and landscape design and over 50,000 contacts in consumer horticulture. In addition, Extension worked with over 2,000 Master Gardeners in 26 county programs, and in FY 2004, an additional 873 Master Gardeners were trained in the state. The Master Gardener volunteers contributed 45,743 hours to various community horticulture projects.

With Tennessee's limited resource and small family farm economy, UT and TSU Extension taught alternative management and marketing practices that resulted in increased net income, improved production and managerial skills, and the utilization of innovative and improved marketing strategies. Research and Extension efforts in areas such as goat management, fruit and vegetable production and tobacco were pursued to increase profitability of small farms in Tennessee.

1b. Highlights

UT Extension used group meetings, phone calls, farm visits, newsletters, radio programs and newspaper articles to promote beef marketing practices. Extension emphasized marketing in truckload lots, group marketing and adding value to calves through such practices as vaccination and castration of bull calves. Improving Beef Cattle Genetics was a research/demonstration project of improved genetics. It was conducted with beef herds on 17 farms in 16 Tennessee counties.

Tall fescue, covering 3.7 million acres in Tennessee, is highly productive most of the year, and the forage base for most cattle. Tall fescue toxicosis (caused by *Neotyphodium coenophialum*



fungus) causes annual losses in excess of \$100 million to the state's beef cattle industry by reduced weight gain, milk production, and fertility. Work by the UT Experiment Station indicates that the reproduction problems in both bulls and cows grazing infested tall fescue occur during early fertilization, and timing of breeding will improve reproductive competence.

Ic. Benefits

Outcomes of beef marketing efforts included UT Extension's work to educate producers and marketing agencies in initiating the 2004 McMinnville Area Feeder Calf Sale. This was the first all-weaned preconditioned feeder calf sale held in the McMinnville Area. The effort began by educating producers to address cattle health concerns. The sale consisted of 696 feeder calves from approximately 100 producers. The calves were all graded and grouped into truckloads of uniform calves. The calves sold for prices ranging from \$6.60 to \$16.29 per hundred higher than the weighted average prices in Tennessee weekly auctions. The average added value over the weekly auction prices amounted to \$77 per head or \$53,836 on the 696 calves. Extension has achieved similar results at five other locations in the state and one location in Kentucky.

Using the Independent Sector's hourly volunteer rate of \$17.19, the value of Master Gardener work to Tennessee communities in 2004 was \$786,330. This included the Memphis-Shelby County group that landscaped six Habitat for Humanity Homes. Putnam County Master Gardeners spent over 1,200 hours in constructing walkways, waterways and planting over 800 individual shrubs, trees, grasses and flowers to establish an outdoor classroom for to instruct young people about native plants, conservation and water quality.

Id. Assessment of Accomplishments

Multistate, multi-institutional, multi-disciplinary and integrated Research and Extension programs were numerous in the Goal One programs. Stakeholder input was extensively sought and used in Goal One programs; for example, the Center for Profitable Agriculture involves a 23-member Tennessee Value-Added Council that includes crop producers, value-added practitioners and representatives of all farm organizations in the state.

Ie. Allocations for Goal I

<p>UT 1862 Research – \$13,988,826</p> <ul style="list-style-type: none"> • Hatch – \$1,953,950 • Multistate 3(c) 3 – \$ 573,897 • McIntire-Stennis – \$112,952 • State – \$11,348,027 	<p>FTEs for Goal I – 315.8</p> <ul style="list-style-type: none"> • UT 1862 Research – 232.4 (42.8 scientist and 189.6 non-scientist) • UT 1862 Extension – 76.4 • TSU 1890 Extension – 7.0 (5.0 professional and 2.0 para-professional)
<p>UT 1862 Extension – \$6,333,959</p> <ul style="list-style-type: none"> • Smith-Lever b and c – \$1,351,626 • Smith-Lever d – \$13,732 • State/County – \$4,968,601 	<p>TSU 1890 Extension – \$398,498</p> <ul style="list-style-type: none"> • NARETPA Section 1444 and 1445 – \$288,334 • Grants and Contracts – \$43,008 • State/County – \$67,156



I.1 Key Theme: Agricultural Competitiveness (Value-Added, Marketing and Management)

Title: Tennessee's Value-Added Agriculture Initiative

Issue: Tennessee's farming sector continues to be stressed by low profit margins, scarce production resources and changing marketing conditions. 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. Value is often added to agricultural commodities and farm resources by various processing, packaging and marketing activities. To take advantage of value-added opportunities, Tennessee agriculture leaders and farmers need more awareness of opportunities and economic feasibility, planning and market development.

What has been done: UT Extension provided statewide programs and services in value-added agriculture through its Center for Profitable Agriculture that utilized a 23-member Value-Added Council that includes crop producers, value-added practitioners and representatives of all farm organizations in the state. In FY 2004, the Center's specialists provided one-on-one assistance and outreach in value-added agriculture. Regarding farmer projects and consultations, the specialists made 43 on-farm visits with 37 different farms, completed six project analyses and conducted 10 other farmer consultations. Publications and Teaching Tools included eight news releases, 10 video/radio program interviews, 24 fact sheets prepared and distributed, four quarterly reports/newsletters were distributed and four UT Extension publications were released. Teaching and training was provided at 53 different venues in 23 Tennessee counties and three other states to 2,310 persons.

Impact: One of the most significant impacts is the long-term value of the increase in knowledge and skills obtained by the 2,310 participants shown by post-program surveys, interviews and observation. Observations of program participants by their local Extension Agent show that based on their improved knowledge and skills gained from the Center's programs, various improvements at the farm level result.

As a result of these efforts, 30 income-producing, farm enterprises have been in various development stages in 2004. In addition, eight value-added farm enterprises were added and are positioned to increase net farm income. This represents 9.6 new jobs in the short-term. (Previous survey results by the Center indicate that each new value-added enterprise will create 1.2 new jobs in the short-term.) An example of the 30 farm enterprises is in Smith County. As a result of UT Extension efforts, a part-time farmer established a small apple orchard which came into production last year. Local marketing of the apples was successful, but with the help of his local Extension agent, he determined that value-added products would be more profitable. The farmer turned his raw product into apple butter, jellies, candied apples and apple turnovers, and marketed these products at the local farmers market and other sites. These products returned a net profit averaging four times that from whole apples and used some blemished fruit that would



have otherwise have been wasted. Whole apples averaged \$15 per bushel. By producing value-added items with just 10% of the crop, his income was increased by \$900.

Funding: Smith-Lever; Tennessee Farm Bureau Federation; special market development and initiative projects were funded through contracts with the Kentucky Center for Cooperative Development, Tennessee Farm Bureau's Value-Added Producer Grant Program, and the Tennessee Department of Agriculture

Scope of Impact: Multistate (KY)

Title: Beef Marketing (Including Marketing Methods for Feeder Cattle)

Issue: Local and state needs assessments indicate that Tennessee beef producers could greatly benefit from value-added strategies. Tennessee beef producers receive low prices due to producing and marketing calves: (1) without a health /management program, (2) in small numbers, and (3) without known genetic performance traits.

Approximately 80% of the feeder cattle produced in Tennessee are sold as individual animals through weekly livestock auctions. In many instances these animals are of unknown health/management programs and genetics are known only by color. Research has shown that calves marketed in uniform loads of 50,000 pounds are worth at least \$4 per hundred pounds more than calves sold as singles. The challenge is getting producers to give up some independence so that through a cooperative marketing effort, sufficient numbers of calves can be assembled to effectively market calves to achieve their full value.

What has been done: UT Extension used group meetings, phone calls, farm visits, newsletters, radio programs and newspaper articles to promote beef marketing practices. Extension emphasized marketing in truckload lots, group marketing and adding value to calves through such practices as vaccination and castration of bull calves.

Through written materials, county and area meetings, and demonstrations, beef producers and marketing agencies have been informed of the value of marketing truckloads of uniform calves which have recognized health/management programs and, if possible, of known genetics.

Impact: UT Extension's work to educate producers and marketing agencies lead to the McMinnville Area Feeder Calf Sale. This was the first all-weaned preconditioned feeder calf sale held in the McMinnville Area. Planning began with a meeting with the marketing agency in the spring. It was followed by an interest meeting of about 100 producers in late spring. The sale consisted of 696 feeder calves all of which had been weaned. They were all vaccinated and dewormed with the same brand of product. The calves were all graded and grouped into nine and one-half truckloads of uniform calves. The calves sold for prices ranging from \$6.60 to \$16.29 per hundred higher than the weighted average prices on Tennessee weekly auctions. The average added value over the weekly auction prices amounted to \$77 per head or \$53,836 on



the 696 calves. Similar results have been achieved at Sweetwater, Guthrie, Kentucky (Tennessee cattle), Fayetteville, Cookeville, Savannah, and in the Giles County Beef Alliance sales at Columbia. Other notable impacts included:

- In Giles County, 45 Beef Marketing Alliance members, including those in Limestone County, Alabama, were surveyed as to practices they had changed or adopted since beginning the Beef Marketing Alliance with UT Extension assistance four years ago. The group of 45 beef producers held a total of 6,480 cows, 238 performance-tested herd sires and 5,961 calves. Their adoption of 14 different practices, including castration of bull calves, vaccination of cows and calves, selling in truckload lots, group marketing and culling cows based on records brought the total economic impact for these 45 producers to \$1,043,471.
- In Marion County, 83 participants in on-farm field days indicated the following on their end-of-program questionnaire:
 - 95% indicated that the program met their need for information on beef cattle production.
 - 90% increased their knowledge of beef cattle grading.
 - 87% increased their knowledge of bull selection and genetics.
 - 90% increased their knowledge of the type of market animals desired by feedlots.
 - 84% plan to adopt the practices presented.
- In Perry County, four on-farm demonstrations included castrating, implanting, fly control, worming and vaccinating impacted five beef producers owning 240 cows. These producers increased weight an average of 230 pounds per calf, increasing income approximately \$48,000.
- In Wayne County, 28 producers marketed 1,616 graded feeder calves in a graded sale. M-1 calves were 70% of the graded run; M-2's were 21%. Figuring a \$3/cwt price gain for the graded and grouped calves, the 950,000 pounds of calves improved the producers' net income by \$28,500. Comments from producers included: "The e-mailed beef market report is the best thing Extension has ever done." One of the Wayne County beef producers, encouraged by UT Extension to sell calves with a marketing alliance, feels that he reaps an additional \$50 per head over traditional marketing efforts which means an additional \$6,000 this year.
- In White and Van Buren Counties, 60 producers have increased reproductive efficiency, improved animal performance and adopted recommended health practices. These management changes ultimately increased the marketability of local feeder cattle and allowed 31 producers to market 2,779 feeder cattle through a special area preconditioned sale; increasing feeder cattle value \$28.28 per head. These producers increased total returns by \$78,590.



Funding: Smith-Lever

Scope of Impact: Multistate (AL)

Title: Improving Farm Management in Tennessee

Issue: The changing structure of Tennessee's agricultural production and marketing is forcing producers to adapt better management and marketing practices. Farm families need financial education for developing short-term and long-term plans that can assist them in better decision-making.

What has been done: The MANAGE program is aimed at helping Tennessee farm families to carefully evaluate their individual situation and assist them in improving their quality of life. UT Extension routinely helps farm families review their current financial situation, capitalize on strengths and reduce weaknesses in the farm business, develop individualized farm and financial plans, explore alternatives both on and off the farm, evaluate capital investment opportunities including land and/or machinery purchases, analyze likely consequences of changing the scope of enterprises, and determine appropriate production practices. As part of its MANAGE program, UT Extension offered group education and one-on-one consultations in these areas: farm financial education, record-keeping, farm planning, computer applications, marketing alliances, partial budgeting and leases, farm policy or risk management.

Impact: In Upper East Tennessee, seven Farm Management and Marketing meetings reached 82 farms. The farm management and marketing presentations and hands-on classes resulted in at least 70% of the participants adopting new farm management and marketing practices. In the follow-up evaluation, some examples participants reported are using the Internet to watch market prices, using livestock ratios (calving percentage) to measure herd success, complying with an established health regimen and selling livestock in loads, and using artificial insemination to narrow the calving season. Record-keeping workshops involved 36 agricultural operations. Through an end-of-program questionnaire, participants reported the record-keeping methods learned would have a minimum of \$2000 value to their agricultural businesses each year. Most importantly, participants estimated a time savings of 5-20 hours per week by adopting the record-keeping methods learned.

In an eight-county area of West Tennessee, 30 farm families now have whole-farm business plans resulting from UT Extension's intensive one-on-one whole farm planning sessions. Another 30 farm families re-worked existing plans in 2004.

Funding: Smith-Lever

Scope of Impact: State Specific



I.2 Key Theme: Agricultural Profitability (Forage, Livestock and Crops)

Title: Managing Forage Systems to Reduce the Adverse Effects of Tall Fescue Toxicosis

Issue: Tall fescue covers 3.7 million acres in Tennessee. It is persistent, highly productive most of the year, and the forage base for 2 million cattle. Wild strains of *Neotyphodium coenophialum* fungus infest most tall fescue pastures. Tall fescue toxicosis results from consumption of the infested grass. The toxicosis problem results in annual losses in excess of 100 million dollars to the Tennessee beef cattle industry because animals consuming the infested grass have reduced weight gain, milk production, and fertility.

What has been done: This research has determined the importance of maintaining clover in tall fescue pastures to reduce the adverse effects of the alkaloids consumed by the grazing animals. The presence of 25 to 40% clover in tall fescue pastures was shown to reduce the adverse effects by one-half. A new clover cultivar was evaluated in pastures with and without the endophytic fungus that produces tall fescue toxicosis. This new clover has persisted better than the standard large white clover for the past two years. Bulls consuming infested tall fescue pass normal breeding soundness examinations but their semen has reduced fertilizing ability. A system to deliver supplemental arginine, an amino acid with potential to reduce vasoconstriction, to animals grazing infested tall fescue has been investigated. Forage management using clovers and supplementation of key compounds offer promise in reducing tall fescue toxicosis.

Impact: Work by the UT Experiment Station indicates that the reproduction problems in both bulls and cows grazing infested tall fescue occur during early fertilization. This information is important to improve the reproductive rates of the beef herds depending on tall fescue for the majority of nutrients. Timing of breeding to reduce exposure should improve reproductive competence. We have shown that the Jesup MaxQ tall fescue and Persist orchardgrass are persistent under Tennessee grazing conditions, thus providing our beef producers with alternative forages to improve animal performance.

Funding: Hatch funds, AgResearch of New Zealand

Scope of Impact: State Specific

Title: Making Tennessee Forages Work

Issue: Many Tennessee farmers lack high quality, efficiently-produced forages. This increases their feed costs. Lack of the control of annual weeds in forage crops is a major reason for low quality forages.

What has been done: UT Extension conducted local forage education programs in 70 Tennessee counties using direct mail, winter production meetings, radio programs, exhibits, demonstration plots, field days, farm visits and producer visits to their local Extension office.



Local programs emphasized how to best manage fescue and warm season grasses to improve feeding practices by utilizing feeding and storage pads, adding clovers to pastures, cutting hay at right stages, using some type of weed control, stockpiling fescue to reduce hay costs, and adding winter annuals.

Various field days and group meetings were held across the state. Demonstration plots were established to teach best practices in clover establishment and weed control. In West Tennessee, Hay Day was held for over 125 participants. The field day consisted of six educational stops dealing with various topics on or related to forage production. In East Tennessee, the Beef and Forage Field Day has attracted over 500 attendees over the past two years. Through forage field days at Experiment Stations, current research on Tennessee forage production was shared.

Impact: In Decatur County, 57 forage producers have increased their yields of forages by 500 pounds per acre or more by using warm season grasses with their KY31 fescue. They are getting 60 more days of grazing during the summer months, and this has increased calf weaning weights on the average of 40 pounds per calf or \$40 per head! These 57 producers are using recommended herbicides for weed control thereby increasing their hay value and yield on Bermudagrass for the horse market. Consider:

- Price on small bales was increased \$0.50 on 160-bales-per-acre or \$80 more per acre.
- 20 producers are using no-till to plant winter annual grasses in Bermuda for extra grazing or extra cutting in the spring saving \$500 per farm per winter on feed cost.
- Interviews conducted during farm visits show that 39 farmers estimate their calves are 50 pounds heavier this year due to the new sowing. 45 of these farmers stockpiled fescue this fall and calves were 80 pounds heavier at market time this year compared to last year.
- Decatur County producers built 30 new hay pads to store and feed hay in the winter reducing hay losses of \$600 per farmer per year.
- 38 Master Beef producers were surveyed after the program, and 100% were using one or more new recommendations in forage production; 12 had constructed hay pads to reduce storage losses of approximately \$7000 annually; four had tested their hay and increased the protein content from 8-10% by harvesting it at the correct stage.

In Pickett County, forage production has been emphasized by UT Extension over the past five years. A document review of 2000-2004 agribusiness sales records in the county showed the following:

- 2000 – less than 100 acres of pastures were renovated with clovers
- 2001 – 838 acres renovated with clovers
- 2002 – 1023 acres renovated with clovers
- 2003 – 966 acres renovated with clovers
- 2004 – 1050 acres renovated with clovers



The savings in nitrogen applications from clover establishment was \$11,780 in 2004, and \$43,499 for the past four years of the UT Extension forages program in Pickett County.

In 2004, 46 Wayne County producers (a 28% increase over last year) tested their forage land fertility. Figuring for viable period of three years for the average sample, for 930 acres producers are likely to experience an impact of \$61,380 to their forage program due to added yields of forages, and reduced wastage of soil amendments.

In McMinn County, 42 producers were taught about utilizing forage production systems to manage hay and pastureland, resulting in 20 producers either renovating or establishing forages in 2004. Through meetings and farm visits, 30 producers learned and utilized weed control recommendations for pasture and hay fields. By utilizing pasture renovation with legumes, weed control, hay production recommendations, planting small grain pasture and stockpiling fescue in the fall, or establishing bermudagrass stands, 12 beef producers with over 500 cows have reported increased calf weaning weights and decreased commercial feed and hay feeding costs, along with increases in hay and forage quantity and quality.

In Lewis County, interviews to determine practice adoption were conducted during farm visits with 18 producers. Results revealed that:

- 100% (18) had gained new knowledge of forage management practices.
- 60% (10) planned on utilizing Extension forage recommendations.

Following recommendations in the UT Extension publication Weed Control in Pastures and Hay Fields, 10 Carter County producers applied chemicals on 120 to improve forage stands of orchardgrass and fescue. This resulted in an increase of \$1,200 dollars on the 120 acres. Ten new acres of alfalfa were improved for the horse industry for a dollar impact of \$3,000.

In Weakley County, an estimated 400 acres of forage was established this year using UT recommendations. Forage samples representing over fifty tons of hay were tested by producers with the assistance of the agent. Rations were balanced to meet the nutritional requirements of each producer's herd. These rations allowed producers to maintain healthy herds without over feeding or wasting forages during winter months.

Over 136,000 pounds of seed were sold in Hardeman County for establishment and renovation of pastures and hay, and the county now has almost 4,000 acres of Vaughan No. 1 Bermuda. Forage testing increased over 10% during 2004. The agent has observed an increase of interest in the addition of clover and small grains to pasture as well as pasture renovation and weed control.

In Smith County, eight producers indicated they stored hay under cover. The average producer put up 150 round bales valued at \$25 per bale. Covered storage saved an average of 30%, or \$1125 per producer.



In Marion County, seven producers have added covers to outside-stored hay and one producer converted to total inside storage for an estimated savings in lost hay of \$400 annually for each producer.

In Perry County, 24 acres of Vaughn's Bermudagrass was established on two farms in 2004. The 260 acres established over the last four years yielded an average of 8.5 tons of forage per acre. These forages have superior nutritional value and have improved weaning weights and quality of calves sold. Producers submitted 13 soil samples for forage crops and renovated or reestablished 200 acres this year. Research shows adding clover increases weaning weight 146 pounds. This represents a \$29,200 increase in income to Perry County producers. The five producers participating in Value Added sales added approximately \$7,000 in income.

In Meigs County, 18 soil samples analyzed representing 400 acres of pasture and hay land fertilized properly for an estimated saving of \$10 per acre for a total of \$400. Three forage samples taken to balance rations for use with existing forages and the estimated savings from avoiding under or over feeding was \$200 per producer. 1,400 tons of hay were saved by proper storage practices at \$40 per ton for an estimated savings of \$56,000.

Funding: Smith-Lever; Hatch

Scope of Impact: State Specific; Integrated Research and Extension

Title: Research and Extension Enhance Profits for Tennessee Tobacco Growers

Issue: In about one-third of Tennessee counties, tobacco is a main source of income. Almost all tobacco transplants are now produced on floatbeds in greenhouses, which is an ideal environment for disease development. Diseases can dramatically reduce useable transplants and can even be transmitted to the field where stands and yields are further reduced.

Black shank is the most important disease problem facing Tennessee burley tobacco growers. Black shank annually reduces yield more than any other pest, consistently representing a 5-10% yield loss, which translates into a \$5-15 million loss in income. Needs assessment indicates that Tennessee tobacco farmers need education on tobacco production practices, including black shank resistant varieties. Additionally, research should evaluate production practices and develop new varieties to improve profits.

What has been done: 21 counties reported extensive tobacco education programs aimed at increasing tobacco profitability for low resource farmers.

In Middle Tennessee, the TN-KY Tobacco Expo provided over 500 growers and agribusinesses with the latest production information and research results. UT Extension, the Kentucky Cooperative Extension Service and the UT Highland Rim Experiment Station cooperated to plan and conduct the annual Tobacco Field Day. A summer test plot tour was conducted to share educational information and research data with tobacco growers.



In East Tennessee, Extension held the three day Burley Tobacco University to emphasize practices to earn greater profits. A multistate effort, the TN-VA-NC Tobacco Expo was held in Kingsport, Tennessee.

Over the past 15 years, researchers in the University of Tennessee and University of Kentucky tobacco breeding program have developed several new varieties with enhanced black shank resistance and increased yield potential. The most widely grown are TN 90 and TN 97. Under severe black shank conditions, a newer release, KT200, offers better yield potential. However, it has quality problems that make TN 90 or TN 97 a better choice for many producers under moderate pressure. UT Extension, through group meetings, publications, demonstrations and field day presentations, has conducted an extensive educational effort to inform Tennessee producers of the situations in which each of the varieties is best suited.

On-farm, integrated research continued in 2004. In Johnson County, five producers tested two new varieties (NC2002 and KT204). In Robertson County, seven result demonstrations evaluated 15 tobacco varieties for yield, disease resistance and quality. The Dark Tobacco Specialist, a joint position funded by the Kentucky Cooperative Extension Service and UT Extension conducted a Fungicide Treatment Research Study with test plots on actual farms.

Impact: At the TN-KY Tobacco Expo, 187 tobacco growers completed surveys. Results showed that because of their participation in Extension Tobacco programs:

- 82% increased their knowledge of recommended tobacco production practices.
- 89% planned to adopt the more profitable production or management practices.
- 79% indicated that the assistance from Extension had resulted in an increase in their net returns from tobacco and the average in net returns reported was \$4300 per tobacco grower.

KT 200 is grown on about 3000 acres of highly black shank infested land. The increased yield of the KT 200 on this land was estimated at 200 pounds per acre, or about \$380 per acre, for a total impact of \$1.2 million in 2004. On the 12,000 acres on which TN 90 and TN 97 are grown, the improvement in quality as compared to growing KT 200 was estimated at a value of \$100 per acre, or about \$1.2 million annually. In 2004, adoption of the proper black shank resistant varieties was estimated to have a value of \$2.4 million.

In Cheatham County, secondary data sources were used to document the Extension tobacco program's impact. Sales receipts and USDA Farm Service Agency records verify that 23 tobacco growers increased their average yield per acre by 352 pounds over the last 5 years through using the improved varieties and tobacco production recommendations taught by UT Extension. This resulted in combined increase revenue of over \$390,000 or \$16,956 per tobacco grower over the past five years.



Funding: Smith- Lever; Philip Morris USA grant; United States Tobacco Company grant; US Smokeless Tobacco grant;

Scope of Impact: Multistate (KY, NC, and VA); Integrated Research and Extension

Title: Tennessee Master Beef Producer Program

Issue: Although cow-calf operations are Tennessee's greatest source of agricultural income, cow-calf producers beef producers need up-to-date information and education to improve profitability and to be more competitive. Tennessee's cattle producers are in competition with all Southeastern states them in producing and marketing feeder cattle. Profitability of Tennessee cow-calf producers can be improved by "adding value" to feeder cattle before marketing and reducing costs of production.

What has been done: Input was secured from agricultural supply outlets, Tennessee Cattlemen's Association, Tennessee Veterinary Medical Association, Tennessee Livestock Producers and Extension specialists that represented various subject matter areas of the University of Tennessee Extension. As result, the Tennessee Master Beef Producer program was developed and 12 sessions were held across the state in 2004.

Impact: 331 producers from 32 Tennessee counties participated in 12 county or multi-county sessions during 2004. In the end-of-program questionnaire, producers were asked to provide expected monetary impact regarding their application of the technology and practices presented to their cow-calf operation: 29% said that the anticipated impact on their operations ranged from \$1,000 to \$2,000; 26% reported between \$2001 - \$5,000; 9% reported between \$5,000 - \$10,000; and 9% reported \$10,000 or more.

Funding: Smith-Lever; Tennessee Department of Agriculture Grant

Scope of Impact: State Specific

Title: Improved Beef Cattle Genetics

Issue: Many beef producers do not fully understand the impact that use of improved beef cattle genetics can mean to their bottom line. Most herds have cows that were derived from use of one or more breeds of bulls over a period of years. Use of superior sires can not only improve weaning weights, but subsequent performance for buyers of feeder calves. In addition, the heifers saved from these matings can further improve the cow herd in future years. If buyers have available information about the expected performance of feeder calves based on genetics and tests on previous calf crops, they should be willing to pay higher prices for those calves.

What has been done: A demonstration and research project to show the value of improved genetics in beef herds was conducted on 17 farms in 16 Tennessee counties. 800 females were



synchronized and bred artificially to proven superior sires based on their Expected Progeny Differences. Clean-up bulls with similar performance traits were provided to each demonstrator. The calf weaning weights from the owner's previous genetics were compared to the weaning weights of the improved genetics. On 15 of the herds, the calves were weaned and fed a post weaning ration for approximately 45 days.

Impact: The average increase in weaning weights was about 40 pounds per calf. The estimated value of the added weight is \$1 per pound and the 700 calves averaged 500 pounds, making the impact on these demonstrators approximately \$28,000. The added impact of marketing uniform groups of calves cooperatively could add \$4 per hundred to prices.

Funding: Smith-Lever; Hatch

Scope of Impact: State Specific; Integrated Research and Extension

Title: Improving Meat Goat Management

Issue: Goat production is a growing industry in South Central Tennessee, and the area's goat producers tend to farm a small acreage of limited resources. According to the Farm Service Agency, there are over 300 goat producers in just four counties alone (Giles, Lincoln, Maury and Lawrence). Educational programs and field day events offered by the TSU and UT Extension to assist these producers in everyday situations such as risk management, nutrition, parasites, genetics, and marketing practices associated with goat production.

What has been done: UT and TSU Extension county agents and area specialists worked to plan and conduct educational programs and field days. Newsletters, flyers, and radio programs focused on improving goat herds. One TSU Specialist made contact with over 131 goat producers in three counties to assist with production management and record keeping. A multi-county field day was conducted to share research and risk management practices with the producers. A multi-county goat meeting was conducted to share research and management practices including production, disease prevention and treatment, and marketing factors in goat farming. Partners included the Farm Service Agency, TSU State Goat Specialist, Tennessee Farmers Co-op, and a local veterinarian.

Impact: In Giles, Lincoln and Maury Counties, according to questionnaire results and end-of-program surveys, 105 producers out of 131 (80%) noted they adopted at least one practice taught in the meetings and field days and applied it to their own farm situation. In addition, of the 131 goat producers,

- 63% increased income by \$62,000 in doe and buck sales for 2004.
- 60.% improved fencing and facilities for their goat herd
- 46% noted an increase in goat sales by targeting certain ethnicities and holidays
- 43% recorded a decrease in parasites and disease



- 17 participants got into goat farming by attending the multi-county meetings and field day.

In Marshall County, 22 goat producers were not using records of any kind, but are now keeping accurate records to manage their goat operation. In Franklin County, TSU Extension surveys indicated seven goat producers saved 70 goats by using information gained from attending the Goat Management Workshop. The 70 goats (\$60 per head) are valued at \$4,200. A Moore County 4-H member traveled to Belize to conduct talks and demonstrations for Central American 4-H'ers and adults on goat production.

Funding: NARETPA Sections 1444 and 1445; Smith-Lever; TSU Program Enhancement Grant; Local Donors

Scope of Impact: State Specific

Title: Basic Feeding Management Practices for Horses

Issue: New horse owners do not have the knowledge to properly care for and manage a horse(s). Therefore, most are seeking reliable information on management, care and health of their horses.

What has been done: UT Extension held 30 group meetings targeted at horse owners, particularly the new and novice horse owners, across the state. The goal was to increase the nutritional know-how of horse owners to improve management of their horse(s). Teaching materials included fact sheets, slide presentations, videos, nutritional feed samples and plastinated parts of the horse's digestive tract. The control of infectious diseases and the control of internal parasites of horses were emphasized in vaccination and deworming clinics.

Impact: Over 2,000 horse owners (owning in excess of 8,000 horses) participated in this series of meetings with 10% of the attendees submitting hay for analysis and subsequent feeding recommendations. Since the meetings, follow-up with the horse owners by Extension agents has indicated that the majority decreased feed costs by \$12 per head per month. This represents a \$1.1 million savings in feed costs.

Over 400 horse owners (owning in excess of 2,000 horses) participated in the vaccination and deworming clinics. As a result of this educational effort, participants were able to save \$40 annually per head from deworming and \$20 per head from vaccinations resulting in a total savings to horse owners of approximately \$120,000 per year.

Funding: Smith-Lever

Scope of impact: State Specific



Title: Limiting the Threat of Horseweed to No-Tillage Crops

Issue: Farmers in Tennessee and the Mid-South are facing an epidemic of glyphosate-resistant (GR) horseweed threatening no-tillage crop production and crop yields.

What has been done: Tennessee researchers have identified the most effective and economical solutions for managing GR horseweed and together with the Tennessee Extension Weed Specialist and members of the 'Weed Team' have disseminated the solutions via presentations at professional, commercial and commodity meetings, at workshops, in articles published in farm press and trade publications, in videos, by direct mail and email, and websites.

Impact: Tennessee producers implemented the research-based recommendations in 2004 and experienced excellent GR horseweed control and the highest crop yields in recent history. All of this was achieved with nominal additional cost (less than \$10 per acre) to the producers for herbicides while conserving at least 10% of the crop yield potential, or about \$40 million; a net value of \$20 million over cost of control. This does not include the value of maintaining no-tillage cropping systems, especially on erodible soils.

Funding: Hatch

Scope of Impact: State Specific

Title: Cotton Agronomy and Physiology Research

Issue: Cotton remains a major field crop of Tennessee, producing annual farm revenues exceeding \$200 million, and adding over \$1 billion to Tennessee's economy each year. Profitable crop management remains challenging, as yields and fiber quality fluctuate from year to year, while costly new technologies are offered to producers. Improved cultivars, management practices, and cropping systems can improve Tennessee cotton production efficiency. Agronomic and physiology research is needed to develop more profitable, sustainable, and technically sound production systems as well as improve the efficiency of yield formation in cotton.

What has been done: In 2004, the Cotton Agronomy and Physiology Project evaluated the growth and development traits of 30 new experimental and transgenic cotton varieties in a grower-supported study. Other responses included:

- continued a potassium nutrition study of contrasting varieties using long-term soil fertility plots, and showed these plots at the West Tennessee Experiment Station Cotton Field Day in August.
- published results of a regional study of harvest-aid timing based on heat-unit accumulation in diverse environments.



- collaborated in a regional core-funded project to evaluate and adapt existing methods to statistically evaluate the stability of yield and fiber properties of cotton germplasm tested in the North Delta region.

Impact: The Project's regional study of harvest-aid timing based on heat-unit accumulation contributed new information to improve a popular heat-unit model for use in diverse field environments, by incorporating a yield predictor. The Project's regional study determined and reported the last effective boll population in two contrasting cropping systems. This advancement also improved calibration of a popular decision-aid program for use in different cotton cropping systems. The Project's early evaluation of new cotton varieties influenced decisions of seed companies to release and market new cultivars in Tennessee in 2004. Specific growth and development traits of varieties and strains that contribute to yield and earliness of maturity were reported to producers and the seed industry.

Funding: Hatch; Cotton Incorporated

Scope of Impact: Multistate (MS)

Title: On-Farm Research and Extension Improves Northwest Tennessee Grain Production

Issue: In addition to hybrid/variety selection, producers are struggling to keep up with emerging cultural management decisions, including seed treatments, fungicide efficacy, seed technologies and seeding rates. As seed treatments and technology traits, that add value for producers, increase the cost of seed, producers need to fine tune their planting rates to improve their efficiency and lower seeding cost. Improving yields while limiting cost inputs will keep our producers in a competitive position.

What has been done: UT Extension developed the County Standardized Hybrid/Variety Test to enable producers to identify locally available superior hybrids/varieties with superior disease-resistant characteristics for use on their farms. In Tennessee, 27 counties participated in the trials, and two UT Experiment Stations also participated. In Western Kentucky, three counties participated. Over 167 demonstrations were conducted including: 1,376 corn, 1,179 soybean and 180 wheat variety plots in cooperation with area producers. These plots involved: 107 corn/milo hybrids, 114 soybean varieties and 18 wheat varieties. Moreover, 13 counties conducted 30 comparisons of corn seed insecticide treatment demonstrations. These data were disseminated to producers through 25 production field days/meetings involving 1,493 producers including 259 agribusiness personnel, various county newsletters mailed directly to producers, power point programs, posting of variety and agronomic data on the Extension/Experiment Station Website, agribusiness visits, and individual contacts (office, phone and farm visits) in an effort to encourage adoption of practices. Individual county surveys, multiple county area surveys, agribusiness surveys and end of year follow-up surveys conducted and analyzed to determine programming impacts and focus for future extension programming.



Impact: The impact in the six-county area of Northwest Tennessee follows. Producer adoption (92%) of planting superior performing hybrids/varieties identified from the county standardized test resulted in some \$11.4 million additional income without increasing cost. The \$11.4 million increase resulted from an increase of:

- 6.98 bushels per acre or \$16.40 per acre for corn.
- 1.74 bushels per acre or \$12.62 per acre for beans.
- 4.25 bushels per acre or \$13.47 for wheat.

As a direct result of producer adoption of planting superior performing, disease resistant, site specific hybrid/variety selections, producers are diversifying their planting decisions. End-of-year surveys indicated corn producers planted 44 hybrids on 31,089 acres in 2003 compared to 64 hybrids on 24,053 acres in 2004. Soybean producers planted 49 varieties on 45,938 acres in 2003 compared to 61 varieties on 45,573 acres in 2004.

Adoption of recommended production practices was measured from a sample of 50 producers who are interviewed on their farms at harvest time. Adoption levels of disease-resistant varieties included: 65% of producers adopted disease-resistant of corn varieties and 91% of producers adopted disease-resistant soybean varieties.

Wheat producers were also targeted for greater adoption of profitable production practices. One-half of wheat producers in Northwest Tennessee have adopted Gaucho seed insecticide treatment or synthetic pyrethroid insecticide spray treatment for control of aphids. UT Experiment Station and the county standardized test indicate 5.5 bushels per acre yield advantage. The adoption of this practice alone resulted in an additional \$1.12 million income for the region's wheat producers.

In addition, reduced seeding rates of premium priced soybean varieties can reduce production cost without sacrificing yield. 39% of producers indicated they decreased seeding rates this year to 166,000 seed per acre compared to the 61% unchanged seeding rate of 178,000 seed per acre. The difference of 12,000 seed per acre at 3,000 seeds per pound resulted in a savings of four pounds per acre, saving producers an estimated \$462,384.

Funding: Smith-Lever; Tennessee Soybean Promotion Board; Private Seed Companies

Scope of Impact: Integrated; Multistate (KY)

1.3 Key Theme: Innovative Farming Techniques

Title: UT Research on Biodiesel Production Influences New State Law

Issue: Adding value to farm products through additional processing is one method to increase farm and rural incomes. In the past several years, interest in using agricultural crops or residues



to generate electricity has grown. Use of bio-energy cannot only help reduce air emissions, but can also help increase incomes in rural areas. This study examined soybean producers' views on market viability of using soybeans to produce bio-diesel (diesel from bio-based products that can be blended with conventional diesel). Second, producers' views on investing in a New Generation Cooperative were also examined. Third, the business structures of traditional cooperatives, New Generation Cooperatives, and other types of businesses were examined.

What has been done: A study of soybean producers' attitudes toward forming a New Generation Cooperative and producing bio-diesel was completed by surveying 561 Tennessee soybean producers. The results showed significant interest on the part of producers to sell to or invest in bio-diesel processing facilities. Many producers believe bio-diesel will make a strong contribution to soybean markets. While the analysis did not show sufficient supply/investment funds available to support the selected facility size at this time among Tennessee producers, the potential should be examined further. Soybeans could be drawn across state lines into Tennessee. Also, as the market grows, Tennessee producers' interest may intensify. As part of this study, alternative business structures, including a New Generation Cooperative, were examined.

Impact: Results from this study paved the way for a new state law on cooperatives. When the project was initiated in 2002, a lawyer was employed to draft a new state law regarding cooperatives. This draft was submitted to the Tennessee Legislature last year and was subsequently amended by Tennessee Farm Bureau lawyers.

In 2004, the Tennessee Cooperative Processing Act was passed. This law has expanded the business structure opportunities for producers to add value to their products through further processing. It will allow for producers of agricultural commodities to increase the value of their products by forming a cooperative that can operate with less than 50% producer share of investment. Now, Tennessee farmers are allowed to participate in bio-refineries, and other capital intensive, value-added manufacturing/processing activities.

Funding: Hatch

Scope of Impact: State Specific

Title: Agricultural Structures and Livestock Production Facilities Planning

Issue: Mistakes in building construction are quite common. Some of the mistakes are easily corrected, but most are not. Oftentimes the errors in constructing agricultural and livestock production facilities stem from the failure to start with a complete building plan. Inadequate planning, poor site selection, inefficient farmstead arrangement, and improper ventilation can also produce negative environment impacts. It is not possible or even practical to correct all the existing mistakes in construction; however, future errors can be minimized with adequate plans and planning.



What has been done: On-site planning assistance was provided to ten different agricultural producers to demonstrate the cost effectiveness of forward planning in the construction of their facilities. Eleven special plans were prepared to assist these and other producers in planning their new and/or remodeled agricultural facilities.

Approximately 1000 standard plans for a wide variety of agricultural structures and livestock facilities were distributed. Approximately 45 percent (450) of these plans were distributed to Tennessee residents. Most of the requests for plans were generated as a result of posting the *Agricultural Building and Equipment Plan List* on a UT Extension website. Internet requests from 202 individuals for 799 plans were received. These requests came from Tennessee, 41 other states, one territory and four foreign countries. In an effort to reduce the time and expense required for mailing plans, an additional seven plans were listed on the web site for direct access and download by on-line visitors. The use of these electronic files has continued to increase as they were accessed over 290,000 times during 2004.

Impacts: The costs of inadequate planning, poor site selection, inefficient farmstead arrangement, improper ventilation, and unsafe facilities do not appear in monthly expense statements; they appear in the form of increased labor, feed, medication, and manure handling costs. The effects of construction errors are therefore not easily quantified because they are confounded with the effects of management practices.

Conservatively, the 11 agricultural producers which were assisted experienced an average savings of at least \$2,750 in construction costs. In other words, a total construction cost savings of \$30,250 resulted from the use of research-based planning advice on these farms. The savings were mainly from decreased costs of concrete in the suggested plans compared to what would have been used in the producers' original planning ideas.

The use of more efficient facilities will reduce the average operating costs on these 11 farms by at least \$75 per month over the 25-year life of the facilities. The total operating cost savings is estimated at \$198,000. The long term savings will stem primarily from reduced labor for cleaning, reduced maintenance, and increased production resulting from improved animal comfort.

Funding: Smith-Lever

Scope of Impact: International

Title: Selenium Nutrition of Tennessee Beef Cattle



Issue: Selenium is a micronutrient that originally was considered as a toxic compound. More recent research showed that selenium, while still toxic at high levels, is an essential nutrient that plays a role in animal performance, immune function, and health. Selenium content of plants is taken up from the soils and the soils in Tennessee are known to be marginal to deficient in selenium. Additionally, selenium supplementation rate and the form of selenium supplemented to cattle are regulated and limit beef cattle producers' ability to supplement selenium to meet the beef cattle requirements.

What has been done: Forage samples were collected from the spring and fall forage growth of counties across Tennessee. These samples were analyzed for selenium concentration and compared to the requirements of beef cattle. Additionally, an organic form of selenium was evaluated to determine if it would be more available to the cattle than the inorganic forms currently available. This included evaluation of tissue selenium residues to ensure that selenium concentrations would not be above a range considered normal for human consumption.

Impact: In the forages tested, the average concentrations of selenium were only half that required to meet the needs of beef cattle. This indicates that Tennessee beef cattle are in need of supplemental selenium. The organic form of supplemental selenium tested increased short (plasma) and long (muscle tissues) term body stores of selenium in beef calves. While long-term storage of selenium was improved with the organic selenium supplementation, it did not result in tissue concentrations that would be of concern when entering the human food chain. This research demonstrates the need and enables producers to meet the selenium requirement and improve the immune function and health of their cattle.

Funding: Hatch

Scope of Impact: State Specific

Title: Diagnosis of Fruit, Vegetable and Tobacco Problems

Issue: Prompt diagnosis of plant growth problems is key to profitability in the commercial fruit, vegetable and tobacco crops. Speed can be of paramount importance in avoiding unacceptable losses in production.

What has been done: A stakeholder survey was conducted in 2004 to determine the impact of the plant diagnostic lab operated by the University of Tennessee Entomology and Plant Pathology Department. The personnel of this Nashville-based lab conduct diagnoses for plant samples submitted by mail, hand delivery, and digital images (Distance Diagnosis). Expert opinion and objective clinical procedures are used to make diagnoses and provide remedial advice.

Impact: According to commercial clients who provided estimates in the stakeholder survey, the median savings was \$800 per sample, as a result of avoiding potential crop losses. Using this



value, the 400 fruit, vegetable, and tobacco samples processed by the diagnostic center in 2004 represented about \$320,000 worth of savings. If the educational aspect of diagnoses is considered, the value is much greater because the grower is able to recognize the problem in the future and can immediately take remedial action without the need for diagnosis.

Funding: Smith-Lever

Scope: State Specific

1.4 Key Theme: Urban Gardening and Home Horticulture

Title: TSU Memphis Urban Gardening Program

Issue: People who participate in gardening eat more nutritious meals and exercise more than non-gardeners. They also save money on food. Perhaps more importantly, community gardens help bring neighbors together, create opportunities to educate youth, help the needy, and encourage people to pass on their cultural heritage.

What has been done: The Memphis Urban Garden Program is an educational program that addresses vegetable production, preservation and its nutritional value to urban citizens. The program's objective is to improve knowledge, skills, and sense of accomplishment in vegetable production, preservation and its nutritional value and also to improve vacant lot conditions in urban neighborhoods. The TSU Extension Agent trained 24 volunteers, enrolled 750 residents and presented three educational seminars to 340 gardeners. 47 gardeners traveled to Nashville for an educational field tour to gain knowledge and research-based information in vegetable production and harvesting.

Impact: In 2004, 750 residents participated in the Memphis Urban Garden Program, producing over 20,000 pounds of fresh produce saving a combined \$200,000 in food costs for participants.

Funding: NARETPA Sections 1444 and 1445; City of Memphis Housing and Community Development

Scope: State Specific

Title: Master Gardeners Create Cleaner, Greener Tennessee Communities

Issue: Trained and knowledgeable volunteers are essential to a successful consumer horticulture program, thus illustrating the significance of the Master Gardener volunteers. In Tennessee there are approximately 2,000 active Master Gardener volunteers in 44 counties. The Master Gardener program is an effective link between Extension and the home gardening community. Trained volunteers are used to educate home gardeners and community groups on a wide range of gardening topics, using research based information.



What has been done: UT and TSU Extension worked with over 2,000 Master Gardeners in 2004 in 26 county programs. In 2004, an additional 873 Master Gardeners were trained in the state. The Master Gardener volunteers contributed 45,743 hours to various community horticulture projects.

Impact: Using the Independent Sector's hourly volunteer rate of \$17.19, the value of Master Gardener work to Tennessee communities in 2004 was \$786,330. Examples of the knowledge and skills gained and community service work completed includes the following highlights.

Follow-up surveys of recent Sullivan County Master Gardener workshops have shown over a 70% success rate for grafting. In fact, 1,000 rootstocks were distributed to 60 grafting workshop participants. At a 70% success rate, that is 700 grafts. At a value of \$15 per tree, this is a value of \$1050 to the participants. Master Gardeners coordinated a gardening series consisting of 11 sessions in an inner city area of Kingsport targeting the minority population.

In Shelby County, the Master Gardeners landscaped six houses for Habitat Humanity. This saved Habitat Humanity over three thousand dollars.

Montgomery County Master Gardeners contacted 1,480 homeowners representing minority racial or ethnic groups to increase their knowledge of proper gardening and home horticulture practices.

In Bradley County, the 18 graduates of the 2004 Master Gardener program completed a pre and post-test to determine the knowledge and skills gained about recommended horticulture practices. Test scores concerning recommended soil testing procedures increased 33% (from 64.5 on pre-test to 98.1 on post-test). Scores pertaining to insect and disease control measures increased 53% (from 44.4 on pre-test to 97.9 on post-test).

Williamson County Master Gardeners sponsored a Gardening Day Camp for youth. One parent of a youth camper stated "It is one of the best camps my children have ever attended. I have never before seen such time and effort put into a day camp."

Putnam County Master Gardeners spent over 1200 hours in constructing walkways, waterways and planting over 800 individual shrubs, trees, grasses and flowers to establish an outdoor classroom for the children and youth in both Putnam and White counties. The site will instruct young people about native plants in the Upper Cumberland as well as conservation and water quality.

In Meigs County, 12 Master Gardeners learned how to properly take a soil sample and interpret soil sample results. Pre and post-test results revealed the following:

- 35% increase in knowledge regarding soil fertility, soil pH and liming.
- 40% increase in knowledge related to insects and diseases.



- 25% increase in knowledge of annual and perennial selection.
- 60% increase in knowledge related to irrigation and types of irrigation systems.
- 56% increase in knowledge of production practices and variety selection.

Funding: Smith-Lever

Scope of Impact: State specific

1.4 Key Theme: Fruit/Vegetable Production

Title: UT Extension Promotes Hawkins County Fruit and Vegetable Production

Issue: Agriculture has changed dramatically in Hawkins County. Due to tobacco quota cuts, high tobacco lease prices, and a shrinking profit margin in the beef industry, Hawkins County farmers were searching for alternative/additional crops capable of producing a viable income.

What has been done: During the eight year period from 1997 to 2004, UT Extension conducted various group meetings, including a multi-day vegetable school. Fruit and vegetable farm visits were made to assist producers with disease and insect diagnosis, irrigation, spray schedules, and plant nutrition. Newsletters reinforcing fruit and vegetable production practices were widely distributed in the county. In 2004, contacts with farmers in the county included 1,532 contacts in group meetings and 478 contacts through farm visits. The pumpkin variety research trial, an integrated Extension and Research effort, was also conducted on various farms in the county.

Impact: From 1997 to 2004, UT Extension helped Hawkins County farmers to find new cash crops. Producer interviews confirm that:

- Harvested vegetable acreage increased from 60 acres to 312 acres over the eight years.
- Cantaloupe production increased from six to 58 acres over the eight years, an increase of 966%.
- Sweet corn harvested for sale increased from 21 to 68 acres.
- Pumpkin production increased from six acres to approximately 140 acres.

In 2004, Irrigated acreage was up approximately 8% over production year 2003, totaling approximately 150 acres of vegetables.

Funding: Smith-Lever

Scope of Impact: State Specific; Integrated Research and Extension

Title: Crop Protection for Tennessee Commercial Pumpkin and Squash Growers



Issue: Powdery mildew is a common disease of cucurbit crops such as pumpkins and squash. It is controlled primarily with fungicides. Control was becoming more difficult for Tennessee commercial pumpkin and squash growers because the recommended spray program was not performing as well as it had been.

What has been done: UT Extension conducted a survey of commercial pumpkin growers' fields. The survey confirmed what was suspected based on the University's field trials: Powdery mildew had developed resistance to one of the primary fungicide classes (strobilurins) used to control it. In the survey, samples were collected from growers' fields and used to inoculate treated plants in the greenhouse. Fungicide classes other than the strobilurins were found to provide good control. The powdery mildew control recommendations were revised to reflect the findings. The strobilurin fungicides were deleted from the recommendations for powdery mildew control, and adjustments were made in the cucurbit spray program for other diseases.

Impact: The survey and educational program resulted in a savings of \$365,000 to growers of cucurbit crops.

Funding: Smith-Lever

Scope: State Specific

1.5 Key Theme: Green Industry, Greenhouse, Turf and Nursery Stock

Title: Improving Effectiveness of Tennessee's Green Industry

Issue: The Green Industry in Tennessee includes ornamental horticultural producers and service providers in landscape design, construction and maintenance. Consumers prefer safe, low-maintenance, sustainable and aesthetically pleasing landscapes that do not negatively impact the quality of the state's natural resources. Industry professionals and consumers are often ill-informed about choice of ornamental plant species and management practices to increase economic efficiency while encouraging conservation of environmental quality.

What Has Been Done: Education programs were delivered to landscape service professionals, including tree care providers, in three metropolitan areas through a series of workshops. Additional educational programs were presented in other urban and rural counties. Through cooperation with producers and professional associations, educational programs were presented at meetings of Tennessee Nursery and Landscape Association, Tennessee Turf-grass Association, Tennessee Flower Growers Association, Southern Greenhouse Conference and Trade Show and field days and demonstrations at UT Arboretum and Knoxville and Greenville Experiment Stations.

Impact: The programs for landscape service professionals served more than 300 participants from the professional landscape service sector. An end-of-program survey revealed that 95%



will adopt at least one new practice as a result of the training. Over 1,000 professionals from the Green Industry and at least 400 consumers and advanced gardeners were served at various sites throughout the state. The Landscape Field Day at the Knoxville Experiment attracted an audience of over 200. End-of-program questionnaires showed that:

- 85% declared that the program was informative.
- 83% plan to implement at least one new practice in landscape management.

Funding: Smith-Lever

Scope of Impact: State Specific

Title: Heat Tolerant Bluegrass Research

Issue: Tall fescue is the primary turfgrass used for home lawns in Tennessee, and disease and heat are annual killers for this particular species. Kentucky bluegrass is another desirable cool season turfgrass species that has limited use in Tennessee because of the hot and humid summer. As a result bluegrass sales in Tennessee are typically less than 1,000 pounds annually. In the past few years turfgrass breeders have developed improved bluegrass cultivars by crossing Kentucky bluegrass with Texas bluegrass. A result of the hybrids is a turfgrass with visual characteristics of Kentucky bluegrass and the heat and disease tolerance of the Texas bluegrass. However, since this is a relatively new hybrid little is known about its adaptability to Tennessee.

What has been done: Extensive research has been conducted at the University of Tennessee to investigate the use of improved heat tolerant bluegrass varieties for use as a home lawn species. Mowing height, fertility rate and time, and disease tolerance has been researched for the past two years.

Impact: Research has determined that heat tolerant bluegrasses are well adapted to the Tennessee climate, and actually perform better than tall fescue with respect to heat and disease tolerance. As a direct result of the research conducted at the University of Tennessee, heat tolerant bluegrass sales for 2004 have exceeded 20,000 pounds. This has benefited everyone involved. Quality research is being conducted, and the sales have been exceptional, and most importantly homeowners are happier with a better home lawn.

Funding: Hatch; Smith-Lever; Scotts Company; Tennessee Turfgrass Association

Scope of Impact: State Specific; Integrated Research and Extension

Title: Improving Bermudagrass Sports Turf



Issue: Poor water drainage is a major cause of turfgrass loss on athletic fields. However, the installation of conventional subsurface drainage systems using perforated pipe four inches in diameter is very expensive and often damages the sports turf surface. New technologies are available to improve surface water drainage from turf surfaces with minimal soil movement and disruption of the playing surface.

What has been done: Extension conducted two demonstrations, one at Central High School in Knoxville and another at the Mike Rose Soccer Complex in Memphis, to show sports turf managers how drainage on high-use, heavily compacted athletic fields can be improved using new trenching and sand-insertion technologies. A demonstration of the benefits of applying dairy-waste compost topdressing on a heavily trafficked bermudagrass practice football field at Dickson High School continues.

Impact: More than 130 of the 190 sports turf professionals from Tennessee, Kentucky, North Carolina, Texas and New Mexico receiving update information regarding sports turf management practices indicated that they learned about at least three new methods, products or technologies. Of those 130, 38 intend to find out more about or use locally available compost in an effort to improve soils and the overall quality of sports turf surfaces.

Funding Source: Smith-Lever

Scope of Impact: Multistate (KY, TX, NC, NM)

1.6 Key Theme: Small Farm Viability

Title: Improving Production and Marketing of Alternative Crops

Issue: Cuts in tobacco quotas, lower and unstable commodity prices, and decreased profit margins, and an anticipation of a tobacco buyout are forcing small farmers to diversify their product base (mainly through fruit and vegetables), add value to their products, and increase their ability to effectively market their products, which indirectly includes increasing the educational awareness of potential consumers. The target audience for this program includes small to mid-sized farm owners, minority and/or underserved farmers and landowners who want to increase/supplement farm income through better production, management and implementation of alternative crops.

What has been done: Workshops that help increase overall production and marketing of crops have been offered to producers and the general public. Research and demonstration plots have also been implemented on a variety of crops with data being collected through the year and culminating in a field day. Some of the programs offered were: Alternative Ag Conference, Sweet Potato School, Strawberry Plasticulture Field Day, Montgomery County Ag Showcase. Specific topics included: successful marketing and management techniques, beginning an agritourism enterprise, proper crop production practices, weed, pest, and insect management,



value-added products, implementing innovative techniques (plasticulture), irrigation management, and direct sales methods.

Impact:

- Survey results from The Alternative Ag Conference indicate that 96 participants estimated that the skills they gained would help them save or earn a total of \$59,500 annually due to better production methods or marketing. This is an average of over \$2,000 per person. 34% of participants stated that they would be using information accessed at the conference to help them produce new specialty crops and/or pursue a new marketing approach.
- Post-test only data from The Strawberry Plasticulture Field Day (40 participants) showed that 80% felt they could more effectively control insects, diseases, weeds, and utilize IPM with this technology. 78% were more likely to implement drip irrigation and/or plasticulture, thus saving money/increase profitability due to improved fruit quality, yields, and less pesticide use.
- In the past two years over 120 people attended The Ag Showcase and 75% of producers reported increased sales due to return visits or publicity from the Ag Showcase. Four agri-tourism enterprises were expanded and one new enterprise was started.

Funding: NARETPA Sections 1444 and 1445

Scope of Impact: State Specific

Title: TSU Improves Small Scale Vegetable Production

Issue: According to Giles County Farm Service Agency, most producers do not report to FSA office because financial assistance was not available. For this reason, more small scale vegetable growers were being over-looked and under-represented. There was a need for small-scale vegetable producers who produce good, quality produce to serve local consumers. Several vegetable producers in Lincoln County expressed the significance of being educated through Extension to produce quality produce and make a profit. An agricultural advisory committee, organized by TSU Extension, spoke of how crucial it was to support the small vegetable farmers in the area.

What has been done: The specialist formulated an up-to-date listing of vegetable producers in Giles, Maury, and Lincoln counties. Meetings were conducted emphasizing the importance of collecting soil samples to determine what nutrients were needed to get the maximum production from vegetables. An Extension Specialist conducted a cool-season vegetable crops meeting; provided technical and educational assistance to local vegetable producers; developed a newsletter full of timely tips to control weeds and wild grasses; prepared radio programs on controlling insects and disease; conducted on on-farm demonstration focused on equipment calibration for vegetable gardens and pastures. Over 95 vegetable growers in Giles, Maury, and Lincoln counties were assisted. In Franklin County, the beekeeping enterprise was also taught



through bi-monthly meetings and a hands-on field day in conjunction with the Elk Valley Beekeepers Association to educate new beekeepers on hive management techniques.

Impact:

- According to end-of-program surveys, observation, interviews, and farm visits, 71 vegetable producers in Giles, Lincoln and Maury Counties noted an increase in crop sales after attending meetings and obtaining TSU Extension assistance.
- 59 vegetable producers reported a combined \$27,000 in increased income from crop sales.
- 94% noted a decrease in insect/disease problems after applying recommended ingredients and applications.
- 96% adopted management skills taught by agents and specialists.
- 44 producers increased knowledge of raised-bed vegetable production and management.
- In Franklin County, 11 producers adopted more profitable vegetable production practices, including plastic mulch production techniques, new fungicide spray schedule, and the disease diagnostic lab. Two beekeepers became certified to inspect bee hives and eight beekeepers increased their number of bee colonies by 34. The total estimated economic benefit to these 14 small farmers was \$59,100, or just over \$4,000 per farm.

Funding: NARETPA Sections 1444 and 1445

Scope of Impact: State Specific



Goal 2 – A Safe and Secure Food and Fiber System

2.0 Overview

2a. Results

In FY 2004, Research and Extension efforts were focused on food safety in production, processing and consumption. Programs with statewide impact included: The Expanded Food and Nutrition Education Program (EFNEP), the Tennessee Nutrition and Consumer Education Program (TNCEP), Beef Quality Assurance, and research in food quality, foodborne pathogen protection and food security.

Major research findings included the UT discovery that a flow cytometry method provides a very effective means of diagnosing Johne's disease in cattle. Johne's disease caused by *Mycobacterium avium* subsp. *paratuberculosis*, is one of the most widespread and economically important diseases of livestock and wild ruminants worldwide.

2b. Highlights

EFNEP utilized 53 paraprofessionals trained by eight Extension agents and state specialists delivered food safety education to 6,762 low-income families (24,693 individuals) and 15,932 low-income youth in FY 2004. With the adult audience, paraprofessionals focused on the importance of personal hygiene, keeping foods and juices that harbor pathogens away from other foods, cooking foods to the recommended internal temperatures, refrigerating perishable foods within two hours of serving and avoiding food from unsafe sources. With youth audiences, the importance of proper handwashing before and after handling food, keeping hot foods hot and cold foods cold and keeping pets away from food and kitchen surfaces was emphasized. Proper food safety procedures were modeled during all food demonstrations for adults and youth.

Extension agents, paraprofessionals and county coalition members also delivered food safety education to low-income adults and youth participating in TNCEP. Almost 54,000 individuals received education on proper hand washing, 11,593 on cooking foods to recommended internal temperatures, 10,010 on separating meats and their juices from other foods, and 12,129 on refrigerating perishable foods within two hours of serving. Over 6,000 individuals received education on preserving foods safely.

2c. Benefits

Pre and post-survey data on food safety behaviors were collected from 3,960 families who graduated from EFNEP in 2004. Results indicated that 65% showed improvements in one or more food safety practices; 31% more often followed recommended practices of not allowing



meat and dairy foods to sit out of the refrigerator or freezer for more than two hours; and 59% more often followed the recommended practice of not thawing foods at room temperature.

A sample of adult and youth TNCEP participants were surveyed to determine if they adopted any behaviors based on what they learned in food safety classes. Survey results for adults showed the following:

- 92% of 3,313 sampled said they washed their hands before and after handling food.
- 69% said they cooked foods to a safe internal temperature.
- 84% said they separated raw meats and juices from other foods.
- 94% said they refrigerated perishable foods within two hours.
- 79% said they preserved food safely.

In contrast to all other tests, the flow cytometry method is objective, subspecies-specific, quantitative, rapid, requires small sample sizes, can be performed on milk, and is capable of diagnosing pre-clinical and clinical Johne's disease. The University of Tennessee Research Foundation has filed a utility patent on this technology. *Mycobacterium avium* subsp. *paratuberculosis* appears to be involved in Crohn's disease in humans with meat and milk serving as primary sources of infection. These studies may eventually lead to a diagnostic test for Crohn's Disease as well.

2d. Assessment of Accomplishments

The outcomes achieved in Goal Two programs were consistent with the planned programs in the FY 2000-2004 Plan of Work by targeting food safety for producers, processors and consumers.

2e. Allocations for Goal 2

<p>UT 1862 Research – \$4,634,102</p> <ul style="list-style-type: none"> • Hatch – \$610,809 • Multistate 3(c)3 – \$82,583 • Animal Health – \$29,438 • State – \$3,911,272 	<p>FTEs for Goal 2 – 91.25</p> <ul style="list-style-type: none"> • UT 1862 Research – 79.1 (9.6 scientist and 69.5 non-scientist) • UT 1862 Extension – 7.4 • TSU 1890 Extension – 4.75 (4.25 professional and 0.5 paraprofessional)
<p>UT 1862 Extension – \$2,053,829</p> <ul style="list-style-type: none"> • Smith-Lever b and c – \$131,066 • Smith-Lever d (EFNEP) – \$27,448 • State/County – \$1,895,315 	<p>TSU 1890 Extension – \$161,961</p> <ul style="list-style-type: none"> • NARETPA Section 1444 and 1445 – \$71,693 • Grants and Contracts – \$74,794 • State/County – \$15,474



2.1 Key Theme: Safe Food Handling

Title: Safe Food for Tennessee

Issue: Approximately one in four Americans experience foodborne illness each year resulting in an estimated 5,000 deaths and 325,000 hospitalizations. Total annual estimated costs are believed to be \$2 to \$4 billion. Individuals acquire foodborne illness not only when eating out, but also from foods consumed at home. A large proportion of these illnesses could be prevented by following recommended food safety practices.

What has been done: Extension's response to this issue was to implement food safety education using funds from the Expanded Food and Nutrition Education Program (EFNEP), Tennessee Nutrition and Consumer Education Program (TNCEP), and state and local sources.

53 EFNEP paraprofessionals trained by eight Extension agents and state specialists delivered food safety education to 6,762 low-income families (24,693 individuals) and 15,932 low-income youth in 2004. With the adult audience, paraprofessionals focused on the importance of personal hygiene, keeping foods and juices that harbor pathogens away from other foods, cooking foods to the recommended internal temperatures, refrigerating perishable foods within two hours of serving and avoiding food from unsafe sources. With youth audiences, the importance of proper handwashing before and after handling food, keeping hot foods hot and cold foods cold and keeping pets away from food and kitchen surfaces was emphasized. Proper food safety procedures were modeled during all food demonstrations for adults and youth.

Extension agents, paraprofessionals and county coalition members also delivered food safety education to low-income adults and youth participating in TNCEP. Almost 54,000 individuals received education on proper handwashing, 11,593 on cooking foods to recommended internal temperatures, 10,010 on separating meats and their juices from other foods, 12,129 on refrigerating perishable foods within two hours of serving. Over 6,000 individuals received education on preserving foods safely.

State and county funds were used for several types of food safety education such as a non-credit course on food preservation through The University of Tennessee Office of Continuing Education and Extension, pressure canner testing, preparing families for bioterrorism and natural disasters, food safety classes for 4-H youth, exhibits for health fairs, newsletters, phone consultations, child-care provider training, training for Family and Community Education clubs, and foodservice employees at Head Start centers and schools.

Impact: Pre- and post-survey data on food safety behaviors were collected from 3,960 families who graduated from EFNEP in 2004. Results indicated that:

- 65% (2,538 graduates) showed improvements in one or more food safety practices.



- 31% (1,227 graduates) more often followed recommended practices of not allowing meat and dairy foods to sit out of the refrigerator or freezer for more than two hours.
- 59% (2,325 graduates) more often followed the recommended practice of not thawing foods at room temperature.

A sample of adult and youth TNCEP participants were surveyed to determine if they adopted any behaviors based on what they learned in food safety classes. Survey results for adults showed the following:

- 92% of 3,313 sampled said they washed their hands before and after handling food.
- 69% said they cooked foods to a safe internal temperature.
- 84% said they separated raw meats and juices from other foods.
- 94% said they refrigerated perishable foods within two hours.
- 79% said they preserved food safely.

Survey results for youth showed the following:

- 69% of 6,197 TNCEP youth sampled said they washed their hands before and after handling food.
- 29% of 1,107 sampled said they cooked foods to a safe internal temperature.
- 29% said they separated raw meats and juices from other foods.
- 29% said they refrigerated perishable foods within two hours.
- 29% said they preserved food safely.

Funding: Expanded Food and Nutrition Education Program (Authorized under Section 3 (d) of the Smith Lever Act); Tennessee Department of Human Services Food Stamp Education funds

Scope of Impact: State Specific

2.2 Key Theme: Food Quality

Title of Project: Effect of Chitosan Coatings on Small Fruit Shelf Life

Issue: Consumers and producers of strawberries, blueberries and grapes are interested in having fresh products that maintain quality for a longer time during storage. A longer shelf life of these products will allow consumers to store the fruit for several more days after purchase, will allow producers to market the fruit for a longer time while less fruit will need to be discarded and allow the fruit to be marketed to a larger market area.

What has been done: Edible coatings of chitosan in either tap water or in 1% aqueous acetic acid were applied on the surface of fresh strawberries, blueberries or grapes to extend shelf-life by suppressing respiration, moisture transmission, and microbial growth. The treatments were compared to fruit dipped in tap water. The fruit was stored up to 24 days. Quality analyses were



performed every 3 days. The analyses included measurements of texture, color, weight loss, and ethylene and respiration.

Impact: The results suggest that chitosan coatings can be used on small fruits to maintain quality and extend shelf-life. Statistical analysis was conducted (mixed procedure), and least squares means compared. For texture analysis, there was difference between control and both water-soluble chitosan and chitosan in acetic acid for ethylene, CO₂, production, and firmness. The conclusion is that both chitosan coatings decreased ethylene and CO₂ production in fruits, but it provides slightly more firmness of surfaces and weight loss than non-coated berries.

Funding: Hatch

Scope of Impact: State Specific

2.3 Key Theme: Foodborne Pathogen Protection

Title: Foodborne Pathogens in Swine, Poultry and Beef and the Farm Environment

Issue: Reservoirs of foodborne disease causing agents need to be identified so that they can be eliminated to prevent spread of foodborne diseases.

What has been done? The occurrence of *Escherichia coli* O157:H7, *Listeria monocytogenes* (LM) and *Salmonella* in beef, swine and poultry and the farm environment was determined.

Impact: The incidence of *E. coli* O157:H7 in swine and turkey was significantly higher than the incidence in beef cattle or dairy cows. These data suggest that swine and poultry may serve as previously unidentified vectors for foodborne outbreaks of *E. coli* O157:H7. Currently ground beef is the only raw meat product which is regulated with regard to *E. coli* O157:H7. Foods associated with outbreaks of colitis due to *E. coli* O157:H7 are frequently unidentified. Questions concerning consumption of pork and poultry should be included with questions about ground beef on questionnaires which are used to identify the cause of illness for victims of foodborne illness caused by *E. coli* O157:H7.

Funding: Hatch

Scope of Impact: State Specific

2.4 Key Theme: Food Security

Title: Development of an Early Diagnostic Test for Johne's Disease in Cattle

Issue: Johne's disease (JD) caused by *Mycobacterium avium* subsp. *paratuberculosis* (MAP), is one of the most widespread and economically important diseases of livestock and wild ruminants



worldwide. In the United States, JD causes an annual economic loss of approximately \$1.5 billion. MAP is also suspected as an etiologic agent of Crohn's disease (a form of inflammatory bowel disease) in humans with milk and meat serving as sources of infection. Even though MAP causes such a burden on agriculture and human health, there are no effective diagnostic tests, chemotherapeutics or vaccines. In particular, commercial diagnostic tests are nearly useless because they have low sensitivity (approximately 35%), low levels or total lack of specificity, require several weeks to perform, and cannot detect MAP infections in animals until they are two to three years old, even though animals become infected in utero or within the first few weeks of life.

What has been done: UT Research recently discovered that a flow cytometry method (FCM) provides a very effective means of diagnosing JD in cattle. In contrast to all other tests, the FCM is objective, subspecies-specific, quantitative, rapid (approximately 4 hours), requires small sample sizes, can be performed on milk (individual as well as bulk tank samples), and is capable of diagnosing pre-clinical and clinical JD. The FCM specifically detected four strains and ten isolates of MAP and did not cross-react with samples from cattle infected with other *Mycobacterium* species. The FCM is technically easy and can be automated for handling large numbers of samples.

Impact: This novel diagnostic FCM may lead to a commercial diagnostic test that is highly sensitive and subspecies-specific for JD. The FCM can detect JD in pooled serum samples and in bulk tank milk demonstrating the technique could be used to identify a JD-infected herd, thereby potentially reducing the cost of initial testing for JD by dairy and beef cattle producers. For example, if a herd is found to be JD-positive, then the FCM could be used to identify individually infected animals for culling. Since MAP also appears to be involved in Crohn's disease (CD) in humans with meat and milk serving as primary sources of infection, these studies may eventually lead to a diagnostic test for CD as well. The University of Tennessee Research Foundation has filed a utility patent (Application No. 10/832,761) on this technology.

Funding: Hatch; Veterinary Services grant from the USDA Animal and Plant Health Inspection Service; UT Centers of Excellence for Food Safety and Veterinary Medicine grants; and the B. Ray Thompson Fund

Scope of Impact: State Specific

Title: Tennessee Beef Quality Assurance

Issue: Beef producers need to realize that the beef industry is consumer driven. Beef producers should understand that they are not only producing cattle, but more importantly, they are producing food. Food safety issues continue to be a major concern for the public.

What has been done: The Tennessee Beef Quality Assurance (BQA) Certification Program was initiated in 2000 by UT Extension who partnered with the Tennessee Cattlemen's



Association to conduct the certification. In 2000, over 150 persons were certified as trainers including Extension Agents and veterinarians. Over the past four years, over 2,000 Tennessee beef cattle producers were certified. In FY 2004, the program was conducted in 18 counties that certified 250 producers.

Impact: Certified producers may market BQA-certified feeder calves in video auctions and a special feeder calf sale. Calves marketed through the Smoky Mountain Feeder Calf Association's Southeast Pride Calf Sale sold for \$2 to \$11 more per hundred pounds than calves sold through other board and video sales that same week.

In Hamilton County, three producers reported that by utilizing BQA standards, they were able to realize additional premiums on the sale of their calves at weaning. These premiums resulted in an estimated \$1200 in additional income for each producer.

In Jackson County, 39 4-H members in grades 9-12 completed Beef Quality Assurance. Post-program evaluation of knowledge and skills showed that:

- 79% of students understood that the Beef Quality Assurance Program is driven by consumers, producers, and government.
- 72% of students correctly knew that an animal that has been injected with any product in the rump of hind leg would have an injection site blemish, have tougher muscle issue and is an unacceptable management practice.
- 100% of students correctly identified the neck as the preferred location for giving an antibiotic.
- 88% of students understood the concept that as the needle gauge increases the diameter of the needle decreases.
- 87% of students correctly preferred a subcutaneous injection over an intramuscular injection when given a choice by the product label.
- 79% correctly answered that giving an injection in a site other than that specified on the product label is an "off label use"

Funding: Smith-Lever; Tennessee Cattlemen's Association; Tennessee Beef Industry Council

Scope of Impact: State Specific



Goal 3 – A Healthy and Well-Nourished Population

3.0 Overview

3a. Results

In FY 2004, Research and Extension programs helped Tennesseans benefit from healthy lifestyles, including better nutrition, diet, and self-care practices. Extension made 364,295 statewide educational contacts in healthy eating programs. Another 12,544 contacts were made in overweight and obesity programs and 36,838 contacts were made in programs promoting health literacy, the ability to read, understand and act on health information.

In Davidson, Hamilton and Shelby counties, the TSU Nutrition Education Program educated 7,444 consumers at 72 different locations in dietary quality, shopping behavior/food resource management, food security and food safety. In the Tennessee Nutrition and Consumer Education Program, food stamp recipients and families who are eligible to receive food stamps were educated to make healthy food choices and choose active lifestyles. Extension made 308,318 direct contacts with food stamp recipients in 2004 through one-on-one counseling and group education.

3b. Highlights

Regarding health care issues, the multistate Latino Health Coalition trained 74 health care professionals in Survival Spanish. These health care professionals contact 1,550 Spanish-speaking clients each month. Post-program evaluation showed that 88% of participants reported an increase in their ability to speak with Spanish-speaking clients/patients who speak little or no English.

In 2004, Extension continued its commitment to teaching and motivating Tennesseans to take action for their health. UT Extension offered *Dining with Diabetes*, a self-care education program that includes instruction in food preparation, in 15 rural counties to 572 Tennesseans. The Walk Across Tennessee program involved 2,348 Tennesseans who walked over 105,000 miles, an average of 44 miles per person over the eight-week program.

Extension 4-H Agents in eight Tennessee counties established health education programs in local public schools. Teaching, advocating and modeling healthy lifestyles took place in classroom-based 4-H clubs, after-school programs and school enrichment in various school subjects. Statewide summary data of Extension 4-H work in 2004 shows 8,459 4-H youth involved in programs that showed measurable healthy lifestyle outcomes.

3c. Benefits

In Dyer County, records kept by 592 Walk Across Tennessee participants indicate that walkers averaged a weight loss of 4.62 pounds.



Pre and post-survey data from the state's 3,960 graduates of EFNEP showed that:

- 90% made a positive change in their diet that included increased consumption of fruit, vegetables and dairy foods. As a result, protein, iron, calcium, vitamin A, vitamin C and vitamin B6 intakes increased.
- 56% reported more often thinking about healthy food choices when deciding what to feed their family.
- 53% more often prepared foods without adding salt.
- 67% more often used *Nutrition Facts* on food labels to make food choices.
- 47% reported their children ate breakfast more often.

In Madison County, pre and post program observation protocol was used to determine the eating habits of 325 students at three elementary schools enrolled in a County 4-H Healthy Choices program. Prior to the program, 34% of the students who selected vegetables ate them, and 52% who selected fruit ate them. After the program, 91% of the students who selected vegetables ate them and 98% who selected fruit ate them. A similar program in Lauderdale County found that 500 youth scored 35% higher on post-test than pre-test of nutrition and healthy lifestyle knowledge.

3d. Assessment of Accomplishments

A major accomplishment in Goal Three programs was that Tennessee's working poor and food stamp recipients, families most at-risk for poor dietary quality, were successfully targeted and educated. The various evaluation techniques used indicate the programs made a positive difference in nutrition practices. A multistate initiative, the Latino Health Coalition, proved effective at addressing health care issues for the state's growing Hispanic population. The multistate involvement added both expertise and efficiency to this outreach effort.

3e. Allocations for Goal 3

<p>UT 1862 Research – \$560,496</p> <ul style="list-style-type: none"> • Hatch – \$260,053 • State – \$300,443 	<p>FTEs for Goal 3 – 101.7</p> <ul style="list-style-type: none"> • UT 1862 Research – 15.3 (2.9 scientist and 12.4 non-scientist) • UT 1862 Extension – 76.4 • TSU 1890 Extension – 10.0 (8.25 professional and 1.75 para-professional)
<p>UT 1862 Extension – \$8,008,296</p> <ul style="list-style-type: none"> • Smith-Lever b and c – \$1,351,626 • Smith-Lever d – \$1,688,069 • State/County – \$4,968,601 	<p>TSU 1890 Extension – \$408,679</p> <ul style="list-style-type: none"> • NARETPA Section 1444 and 1445 – \$260,361 • Grants/Contracts – \$74,794 • State/County – \$73,524



3.1 Key Theme: Human Nutrition

Title: Tennessee Adult Expanded Food and Nutrition Education Program (EFNEP)

Issue: Heart disease, cancer and stroke are the three leading causes of death in Tennessee (Tennessee Department of Health, 2002). These diseases are associated with poor diet and overweight. National dietary data show that low-income individuals receiving food stamps are more likely to have poor diets and to be overweight than higher income non-participants (Economic Research Service, 2004).

What has been done: UT Extension's response to this issue was to implement EFNEP, a nutrition education program targeted to low-income families. In 2004, 6,762 families (24,693 individuals) in 17 Tennessee counties received nutrition education while enrolled in EFNEP. 84% of families were enrolled in one or more food assistance programs such as Food Stamps or the Supplemental Nutrition Program for Women, Infants and Children (WIC). 53 paraprofessionals trained by eight Extension agents delivered education in a series of lessons for participants enrolled an average of three to four months. Lessons focused on the following subject-matter areas: general nutrition, food resource management and food safety. Lesson content included a national curriculum, *Eating Right is Basic*, and additional lessons developed by agents and specialists, such as *Simply Cooking School*. The majority of participants were recruited from the health department, food stamp offices, public housing, adult education classes and Families First (Temporary Assistance for Needy Families). Most of the education (93%) occurred in groups.

Impact: Pre- and post-survey data from 3,960 graduates of EFNEP showed that:

- 90% made a positive change in their diet that included increased consumption of fruit, vegetables and dairy foods. As a result, protein, iron, calcium, vitamin A, vitamin C and vitamin B6 intakes increased.
- 56% reported more often thinking about healthy food choices when deciding what to feed their family
- 53% more often prepared foods without adding salt.
- 67% more often used *Nutrition Facts* on food labels to make food choices.
- 47% reported their children ate breakfast more often.

Data on money spent on food showed that families learned to purchase healthy foods without spending more money:

- 59% of participants planned meals in advance.
- 53% compared prices when shopping.
- 57% made a list for grocery shopping.
- As a result 47% reported less often running out of food before the end of the month.



One EFNEP participant stated that as a result of what she learned, she makes grocery lists and uses coupons and weekly store specials to save \$7 to \$10 a week on groceries.

Participants also learned to handle food safely:

- 31% reported not leaving meat and dairy foods at room temperature for more than two hours.
- 59% did not thaw foods at room temperature.

Evaluations from 12 “Simply Cooking Schools” implemented in three counties showed participants learned basic cooking skills:

- 85% of participants could measure liquid and dry ingredients correctly.
- 80% stated they planned to prepare a variety of recipes learned in class.

Funding: Authorized under Section 3 (d) of the Smith Lever Act; Tennessee Department of Human Services Community Block Grant

Scope of Impact: State Specific

Title: Tennessee Youth Expanded Food and Nutrition Education Program (EFNEP)

Issue: Data from the Tennessee Coordinated School Health program and the Knox County Health Department show that as many as 40 percent of school-age children in Tennessee are at risk for overweight. As a consequence of unhealthy weight gain, greater numbers of children have been diagnosed with chronic diseases, such as hypertension and diabetes, not typically seen until adulthood. National dietary data show that impoverished children are at greater risk for poor diet and overweight than children with higher incomes (Economic Research Service, 2004).

What has been done: UT Extension’s response to this issue was to implement EFNEP targeted to low-income children. In 2004, paraprofessionals and volunteers trained by eight Extension agents in 17 Tennessee counties who enrolled 15,932 low-income youth in EFNEP. The majority of youth (59%) were 9 to 12 years old. Approximately 25% of youth were 6 to 8 years old. Education was provided in public schools to enrich existing health curricula.

Education was conducted in a series of four to six lessons focusing on eating a variety of foods; choosing low-cost, healthy foods; and preparing food safely. Paraprofessionals used a variety of curricula developed by agents and specialists. A Junior Chef program was implemented in three counties to increase cooking skills. “All Aboard the Nutrition Train,” was piloted in one county to improve nutrition knowledge and food choices of preschoolers.

Impact: Youth enrolled in EFNEP were asked to complete a survey at the end of the school year to measure nutrition knowledge and practices:

- 84% of youth reported eating a variety of foods.
- 84% increased their knowledge of the essentials of human nutrition.



- 80% increased their ability to select low-cost, nutritious foods.
- 86% improved practices in food preparation and safety.

Preschoolers who learned about nutrition from “All Aboard the Nutrition Train,” could identify where foods come from (i.e., the animal or plant).

Funding: Authorized under Section 3 (d) of the Smith Lever Act

Scope of Impact: State Specific

Title: Tennessee State University Nutrition Education Program (TSUNEP)

Issue: The focus of nutrition education is health promotion. Poor diets and/or sedentary lifestyles have led to 61% of Tennesseans being either overweight or obese. Thus, helping people establish an active lifestyle and healthy eating habits early in life to maintain these behaviors throughout their lives and led to disease prevention. The USDA-ERS estimates that improved dietary patterns could save \$43 billion in medical care costs and lost productivity.

What has been done: The TSUNEP team (program director, coordinator and four program assistants) used the Families First Nutrition Education Curriculum to offer educational programs in Davidson, Hamilton and Shelby counties that targeted limited resource individuals, families and children and food stamp recipients in a variety of settings – health fairs, daycare centers, faith-based organizations, adult basic education classes, senior centers, public schools, after school programs, libraries, community centers, residential facilities, group and private homes. The trainings increased the likelihood of the targeted audience making healthy food and budgetary choices in concordance with the Dietary Guidelines for Healthy Americans and the Food Guide Pyramid.

Impact: In Davidson, Hamilton and Shelby counties, 7,444 consumers at 72 different locations received the education and intervention that focused on four key elements - dietary quality, shopping behavior/food resource management, food security and food safety. Pre and post test were used as evaluation tools.

- 5669 individuals and families were impacted by the dietary quality lessons designed to assist limited resource households in adopting healthy eating and active lifestyles.
- 652 participants improved their food safety knowledge with Mr. and Mrs. Bac (teria) designed to improve resource challenged households’ safe handling, preparation and storage of food.
- 1123 clients were helped by food budgeting and resource management sessions designed to enhance practices related to thrifty shopping and preparation of nutritious foods.
- 100% of 7,444 were enabled by the food security information to insure that low income households have enough to eat without resorting to emergency food assistance and making sure people eligible for the FSP but not participating are made aware of its benefits and how to apply for them as part of TSUNEP nutrition education activities.



Funding: TN Dept of Human Services and USDA Food and Nutrition Service Food Stamp Education Funds

Scope of Impact: State Specific

Title: Nutrition and Exercise Promoted for Lauderdale County 4-H'ers

Issue: According to the Center for Disease Control and Prevention, 35% of all Americans are overweight. Overweight or obese adolescents have a 70% chance of becoming overweight or obese adults.

What has been done: UT Extension worked with Lauderdale County School Officials to conduct a health program for all 6-12 grade students. Topics taught by Extension Agents included the problems with too much fast food, fat, sugar and salt content, and exercise. Students were also shown posters and exhibits of health related side-effects of obesity. All 6th graders in the county received their BMI (Body Mass Index) to determine if they were in a healthy weight range according to their height. The Extension Agent also used the "Fat Vest" to help students understand what the excess weight does to their mobility and the added stress to joints.

Impact: Through the use of pre and post-tests, 500 students scored 35% higher on post-test than pre-test of nutrition and healthy lifestyle knowledge. 50% indicated cutting back on junk foods and making healthier choices when eating out. 75% indicated they would make an increased effort to exercise at least 30 minutes each day. 75% increased their knowledge of the fat content of fast food and junk foods. 75% learned the long-term side effects of an unhealthy diet combined with physical inactivity.

Funding: Smith-Lever; TNCEP

Scope of Impact: State Specific

Title: Improving the Lives of Food Stamp Families

Issue: Low-income families are at risk of having a poor quality diet. On average, low-income adults know less than half of the USDA Food Guide Pyramid recommendations for the daily consumption of the five major food groups.

What has been done: UT Extension delivers nutrition education to food stamp recipients and families who are eligible to receive food stamps to increase the likelihood that food stamp recipients will make healthy food choices. Extension made 308,318 direct contacts with food stamp recipients in 2004 through one-on-one counseling and group education.



TENNESSEE AGRICULTURAL RESEARCH AND EXTENSION SYSTEM
 FY 2004 ACCOMPLISHMENTS AND RESULTS

Impact: Outcomes and adoption levels for Goal Three TNCEP outcome indicators are based on a purposeful sample provided by County Best Practices at three to 12 months.

<i>Outcome Indicators</i>	<i>Number of Food Stamp Recipients Taught</i>	<i>Number Who Plan to Adopt Practice</i>	<i>% Who Planned to Adopt</i>	<i>% Who Adopted Practice*</i>
Select a diet based on the Food Guide Pyramid	99,224	86,876	88%	80%
Eat more fruits, vegetables, whole grains and/or dairy products	144,279	107,086	74%	46%
Eat fewer high-fat, sodium and/or sugar foods	71,988	62,566	87%	39%
Improve food preparation skills	36,767	31,510	86%	36%
Increase physical activity	47,00	41,251	87%	51%
Maintain a healthy weight	34,388	26,943	78%	34%
Reduce risk factors for diet-related diseases	31,919	25,766	81%	53%
Read food labels to help select the most nutritious food	10,220	8,719	85%	70%
Use a shopping list	5,596	5,062	90%	91%
Plan meals ahead of time	8,183	7,476	91%	94%
Manage family resources to ensure adequate provision for food	5,773	4,955	86%	89%

*Based on a purposeful sample provided by County Best Practices at three to 12 months.

Funding: Smith-Lever; Tennessee Department of Human Services through the USA Food Stamp Program

Scope of Impact: State Specific

Title: Madison County 4-H Healthy Choices

Issue: In a July 2000 report, the Madison County Health Council cited cancer, obesity, heart disease, hypertension and diabetes as the top five health concerns for county residents. A 2003 study at three of the county's elementary schools (Lincoln, Isaac Lane and South) found poor consumption of fruits and vegetables during school lunch. Over 15% of students, ages 6 to 19,



are overweight. Strategies for reversing the rising trend of overweight in young children include the daily consumption of five or more servings of fruits and vegetables.

What has been done: Nutrition programs were presented through monthly 4-H club meetings. Extension 4-H Agents, Program Assistants and Adult Volunteers presented educational programs that addressed: the recommended number of servings of fruits/vegetables per day, comparing food labels for nutrient content and other valuable information, correct serving sizes by using educational activities such as Five-A-Day Bingo, Fruit and Veggie Tic-Tac-Toe and Fruit and Veggie Jeopardy.

Impact: Using pre and post program surveys with approximately 3,500 4-H members in 150 4-H clubs, the following impacts were found:

- 70% of the students now know the correct number of servings of fruits and vegetables (26% increase).
- 81% can now read food labels and discern important nutrient information (7% increase).
- 91% can now determine the recommended serving size of fruits and vegetables (10% increase).

Pre and post program observations were used to determine the eating habits of 325 students at three elementary schools. *Prior to the program*, 34% of the students that took vegetables ate them, and 52% that took the fruit ate them. *After the program*, 91% of the students that took vegetables ate them and 98% that took the fruit ate them. In other words, this program resulted in a 57% and 46% increase in students' consumption of vegetables and fruits at the school lunch, respectively.

Funding: Smith-Lever; Tennessee Department of Health

Scope of Impact: State Specific

3.2 Key Theme: Health Care

Title: Latino Health Coalition Improves Health Care

Issue: The Southeast has had the greatest percent increase in Latino residents from 1990 to 2000. Tennessee currently ranks 4th in the nation in Latino immigrant growth. Spanish-speaking immigrants are moving to rural areas to work in construction, farm work, service occupations, nurseries and food processing. According to the 2000 U.S. Census, Coffee County's Latino population is the fastest growing minority group with a 305% increase (261 in 1990 to 1,056 in 2000). According to the 2000 U.S. Census, there are 2819 Hispanics in Bedford County or about 7.5% of the population. However, estimates from El Centro Latino and Connexión Américas place the population at double this number. Community representatives in both Coffee and Bedford Counties report that Census data does not represent the high number of undocumented immigrants in their communities. In both Bedford and Coffee Counties, many of the county's



Hispanic residents live at or near the poverty level with incomes of \$6 - \$7.50 per hour from their work at poultry processing plants, pencil factories and Tennessee Walking Horse farms.

The UT Extension Health Specialist reports that access to health care is important for immigrants to be healthy, productive individuals. However, many Latino families do not seek health care locally because of the language barrier. Few adult immigrants speak English, while a limited number of health care professionals speak Spanish.

A focus group interview with 6 Hispanic residents and 3 Hispanic advocates and interviews with Hospital and Health Department personnel identified these needs: Spanish language health information, cultural training for American providers, and Spanish language training for health providers.

What has been done: UT Extension formed the Latino Health Coalition, serving Bedford and Coffee counties in Tennessee, to improve health care for Latino families. The program has provided Spanish-language training for health care professionals and cultural awareness activities. Program partners include: Kentucky State University, The University of Kentucky, Department of Health and Human Services, Partners for Healing, Harton Regional Medical Center, United Regional Medical Center, Medical Center of Manchester, Bedford County Medical Center, Bedford and Coffee Health Councils, El Centro Latino, Agencies Serving Kids (ASK), Centerstone Mental Health Services, Office of Rural Health and Health Access, Office of Minority Health and Latino community representatives.

Activities this year included conducting two Spanish language trainings for health professionals, three Latino Reality Workshops, and updating and distributing the Spanish Yellow Pages Medical Services Directory. In 2004, 3500 copies of the Yellow Pages bi-lingual Medical Directory were distributed to agencies and Latino families.

Impact: The Latino Health Coalition has been successful in helping health providers serve their Spanish speaking clientele. Comments from the providers include:

- "I appreciate the opportunity the Hispanic Coalition gave me to improve my Spanish language skills." (Coffee County Health Department Nurse)
- "The Hispanic Coalition formed at a time of frustration for many in the communities where the Hispanic immigrants first located several years ago. Thanks for your presence and for the assistance to both groups in the community." (Coffee and Bedford County Health Departments' Past Nurse Supervisor)
- "It can be overwhelming trying to overcome the barriers to help provide health care to our new Hispanic community members. The Hispanic Coalition acknowledges that all people deserve access to basic health care and that we all benefit in the end. We are glad



to see a humane and caring attitude towards this new wave of American immigrants."
(Bedford Coffee Health Department Official)

Also in Tennessee, 74 health care professionals (who contact 1,550 Spanish-speaking clients each month) participated in Survival Spanish Seminars. 51 post-program questionnaires were submitted that showed:

- 88% of participants reported an increase in their ability to speak with Spanish-speaking clients/patients who speak little or no English.
- 88% of participants reported an increase in their understanding of the Latino culture.
- 80% of participants reported an increase in their ability to provide assistance in Spanish to individuals.

Qualitative evaluation revealed themes reflected in these participant comments:

- "I feel a lot more comfortable with my Spanish speaking patients."
- "It will help me understand my clients better."
- "If I have a patient that comes in, I will get my book and try to speak to them instead of yelling like I'm talking to a deaf person or signing and pointing things out to them."
- "As an OB nurse I will use Spanish to better understand my Patient's needs."
- "As a nurse assistant I am the 1st of the nursing staff to greet and meet. I will help the patients to become more comfortable with my Spanish skills."

64 other professionals, including health care workers and coalition members from Tennessee and Kentucky, participated in the Latino Cultural Reality Workshops. The summary of post-program surveys indicated that:

- 100% agree that the experience increased their understanding of what it is like to access health care services in another language.
- 94% agree that they will have more empathy for Latino immigrants seeking services at their agency.
- 100% planned to make changes in the way they relate to Latino immigrants at their agency.

Funding: Smith-Lever; New Communities Project Grant through CYFAR; Rural America Grant and Community Donations

Scope of Impact: Multistate (KY)

Title: Arthritis Self-Help Management

Issue: Arthritis is the second leading cause of disability in Tennessee. Tennesseans needed a self-help course aimed at early diagnosis and appropriate management for people with arthritis. Arthritis sufferers need education to achieve the maximum number of years of a healthy life. They need support in developing and accessing the resources needed to cope with their disease.



What has been done: In five counties, Extension offered a five-part Arthritis Self-Help Management Course. Approximately 300 persons participated in this course. Knowledge and skills targeted were strategies for decreasing pain, ways to relax and deal with stress, proper use of exercise, facts about arthritis medications and their effects, strategies for dealing with depression, good nutritional habits, methods of heat/cold applications, and problem-solving techniques.

Impact: Follow-up evaluations indicated that:

- 80% of participants who completed the self-help course are exercising on a regular basis to control their arthritis pain.
- 60% of participants report using the information gained in class to help them keep a positive attitude about living with arthritis daily and to enable them to better accept their illness and deal with it positively.
- 70% respondents reported an increase in confidence to manage their arthritis pain, an increase in coping with negative feelings and depression, managing their activities, and an increase in using relaxation techniques.
- 50% reported an increase in fatigue management.
- 80% reported an increase in confidence in preparing a list of questions and ability to talk to their doctors.

In Bledsoe County, participants formed their own Arthritis Support Group as a result of the Arthritis Self-Help Management classes. The group meets monthly to motivate and encourage members and to continue to explore ways to deal with their health problems.

Funding: Smith-Lever

Scope of Impact: State Specific

Title: 4-H Healthy Lifestyles

Issue: Tennessee's children and youth need education in making the tough daily choices regarding their health. Tobacco is often the first drug used by youth who then use alcohol and illegal drugs. Key data indicators regarding the health status of Tennessee young people look grim.

What has been done: Extension 4-H Agents in eight Tennessee counties established health education programs in local public schools. In-school 4-H clubs, after-school programs and school enrichment in the school science classes were all techniques used to teach, advocate and model healthier lifestyles. Statewide summary data of Extension 4-H work in 2004 shows 8,459 4-H youth were involved in programs that showed measurable healthy lifestyle outcomes.



Impact: In Sevier County, 400 junior high 4-H youth were taught the harmful affects of tobacco use. End-of-year surveys showed that 85% have a better understanding of the economic and health impacts that tobacco use has on society and 90% made a commitment to remain tobacco free.

After a five-month 4-H after-school series in Nashville-Davidson County, surveys of 400 youth (the majority from limited-resource families) showed that:

- 74% better understand the dangers of tobacco.
- 60% will avoid tobacco products and advocate to peers the dangers of tobacco.
- 70% better understand the dangers of alcohol.
- 89% will avoid alcohol products and advocate to peers the dangers of alcohol.
- 83% better understand the importance of clearly labeling all chemicals within the home.
- 91% will work with their families in making sure chemicals within their home are clearly labeled.

In Polk County, of 200 fourth grade 4-H members, 95% improved or developed motor skills and gained awareness that physical activity is fun.

In Campbell County, 610 students participated in the Health Risks of Tobacco Program with these outcomes:

- 81% said that they learned something new about the health risks of tobacco use.
- 59% said that they had wondered about what it would be like to smoke or use smokeless tobacco products.
- 93% said that after experiencing the program they were positive that they did not intend to smoke.
- 92% said that after experiencing the program that they were sure that they did not intend to use smokeless tobacco.

In Scott County, a high school student who attended a Low-Fat Express Session reported that at her last doctor's visit she had lost seven pounds. She attributed that to her new knowledge of healthy food choices and importance of exercise. She stated, "I've never seen what fat looked like or what it does inside our bodies. You see it going in as food, but never think about what's happening inside. Now that I've gotten to see it and touch the fat, I don't want that stuff in my body." She has never exercised regularly before and now is walking everyday after school with her mom and is aiming to increase her miles slowly so she'll stick to it.

Funding: Smith-Lever

Scope of Impact: State specific



Title: Dining with Diabetes Cooking Schools

Issue: Over the past decade the number of people who have been diagnosed with diabetes has increased 61% and is expected to continue to increase rapidly. Diabetes is a common, chronic, serious, and costly disease in Tennessee. Diabetes is the sixth leading cause of death in Tennessee. Over 8% of adult Tennesseans have reported being diagnosed with diabetes. Experts estimate this number represents only half of those with this devastating disease. Studies have shown that persons with diabetes do not feel properly educated about the disease.

What Has Been Done: UT Extension offered *Dining with Diabetes* in 15 rural counties. The program is a self-care educational program and cooking school. In 2004, it was taught to 572 Tennesseans. This is double the number who participated the previous year. The program reached people with diabetes and/or their caregivers. UT Extension used television, radio, newsletters, to further teach diabetics.

In this multi-session program, proper cooking techniques were demonstrated for such products as artificial sweeteners, reduced-fat products, herbs and spices. Clinical aspects and self-management skills were taught. Participants were taught the importance of diabetes-related medical tests and diabetes management and why they need to know their numbers.

In Tipton County, UT Extension organized a community-wide Diabetes Coalition which included a nurse practitioner, a registered dietician, a public health educator, and a certified strengthening trainer. The group collectively conducted Dining with Diabetes for 52 participants at a local hospital.

Impact: In Tipton County, a three-month follow-up evaluation was conducted involving questionnaires or telephone interviews. Of the 23 participants who completed the follow-up evaluation:

- 22 (96%) increased their fruit and vegetable consumption to at least five servings a day.
- 23 (100%) said they could now care for their diabetes better.
- 20 (87%) have increased their amount of exercise.
- 19 (87%) said their blood sugar levels have been better (decreased) as a result of implementing the information taught in the class.
- 19 (83%) said they continue to use the recipe book given at the class.

In Gibson and Obion Counties, 9 participants can now better identify foods that raise blood sugar levels and use spices (instead of salt) 50% more of the time when cooking to add flavor to their meals.

In Bradley County, 40 participants were reached ranging in age from 14 to 77 with these outcomes:

- 100% indicated a better understanding of the Food Guide Pyramid and its use in developing a healthier eating plan using the Healthy Plate method.



- 100% indicated they had learned how to reduce carbohydrates, fats and sodium in meals and were more conscious of their daily food choices.
- 95% indicated they now understand how to read a food label.
- 50% indicated they learned why certain medical tests are important to have and how to understand the test results.

In Madison County, Dining with Diabetes was taught to 70 individuals. A two-month follow-up telephone or email survey was sent to a random sample of half the participants with a 69% response rate. The follow-up survey results indicated:

- 83% of respondents had tried at least one new recipe.
- 96% of respondents had followed through by adopting at least one new, healthier behavior.

Funding: Smith-Lever

Scope of Impact: State Specific

Title: Walk Across Tennessee

Issue: Increased physical activity has an impact on heart disease, by far the leading cause of death in Tennessee. In addition, increased physical activity improves blood sugar control for people with diabetes, blood pressure control for people with high blood pressure, immunity, and even reduces depression. Tennessee's County Advisory Committees identified healthy lifestyle promotion, especially getting people moving, as a need in a number of Tennessee counties.

What has been done: Extension worked with local health departments, local YMCAs, local parks and recreation departments, health councils, media, senior citizen centers, schools, Families First participants, 4-H, Family and Community Education clubs and various community groups to organize the Walk Across Tennessee program in 15 rural counties.

Impact: In 2004, 2,348 Tennesseans walked over 105,000 miles because of this program, an average of 44 miles per person over the eight-week program. In Dyer County, records kept by 592 participants indicate that participants averaged a weight loss of 4.62 pounds.

In Cannon County, a mother of four reported going from an occasional walk on her own before the program to daily exercise. As a result of the Walk Across Tennessee program, she began taking the children with her for a walk twice a day to encourage family fitness. She reported that the Walk Across Tennessee program, "Gave us a starting point to include exercise in our daily life."

In Hancock County, emphasis was placed on increasing the number of miles walked, male walkers and the number of participants with diabetes. Walk Across Tennessee participants



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walked 1,111 more miles than the same number of participants the year before. The number of males participating increased by six and diabetic participants increased by two over the previous year. A follow-up evaluation showed that of the 72 participants, 25% are still exercising on a regular basis.

A follow-up of Greene County 's 123 walkers showed that 5% reported spending more time with family while walking together; 20% reported reduced stress; 24% reported increased energy and 24% reported a decrease in amount of time sitting watching television.

Funding: Smith-Lever

Scope of Impact: State Specific



Goal 4 – Greater Harmony Between Agriculture and the Environment

4.0 Overview

4a. Results

Goal Four programs supported broad goals for Research and Extension programs in integrated pest management, land use, agricultural waste management, water quality and natural resources management. Extension contacts numbered 168,816 in various programs working to achieve greater harmony between agriculture and the environment, including 8,900 educational contacts in wildlife and fisheries.

Tennessee is a “hardwood state” with tremendous business, recreational, wildlife and scenic values associated with the state’s hardwood forests. Most of these forests lie in private ownership. The Tennessee forest products industry annually contributes \$10 billion to the Tennessee economy and employs 63,000 Tennesseans. Extension supported this important segment of the economy by making 36,226 educational contacts related to forestry and forest products.

In FY 2004, 117 pest management professionals were trained in integrated pest management (IPM) through 12 interactive TV sessions for pesticide applicator training in industrial, institutional, structural and public health-related pest control. Over 20 programs that emphasized small ants, odorous house ants, fire ants, mulch effects on insects, mosquitoes, lady beetles, and school IPM were provided to more than 3,500 pest management professionals and others.

4b. Highlights

During 2004, UT Extension worked to establish 11 new County Forestry Associations, bringing the statewide total to 36. To measure the impact of the County Forestry Associations, the 36 local presidents were surveyed regarding their forestry practices before and after their program participation. The responses indicate that members own 180,075 acres of forestland and that their knowledge forestry has increased 39% since joining their Association.

Wood product research brought a wiser use to forest resources. Research in the environmental physiology of native tree species found that white oak, scarlet oak and chestnut oak have a high first-year survival rate on mine reclamation sites. The result of this research was that a coal mine operator received permits from the Office of Surface Mining to reclaim parts of Tennessee’s Cumberland Mountains by planting these native tree species.

UT Experiment Station developed a new in-furrow chemical application unit that allows row crop farmers to apply chemicals just over the seeds, not the entire furrow, at planting time. This allows



producers to apply chemicals to 95% of the seeds planted while reducing total application by 50%.

4c. Benefits

According to the 2004 cotton producers' survey and other available information, approximately 91% of all cotton producers in a six-county area are now using some degree of IPM practices which has caused pesticide reduction of one-third. The average yield in the area being protected and/or increased through the use of UT Extension recommendations and IPM technology has increased by 8% when comparing 2004 to 2003. Pesticide reduction and other cotton IPM practices represent a total savings of approximately \$2.3 million to the area's cotton producers.

Over the past four years, the Southern Pine Beetle Initiative, a partnership of UT and TSU Extension and the Tennessee Department of Agriculture, helped approximately 370 landowners take action to treat 21,000 acres devastated by the southern pine beetle epidemic.

The UT Experiment Station investigation to predict the internal bond of medium density fiberboard returned positive economic results. The medium density fiberboard plant used for the validation study was able to reduce wood and resin usage from use of UT's newly defined genetic algorithm system. Cost savings from reduced wood and resin use during the six-month validation study were \$700,000.

4d. Assessment of Accomplishments

Partnerships with local leaders, County Forestry Associations and state agencies (such as the Tennessee Wildlife Resources Agency and the Tennessee Department of Agriculture Forestry Division) have built broad-based support for Goal 4 initiatives and helped UT and TSU to achieve the stated outcomes for Extension and Experiment Station programs. The benefits to environmental quality and stewardship are highly commendable.

4e. Allocations for Goal 4

<p>UT 1862 Research – \$4,423,066</p> <ul style="list-style-type: none"> • Hatch - \$635,471 • Multistate 3(c) 3 - \$149,382 • McIntire-Stennis - \$422,143 • State - \$3,216,070 	<p>FTEs for Goal 4 – 121.65</p> <ul style="list-style-type: none"> • UT 1862 Research – 91.7 (18.4 scientist and 73.3 non-scientist) • UT 1862 Extension – 23.2 • TSU 1890 Extension – 6.75 (5.5 professional and 1.25 para-professional)
<p>UT 1862 Extension – \$2,177,720</p> <ul style="list-style-type: none"> • Smith-Lever b and c – \$409,583 • Smith-Lever d – \$262,500 (IPM and ERRA Renewable Resources) • State/County – \$1,505,637 	<p>TSU 1890 Extension – \$313,624</p> <ul style="list-style-type: none"> • NARETPA Section 1444 and 1445 – \$279,794 • Grants/Contracts – \$25,228 • State/County – \$8,602



4.1 Key Theme: Sustainable Agriculture/Integrated Pest Management

Title: Tennessee Cotton Integrated Pest Management

Issue: According to the University of Tennessee, the primary limiting factors to the approximate 130,180 acres of cotton in the six county area of Dyer, Obion, Lake, Lauderdale, Weakley and Gibson Counties are soil fertility, insects, disease and weeds. When these factors reach a level that is damaging to economic returns, they must be controlled in an efficient manner for cotton producers to maintain the highest economic return for their crop while protecting the environment. The goal is to reduce pesticide usage.

What has been done: UT Extension educated cotton producers in all areas of cotton Integrated Pest Management: insects, weeds, disease, soil fertility and other related IPM issues. In-field training sessions, phone calls, demonstrations 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. 5,426 Western Regional IPM newsletters were utilized in six county area to keep producers informed regarding plant and pest management problems and how to solve them efficiently and effectively. Additionally, 78 news articles were written and distributed in the six county area which benefited cotton producers and others involved in the agricultural community regarding the benefits of IPM. An educational monitoring and management service which deals with primary yield limiting factors was offered to area cotton growers that involved weekly comprehensive reports, weekly letter related to pest problems, and correct recommendations to use to control these problems.

Impact: According to the 2004 cotton producers' survey and other available information, approximately 91% of all cotton producers in the six-county area (489 producers) are now using some degree of IPM practices which has caused pesticide reduction of 31%. The average yield in the area being protected and/or increased through the use of UT Extension recommendations and IPM technology has increased by 8% when comparing 2004 to 2003. This program created balance between agriculture and the environment because pesticide reduction and other cotton IPM practices represent a total savings of approximately \$2.3 million.

Funding: Smith-lever d (Cotton IPM funds)

Scope of Impact: State specific

Title: Household/Structural Integrated Pest Management Education

Issue: UT Extension directed its urban pest management programs at the pest management professional (PMP), county Extension agents, Master Gardeners and the general public.



What has been done: In FY 2004, 117 pest management professionals were trained in IPM through 12 videotaped and interactive TV sessions for pesticide applicator training in Industrial, Institutional, Structural and Public Health Related Pest Control. 21 formal presentations that emphasized small ants, odorous house ants, fire ants, mulch effects on insects, mosquitoes, lady beetles, and school IPM were provided to more than 3510 PMPs and others. A training program 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) continues to increase. In FY 2004, 112 were trained which is almost five times the original 23 trained in 2003.

UT Extension continued to its IPM education program through print and electronic publications, mass media, e-mails, office visits and other meetings.

Impact: UT Extension IPM training provided to pest management professionals in 2004 increased post-test scores 20% for the wood-destroying organisms and 28% for the general rodent pest control over the pre-test scores.

UT Extension's urban IPM program has developed successful strategies for managing odorous house ants. This success has brought the program national recognition with specialists providing training to 2,324 PMPs in six states. In addition, when using this IPM method all pesticide applications are made to the structure's exterior thus reducing potential pesticide exposure to the building's occupants and reducing the time and effort needed in scheduling appointments and making the pesticide application. If assumed that UT Extension efforts saved just one odorous house ant account for each of these contacts, the strategy was worth at least \$929,000 to the pest management industry.

Funding Sources: Smith-Lever d

Scope: Multistate (MD, MS, IN, MN, WA and HI)

Title: Integrating IPM Strategies in On-Farm Stored Wheat in Tennessee and Kentucky

Issue: Preventing insect infestations in on-farm stored wheat is a major problem for most Tennessee and Kentucky producers. Results from on-farm demonstrations conducted in 2001 and 2002 revealed that due to the presence of insects at harvest and the warm air temperatures during the summer and early fall storage period, the recommended Integrated Pest Management (IPM) strategy SLAM (Sanitation, Loading, Aeration and Management) was not totally effective in controlling quality losses from two insects in on-farm stored wheat. In order to provide producers and grain elevator managers with more effective control measures, alternative management strategies must be evaluated and demonstrated in on-farm situations to determine its effectiveness in controlling insect infestations in stored wheat in Tennessee and Kentucky.

What Has Been Done: UT Extension conducted on-farm demonstrations in Tennessee and Kentucky were continued in 2004 to verify the results of previous studies on the effectiveness of



a wheat storage management strategy that combines the use of an approved grain protectant with the IPM strategy SLAM for preventing grain quality losses from on-farm stored wheat. Insect trap counts and grain temperatures were monitored bi-weekly throughout a six month storage period in side-by-side bins, one bin managed using SLAM and the other bin managed using SLAM combined with a grain protectant applied at binning. The information collected from these demonstrations will be used in multi-state, multi-discipline educational efforts during the next growing season to train producers, grain storage managers and extension agents on how to effectively reduce quality losses from insect in on-farm stored wheat.

Impact: To date, over 630 row crop producers and grain storage managers with over 5.5 million bushels of storage capacity have received training on how to implement IPM strategies to prevent or minimize grain quality losses from insects and molds in their on-farm storage systems. Our post-program interviews and surveys have shown that 75% of those attending the training indicate plans to adopt one or more of the IPM practices as part of their future management strategy.

Funding: Smith-Lever; Southern Region IPM Special Grants Program

Scope of Impact: Multistate (KY); Integrated Research and Extension

Title: Development of a Variable Placement Seed Protectant Applicator

Issue: Applying fungicides and insecticides at planting are costly and have potential negative environmental impacts. Current technology applies the active material uniformly along the furrow at planting. However, chemical applied between seeds have little or no value.

What has been done: A new in-furrow chemical application unit has been developed that allows row-crop farmers to apply chemicals just over seeds at planting time. This technology eliminates wasteful application of active ingredients between seeds where benefits are limited. A seed-specific electro-mechanical control system has been developed and field tested that applies chemical just over seeds as they are planted in the furrow.

Impact: Results indicate that producers can adequately apply chemicals to 95% of the seeds planted while reducing the total application by more than 50%. This equates to a substantial cost saving to the producer while reducing the negative environmental effects associated with herbicides and insecticides.

Funding: Hatch; Cotton Incorporated

Scope of Impact: State Specific



4.2 Key Theme: Land Use

Title: Environmental Physiology of Tennessee Tree Species

Issue: Forested land covers 14.4 million acres in Tennessee. State forests provide a tremendous economic value through tourism and recreation, and through the forest products industry which provides employment for 174,000 people and contributes \$18.2 billion annually to the state economy. Visual impacts on the forest due to human activities must be minimized in order to reduce public concern and potential impacts on the recreation industry. The forest products industry needs to refine management strategies to maximize the growth and reduce management expenses for economically important tree species such as oaks.

What has been done: Four experiments were initiated in 2004. One of these is investigating the possible impacts of temperature increases on red spruce, a high-elevation species found in the Great Smoky Mountains National Park. Three of the experiments are designed to determine the effects of the environment and management practices on the growth of oak; oak seedlings have been planted in a clear-cut, on a floodplain, and on a mine site. Treatments that manipulate soil characteristics such as moisture, nitrogen content, and compaction have been applied.

Impact: This research has demonstrated that three native oak species, white oak, scarlet oak, and chestnut oak have a high first-year survival rate on mine reclamation sites in the Cumberland mountains. As a result, a coal mine operator has applied for and received permits from the Office of Surface Mining that include in their reclamation plans the planting of native tree species.

Funding: McIntire-Stennis

Scope of Impact: State Specific

Title: Native Grasses for Golf Courses, Landscapes and Parks in Tennessee

Issue: Native perennial grasses can be used on golf courses and in landscapes and parks as wildlife habitat, to protect or improve water quality and to reduce costs associated with the maintenance of conventional turfgrasses.

What has been done: Two programs, *Native Grasses for Golf Courses in Tennessee* and *Native Grasses for Tennessee Landscapes* were presented to turfgrass industry professionals in the state.

Impact: More than 380 industry professionals from Tennessee and surrounding states received information regarding the benefits of establishing and maintaining native grasses. Of these, more than 300 indicated plans to identify areas they are presently managing that could accommodate native grasses. More than 100 indicated their plans to establish native grasses from seed.



Funding: Smith-Lever

Scope of Impact: State Specific

Title: Preserve and enhance the quality of soil and water in Tennessee

Issue: Over the last decade there has been a significant increase in concerns about endocrine disrupting chemicals (EDCs) in the environment. A great number of people and wildlife can be impacted by exposure to EDCs, especially since they can produce adverse effects at extremely low concentrations. However, little is known about the fate and mobility of these chemicals and how they move in soil before ground- and surface water contamination occurs. The improved understanding will help to develop better management practices and remediation technologies.

What has been done: Laboratory and field research was conducted to characterize the fate and transport of EDCs in soil, and to develop a simple stochastic method for prediction of field-scale water and chemical movement. Current methods are laborious, expensive, and relatively inaccurate. An improved method was developed for quantitative characterization of water and chemical transport in multiple locations of field soil.

Impact: Current methods to measure water and chemical transport require extensive subsoil sampling or expensive field instrumentation such as tile drains (\$10,000/ha) and lysimeters (\$5,000 - \$20,000/unit). Our new method costs less than \$2,000 for measuring water and chemical transport of a hectare field. The new method was also approximately 50% more accurate than a current method for prediction of chemical distributions in soil. The new method helps quantify and predict the fate and movement of chemicals and contaminants in subsoil; prevent or reduce contaminants loading of water resources; and degrade contaminants in soils and groundwater by physical, chemical, and biological remediation.

Funding: Hatch; National Science Foundation grant

Scope of Impact: State Specific

Title: Tennessee Research Contributes to National Soil Conservation Tool

Issue: We know how to stop soil erosion, but the question for regulators and for government agricultural cost-sharing and price-support programs is how to maximize the soil erosion benefit at the least possible cost. This requires a tool that allows conservationists or land managers to compare the erosion impact of a wide variety of management alternatives. Since the early 1990s, the tool of choice by USDA-Natural Resource Conservation Service conservationists and others (including the Office of Surface Mining, the Bureau of Reclamation, and several state environmental agencies) has been RUSLE, or the Revised Universal Soil Loss Equation.



What has been done: University of Tennessee researchers and programmers have been involved with this effort since its inception in the late 1980s, and have a major responsibility for the 2004 implementation of a new RUSLE2 version in more than 2,500 UNSD-NRCS field offices across the country.

Impact: Because of their use throughout the United States by the USDA-NRCS, the RUSLE computer programs developed partly by University of Tennessee researchers will be the sole tool used by the federal government for conservation compliance and conservation planning on agricultural lands. Since NRCS is by far the largest user of this sort of tool, others are already following suit, with several other state and federal agencies requiring use of RUSLE2 for erosion-control planning on construction sites, mine spoils, disturbed forest lands, and anywhere else that human activities increase erosion. In addition, the ubiquity of RUSLE2 is making it a very attractive structure on which to attach other scientific models and approaches, so RUSLE2 scientists and programmers are actively working with four other groups to form such attachments, which in the long run will increase RUSLE's presence even further.

Funding: Hatch; USDA-ARS Cooperative Research Agreement

Scope of Impact: National

4.3 Key Theme: Agricultural Waste Management

Title: Predicting the Rate of Infiltration from Animal Waste Storage Ponds

Issue: Given the large quantities of nutrients, pathogens, and hormones stored within soil-lined animal waste holding ponds, it is important to safeguard the underlying soil and groundwater systems from excessive leakage of animal waste. Many states regulate animal waste lagoons and storage ponds by setting limits on either the maximum infiltration rate or the hydraulic properties of the underlying soil. These regulations typically require operators to place an expensive clay liner within new animal waste storage ponds.

What has been done: A numerical model was developed that concurs with the preponderance of published data related to infiltration from animal waste ponds; namely, that the underlying soil hydraulic properties (including those of a clay liner) have little impact on the rate at which animal waste leaks from a pond. The benefit of placing an expensive clay liner has been brought into question.

Impact: We have shown that requiring operators to place a clay liner in animal waste ponds may be a poor use of funds.

Funding: Hatch

Scope of Impact: State Specific



4.4 Key Theme: Water Quality

Title: *Tennessee Forest*A*Syst*

Issue: Silvicultural operations contribute a small but calculable amount of sedimentation into Tennessee's waters. A program was considered necessary to reach forest landowners and educate them about forestry best management practices (BMPs) in order to reduce this source of nonpoint source water pollution.

What has been done: Ten programs were presented to 253 landowners whom collectively own 95,319 acres of forestland. The accompanying *Forest*A*Syst* manuals were distributed to the participants for their use in better understanding techniques in minimizing nonpoint source water pollution.

Impact: The results of the program indicate 98% of the participants are willing to adopt the BMP material presented, and estimated the value of the program with regard to dollars earned or saved for their property at \$27,663. In addition, 97% of the participants indicated a better familiarity of the need to receive technical assistance with their forestry and wildlife management in order to minimize nonpoint source water pollution.

Funding: Smith-Lever; Tennessee Department of Agriculture Nonpoint Source Pollution Program

Scope of Impact: State Specific

Title: *Water Quality Monitoring and Modeling in Ellejoy and Nails Creek*

Issue: Ellejoy Creek and Nails Creek are tributaries of the Little River, a scenic natural resource critical to the Eastern Region of Tennessee. Nails Creek is suffering negative impacts from increasing development of subdivisions south of the Seymour area. Ellejoy continues to be negatively impacted from animal agriculture.

What has been done: In 2004, UT researchers completed their collection of one year of monthly water quality data from these two streams.

Impact: The data showed that both streams should continue on the 303(d) list of impaired streams due to impairments by nutrients and sediments, and lack of biological diversity in certain sections. The data is being used extensively by the Tennessee Department of Environment and Conservation to develop a restoration plan for each watershed.

Funding: Hatch; Tennessee Department of Environment and Conservation

Scope of impact: State Specific



Title: Using Drip Irrigation Techniques to Disperse Wastewater into the Soil

Issue: In Tennessee, the majority of new residential development occurs outside of areas served by sanitary sewers. These new homes must be located on soils that can support an onsite wastewater treatment system (i.e. a septic tank and leach field). It is not uncommon for a house and wastewater system to require greater than one acre of land. Because agricultural lands tend to have excellent soils, many acres of prime farmland are being converted into residential developments. Alternative methods of wastewater treatment and disposal must be evaluated such that marginal lands can be used for housing while preserving farmland for the production of food and fiber.

What has been done: Engineers, installers, and regulator officials need more information about the design, installation, and maintenance of wastewater dispersal systems that use drip irrigation technologies. The Tennessee Valley Authority (TVA) developed a handbook of drip design guidelines. In cooperation with the University of Tennessee Agricultural Experiment Station, a 12-hour workshop was developed from these guidelines. In 2004, workshops were conducted in Jackson, Tennessee, Cullman, Alabama, and Fletcher, North Carolina.

Impact: A total of 54 engineers, soil scientists, and regulators attended these three sessions. An exit survey indicated that attendees are now more knowledgeable about the design and installation of drip dispersal systems.

Funding: Hatch; The Tennessee Department of Agriculture Nonpoint Source Program, The Tennessee Valley Authority, and The University of Tennessee Water Resources Research Center

Scope of Impact: Multistate (NC; AL)

Title: Clean Water for Tennessee

Issue: Basic to human life, clean water is a leading concern as consistently shown through citizen surveys and focus groups throughout Tennessee.

What Has Been Done: In FY 2004, Extension stressed water quality education through eight local projects with mini-grant funding, technical assistance, and education. Extension also conducted water quality/environmental education at two 4-H centers.

Impact:

- Landowners participating in a forestry/water quality field day estimated they would earn an additional \$186,500 by applying the knowledge they gained.



- More than 700 youth took part in a countywide field day. A follow-up survey showed they learned about how we pollute water and practical steps they can take to prevent pollution.
- In another county, over 300 volunteers took part in a river clean-up; they collected and removed five tons of trash and planted 2,000 trees in the river corridor.
- More than 4,300 youth participated in the water quality/environmental education programs at the two 4-H centers. Evaluation reports show increased understanding of the importance of quality water and ways to protect water resources.

Funding: Smith-Lever; USDA-CSREES Section 406 Integrated Water Quality grant

Scope of Impact: State Specific

4.5 Key Theme: Forestry/Natural Resources Management

Title: Initiate and Support County Forestry Associations

Issue: Tennessee forests occupy 55% of the total land base. The majority of this forested land is owned by 470,000 private individuals, many of whom are largely uneducated about modern forest management techniques. The wood products originating from privately held forests contribute significantly to the \$17.1 billion of annual industrial output. A stage was needed to amass landowners for natural resource educational programs.

What has been done: During 2004, 11 new counties were added to the existing 25 County Forestry Associations, bringing the statewide total to 36. In addition, plans were initiated for an additional six to start in 2005.

Impact: In an effort to measure the impact of the County Forestry Associations the presidents of each of the Associations were surveyed regarding their forestry practices before and after their participation in the County Forestry Associations. The responses indicate the members of the Associations own 180,075 acres of forestland and that their knowledge forestry has increased 39% since joining their Association.

Funding: Smith-Lever

Scope of Impact: State specific



Title: 4-H Natural Resources, Environment and Wildlife Projects

Issue: Tennessee youth need instruction in the principles and practices related to wildlife ecology and management. Their knowledge of natural resources management is critical to our environment's future. Various stakeholder groups at the local and state level have indicated that 4-H environmental, natural resources and wildlife projects should be a high priority. Life skills in decision-making and communication are required for youth to take action in their local communities and wisely use our natural resources.

What has been done: Programs conducted on the local, multi-county and state level had a multi-disciplinary focus, such as wildlife judging, forestry judging, environmental camps and conferences and day camps. Examples of these programs included:

- Teacher inservice offered through the Environmental Education program gave 83 educators an opportunity to enhance their teaching skills related to wildlife management, water quality and Project WET.
- 196 youth from 26 counties learned about the relationship between wildlife and habitat while participating in the 4-H Wildlife Judging contests.
- A summer camp staff member at each of the four 4-H Centers, provided additional natural resource and wildlife activities for more than 6172 Junior and Junior High Campers.
- The annual week long Wildlife Conference was attended by 173 Junior High youth and 32 leaders.

Service-learning projects conducted across the state involved environmental matters: 17 sites benefited from trash pick-up; 18 projects involved recycling of paper and aluminum; 25 projects included wildlife habitat enhancement or landscaping.

Impact: Youth from 68 counties participated in the FACE (Food and Cover Establishment) for Wildlife Contest, planting approximately 1,374 acres in supplemental food resources, which improved wildlife habitat on more than 20,610 acres.

In 2004, 6661 youth participated in school year environmental education programs at the W. P. Ridley, and Clyde Austin 4-H Centers. Written evaluations from the Ridley 4-H Center show that:

- 65% of the participants stated they would adopt practices or behaviors learned as a result of participating in the Environmental Education program.
- 91% of the participants indicated they learned more about forest ecology, global connections, team building, water/soil, wildlife and entomology.



Average test score comparisons between 173 pre and post-tests at State 4-H Wildlife Conference showed an increase in knowledge of 40% concerning issues related to wildlife ecology and management.

Field days, day camps or earth day festivals in 8 counties involving 6,500 elementary youth of whom 100% reported an increase in knowledge gained in the areas of natural resources, water quality, safety, and gardening skills.

45 teachers and 1,235 fourth graders who learned how to plant and take care of trees and gained knowledge about the benefits of protecting natural resources through participation in the ReLeaf Tennessee program. More than 75% of the participants reported correctly planting and caring for a tree.

2,038 youth who participated in "It Came From Planted Earth" educational series with pre-post tests indicating 87% could identify parts and functions of trees, 67% could define photosynthesis, and 78% adopted a water conservation practice.

A recycling program for 193 youth of whom 95% said they would be "more careful about the environment" and 56% planned to recycle.

After a water resources program for 477 fourth grade youth, 80% could identify two properties of water and 60% could define water cohesion and adhesion.

Wildlife and Forestry judging activities allow youth to enhance their life skills in communication and decision-making while learning and practicing principles related to these two areas. Wildlife and Forestry Judging contests included four district contests and one state event involving over 250 4-H'ers.

At the state contest involving 96 youth, a five part scale ranging from "never" to "always" was used to measure response frequency to statements evaluating decision-making. Evaluation survey results show that in nine out of ten statements indicating increased competency in decision-making practices and processes, an average of 61% of the participants responded with "often" or "always." Statements with the most positive response included:

- I have confidence in the choices I make
- I feel comfortable making my own decisions
- I feel I can teach others how to make choices in areas where I am knowledgeable
- I do think about past choices when making a decision

A five part scale ranging from "I can't do it" to "I can do it myself" measured the response frequency to statements evaluating communication skills. For all of the measures, an average of 70% of these same participants "felt they could do it themselves" or "needed little help."

- Statements with the most positive responses included:
- I can research a topic for a speech or presentation



- I am a better observer
- I make sure I understand what another person is saying before I respond
- I am a better listener
- I can use eye contact when giving a speech or presentation

Statewide, 6,643 youth and 228 adults donated 24,360 hours to 65 different environmentally focused service learning projects. These projects are valued at \$446,625.

Funding: Smith-Lever; Environmental education programs at the 4-H Centers are supplemented by more than \$25,000 in grants and gifts; Tennessee Wildlife Resources Agency

Scope of Impact: State specific

Title: Vegetation Structure and Diversity in the Southern Region

Issue: The need to manage forest resources sustainably requires a better understanding of community variables that predict potential risks to forest health. Because vegetation is the primary source of productivity and the main determinant of habitat, changes in vegetation composition, diversity, and structure have a cascading effect on an ecosystem. Therefore, a Vegetation Structure and Diversity (VEG) sampling program was developed and implemented to measure and monitor these variables in forested communities across the southern region.

What has been done: The VEG indicator was sampled across South Carolina, Tennessee, and intensely on St. John, U.S. Virgin Islands, and in the Southern Cherokee National Forest. This project was a collaborative agreement between the U.S. Forest Service and University of Tennessee's Department of Forestry, Wildlife, and Fisheries.

Impact: Scientific analyses resulting from the VEG data collection effort have been incorporated into Forest Resource Bulletins, published by the U.S. Forest Service and disseminated to the public, or compiled for publication by a peer reviewed journal. Analysis of South Carolina's data provided a detailed assessment of diversity and invasive species occurrence across the State. For example, the Southern Appalachian region was identified as containing increased diversity relative to the Coastal Flatwoods. Analyses also showed only 6% of the total species identified were invasive. However, these invasive species were found in 50% of the sampled sites, indicating their widespread occurrence. All VEG data will be analyzed and reported in a similar manner. The public and private sectors have accessed this information for developing land-use plans for conservation, sustainable harvesting, and management purposes.

Funding: Hatch; U.S. Forest Service Southern Research Station Forest Inventory and Analysis

Scope of Impact: Multistate (SC; United States Virgin Islands)



Title: Wood Panel Research Helps Industry and Protects Environment

Issue: Oriented strand board (OSB) is generally manufactured as a multiple layer (three or five layers) mat structure for enhanced bending performance. Each layer contains different materials. This multiple layer mat structure has an influence on other important panel properties, notably thickness swell. Thickness swell is a recognized leading performance issue for OSB products. Optimization of thickness swell through layer property manipulation can be elusive, since traditional thickness swell is measured from a single overall caliper measurement of the panel thickness; i.e., the layer properties are not measured in the conventional caliper measurement.

What has been done: We have developed a patented optical layer thickness swell technique to measure layer property contributions to thickness swell. A comprehensive study was conducted to investigate the effects of mat structure on thickness swell of commercial OSB from 14 mills including a Tennessee mill and laboratory produced OSB panels. Layer characteristic measurement was used to investigate the effects of mat structure on the thickness swell of OSB. Mat structure was then optimized to improve product quality.

Impact: The research has improved our knowledge about thickness swell issues and helped panel industry to understand that they can improve product properties based on optimization of mat structure. OSB production in the United States, which started in the early 1980s, reached 11.2 billion square feet (3/8") in 1998. OSB now shares about 75% of the sheathing market in the United States housing industry. This research enabled OSB manufacturers to improve their product quality without additional cost or to maintain the same quality using less adhesives and wax which both are petroleum-based products.

Funding: Hatch; USDA Wood Utilization Research Grant; McIntire-Stennis Cooperative Forestry

Scope of Impact: State Specific

Title: Predictive Modeling the Physical Properties of Wood Composites

Issue: The Tennessee forest products industry contributes \$10 billion to the Tennessee economy annually and employs 63,000 Tennesseans. Wood costs were the largest component of total manufacturing costs for forest products manufacturers and were as high as 40% in some instances. In 2000, more than 1.1 billion board feet of forest products were manufactured in Tennessee of which 3% to 9% were lost to wood waste. High levels of wood waste lead to poor wood yield, and subsequently higher resin and energy use. Reducing wood waste and improving wood yield can help this important economic sector improve and sustain competitiveness. Indirect benefits to society from wiser use of the forest resource are immeasurable.

What has been done: In 2004, a research focus was to investigate predictive modeling of the physical properties of wood composites using advanced computational algorithms. A heuristic algorithmic method using genetic algorithms with real-time distributed data fusion was developed



to predict the internal bond of medium density fiberboard. The real-time relational data fusion system was completely automated and represented the infrastructure of the genetic algorithm prediction system. Validation of the system was performed at a modern, Tennessee medium density fiberboard plant.

Impact: The medium density fiberboard plant used for the validation study was able to reduce wood and resin usage from use of the genetic algorithm system. Cost savings from reduced wood and resin use during the six-month validation study were \$700,000.

Funding: McIntire-Stennis Cooperative Forestry; USDA Special Wood Utilization Grant; Georgia-Pacific Resins, Inc

Scope of Impact: State Specific

Title: TSU Southern Pine Beetle Initiative

Issue: Tennessee has experienced a severe outbreak of southern pine beetles over the last three years, and an estimated 100,000 acres have been impacted with a majority of the outbreak occurring on non-industrial private forestland. This epidemic has drastically changed the distribution of pine forest types within Tennessee.

What Has Been Done: TSU cooperated in the Southern Pine Beetle Initiative to reduce vulnerability and susceptibility of newly-planted pine stands to pine beetle attack through implementation of viable stand establishment practices. In addition, the initiative sought to lower the risk of established stands to pine beetle attack through the application of sound intermediate treatments. TSU provided leadership in identifying underserved and limited resource forest landowners who were taught through a series of workshops across the state. Topics included prevention of the southern pine beetle and reforestation tax incentives. The cost-share program was administered by Tennessee's Department of Agriculture, Division of Forestry. UT and TSU Extension conducted demonstrations, group meetings and one-on-one visits to instruct Tennesseans in the southern pine beetle effort.

Impact: With Tennessee's area foresters and forestry consultants, Extension assisted 293 limited resource and underserved landowners in this project. The landowners replanted trees on forested areas killed by the beetles, established management practices to reduce the risk of further attack and gained knowledge of the southern pine beetle. From 2001 to 2004, the Tennessee Department of Agriculture, Division of Forestry in partnership with UT and TSU Extension and private consultants helped approximately 370 landowners treat 21,000 acres.

Funding: NARETPA; Smith-Lever; Tennessee Department of Agriculture, Division of Forestry

Scope of Impact: State Specific



Title: Sustainability of Private Forest Lands in Tennessee

Issue: Most private forest land is not being actively managed and outreach and assistance programs are not being utilized to the extent desired.

What has been done: Using phenomenological interviews, seven non-participant private forest landowners (PFLs) were asked to describe experiences on their forest land that stand out to them. Thematic descriptions were developed to address the meaning of their experiences on the forest land they own. Six related themes descriptive of these experiences were revealed: connection, continuity, power and awe, peacefulness and trouble, value, and freedom/control/constraint. These non-participant private forest landowners also did not identify as land managers nor find traditionally defined management related terms and concepts to be meaningful aspects of their experiences on their land.

Impact: The research findings have been distributed to 20,000 professional foresters and related interests through the *The Forestry Source*, the monthly publication of the Society of American Foresters. The research drew 13 follow-up requests for additional information from professional foresters across the United States. As part of their continuing education, the research was also presented to Extension foresters in Maine as part of their continuing education program. The practice of natural resource professionals working with private forest landowners is being informed by these research findings and the understanding of private forest landowners increased. By listening to nonparticipant forest landowners and understanding how they experience their land, foresters are able to translate their expertise in a useful and meaningful way to landowners.

Funding: McIntire-Stennis

Scope of Impact: Multistate (ME)



Goal 5 – Enhanced Economic Opportunity and Quality of Life for Tennesseans

5.0 Overview

5a. Results

The planned programs in Goal Five totaled 1.6 million educational contacts and included education regarding financial security, community development, workforce preparation, parenting skills, child care, youth in governance, leadership, volunteerism, home environmental quality and home safety.

Tennessee has the second highest bankruptcy rate in the nation, and the fastest growing population segment declaring bankruptcy is people under the age of 25 (American Bankruptcy Institute). Family Economics was an Extension statewide priority program in FY 2004, and Tennessee Extension Agents reported delivery of Financial Management programs to 48,669 young Tennesseans.

UT and TSU Extension made 101,907 educational contacts in 4-H workforce preparation programs. In 19 Tennessee counties, workforce preparation programs had measured outcomes, targeting life skills in achieving goals and communications. To evaluate these and other life skills, UT Extension created the Tennessee 4-H Life Skills Evaluation System which launched in April, 2004. The system is an online survey builder which uses valid and reliable questions, with readability levels and reliability having been established through pilot tests with over 1,000 Tennessee youth.

5b. Highlights

Extension also organized local and regional Tennessee Saves coalitions in the state and trained 197 volunteers on these coalitions to serve as motivational speakers and wealth-building coaches. Youth programming included financial education simulations (16,405), workforce education (15,618), basic financial education (8,680), credit education (2,165) the Spend, Save and Share program (2,383) and Tennessee Saves enrollees (667).

Tennessee 4-H programs, conducted cooperatively by UT and TSU Extension, targeted building responsible citizens and leaders. In youth leadership programs alone, 172,518 educational contacts were made, including teen leadership opportunities such as 4-H All Stars, Teen Leadership Connection and State 4-H Council.

Extension had 10,438 educational contacts with the state's child care providers. In 17 Tennessee counties, training was implemented with measured outcomes. A follow-up with child care providers in one county indicated that 40% were serving healthier snacks to children and serving correct portion sizes because of the Extension child care courses.



5c. Benefits

The totals of estimated debt reduction and savings for adults and youth participants in Extension-related programs for 2004 indicate a positive economic impact on Tennessee families of \$7.2 million. A life skills questionnaire was used with 400 of the state’s ninth and tenth graders in the 4-H citizenship project. The purpose was to measure response frequency to statements evaluating responsible citizenship, and it included a 5-point scale ranging from “definitely false” to “definitely true”. Results indicate that on 20 out of 29 statements indicating increased competency in responsible citizenship, at least 70% of participants responded with “probably true” or “definitely true.” The results further showed that 352 youth (88%) indicated that because of their 4-H experiences, they now show respect for the flag even if their friends do not; believe that citizens of this country should be loyal to it; plan to register to vote when eligible; and plan to volunteer to help others in the future.

5d. Assessment of Accomplishments

The planned programs conducted in Goal Five targeted Tennessee needs regarding children, youth, families, economic and community development. An assessment of annual accomplishments shows that Goal Five outcomes set in the FY 2000-2004 Plan of Work were met or exceeded. While programs targeting children, youth, family, economic and community development issues are often difficult to evaluate, UT and TSU conclude that this Annual Report represents an exemplary, national program evaluation model.

Tennessee Research and Extension established immediate, intermediate and long-range outcomes as appropriate for the different programs. Program evaluation protocols defined and implemented included pre and post-tests, observations, questionnaires, end-of-program surveys, third-party interviews or participant interviews. The outcome data obtained from Extension Financial Management programs demonstrate clearly that these programs are having a positive impact. In addition, the data was obtained through a rigorous evaluation process that included a three-month follow-up with over 4,000 youth and adults to assess their behavior change.

5e. Allocations for Goal 5

<p>UT 1862 Research – \$1,147,879</p> <ul style="list-style-type: none"> • Hatch - \$368,908 • Multistate 3(c) 3 - \$27,574 • State - \$751,397 	<p>FTEs for Goal 5 – 180.2</p> <ul style="list-style-type: none"> • UT 1862 Research – 30.3 (7.2 scientist and 23.1 non-Scientist) • UT 1862 Extension – 138.4 • TSU 1890 Extension – 11.5 (9.0 professional and 2.5 para-professional)
<p>UT 1862 Extension – \$9,907,891</p> <ul style="list-style-type: none"> • Smith-Lever b and c – \$2,449,311 • State/County – \$7,458,580 	<p>TSU 1890 Extension – \$645,861</p> <ul style="list-style-type: none"> • NARETPA Section 1444 and 1445 – \$414,056 • Grants/Contracts – \$122,952 • State/County – \$ 108,853



5.1 Key Theme: Financial Security for Tennesseans

Title: Teaching Young Tennesseans to Manage Money

Issue: Because they lack basic money management skills, many young Tennesseans will be, as young adults, vulnerable to financial problems including inadequate income, over-use of credit, bankruptcy, and failure to build wealth for retirement.

What has been done: Tennessee Extension Agents reported delivery of Financial Management programs to 48,669 young Tennesseans during 2004, up from 33,393 in 2003, 23,785 in 2002 and 13,289 in 2001. Youth programming included financial education simulations (16,405), workforce education (15,618), basic financial education (8,680), credit education (2,165) the Spend, Save and Share program (2,383) and Tennessee Saves enrollees (667).

Impact: Post-program and follow-up evaluation data was obtained from 7,193 high school and junior high students participating in financial education simulations, Tennessee Saves and other financial education programs across the state. Weighted percentages for reported impacts and three-month follow-up (conducted with a smaller follow-up sample) were:

Knowledge Gained

- 62% learned the importance of education to earnings
- 52% learned the connection between occupation and lifestyle
- 79% learned the cost of children and their impact on lifestyle
- 49% learned how much it takes to “get by”
- 73% learned how payroll deductions are taken from gross pay

Attitude Change

- 62% felt more strongly that it was important to get a good education
- 90% gained a better understanding of parents’ financial concerns

Skills Gained

- 59% gained skill in how to write a check
- 58% gained skill in keeping a check register
- 67% felt they knew better how to plan their spending

Aspirations

- 60% planned a change in career or education as a result of the simulation

Behavior Change (from follow-up samples, n = 1,842)

- 14% made a spending plan
- 27% began or increased savings (average monthly savings \$32/month)
- 75% changed spending habits
- 67% made a change in career path or financial behavior



The total of savings generated among all youth participants in Extension financial management programs for 2004 was estimated at \$5,892,937.

Funding: Smith-Lever; seed money for On My Own was provided as a gift by Dr. John Dabbs of Oak Ridge, TN

Scope of Impact: State Specific

Title: Tennessee Saves – Helping Tennesseans Build Wealth

Issue: According to the American Banking Institute, Tennessee has led the nation in personal bankruptcies during three of the past five years. Many Tennesseans will not have enough money to live with financial security through their working and retirement years.

What has been done: Tennessee Extension Agents reported delivery of family economics educational programs to 8,281 Tennesseans. Another 300,000 were reached through media, news letters, exhibits and public relations. Major programming efforts for adults in Family Economics included *Tennessee Saves* (853 enrollees); financial management classes including homebuyer and bankruptcy education (5,199) and peer education in Identity Theft and Predatory Lending (1,631). In addition, 197 volunteers participated on local and regional Tennessee Saves coalitions and as motivational speakers and wealth-building coaches.

Impact: As indicated by post-program surveys with 2,753 adults, participants in Extension Family Economics programs showed the following weighted percentages for post-program impact:

- 80% planned to make a spending plan
- 57% planned to track their spending
- 20% planned to increase savings
- 94% planned to decrease debt
- 100% learned ways to avoid fraud
- 95% planned to make a change in behavior to avoid fraud
- 81% improved their financial management as a result of the programming

Three month follow-up surveys with 2,598 participants indicated the following:

- 18% made a spending plan
- 30% tracked their spending
- 19% began or increased savings averaging \$48.68 per month
- 14% decreased debt averaging \$70.42 per month
- 77% made a change in financial behavior to avoid fraud

The total of discharged credit and increased savings indicated for adult participants in Extension Financial Management programs in 2004 is \$1,389,622. In addition, Tennessee Saves volunteers contributed time valued at \$205,000 to financial education programs. Totals of estimated debt



reduction and savings for adults and youth participants in Extension-related programs for 2004 indicate a positive economic impact on Tennessee families of \$7,282,559.

Funding: Smith-Lever; seed money from America Saves and donations from local and regional Tennessee Saves partnering organizations

Scope of Impact: State Specific

Title: Tennessee LifeSmarts Program

Issue: Financial skills are a growing need for Tennessee youth. Because they lack basic money management skills, many young Tennesseans will be vulnerable to future financial problems including inadequate income, over-use of credit, bankruptcy, and failure to build wealth for retirement. Tennessee has the second highest bankruptcy rate in the nation, and the fastest growing population segment declaring bankruptcy is people under the age of 25 (American Bankruptcy Institute).

What Was Done: Extension FCS Specialists teamed with the National Consumer's League and 4-H to provide the LifeSmarts contest for senior high youth focusing on consumer issues of personal finance, health and safety, environment, technology, and consumer rights and responsibilities. The contest includes local individual on-line competition for teams of youth with teams for the state contest being chosen from the top scoring teams across the state.

Impact: In 2004, 268 youth from 16 counties participated in LifeSmarts. One agent surveyed participants and found that 66% of the LifeSmarts team members felt they had increased knowledge of Health and Safety issues over last year, and 100% felt they had increased knowledge of personal finance, technology, and consumer rights and responsibilities. Another agent reported that comparison of practice test scores with competition test scores indicated 100% of the students showed increased knowledge of the materials studied. In that same county, teacher observation indicated that the majority of the students gained confidence and verbal communication skills by participating in LifeSmarts. One member stated "[LifeSmarts] helps you be healthy. It's gotten us all studying and learning about stuff that teenagers don't usually want to learn."

Funding: Smith-Lever; National Consumers League

Scope of Impact: State Specific



5.2 Key Theme: Community Development

Title: Dyer County's Special Summer Education Program

Issue: During the summer months children in low income areas do not receive the proper nutrition or food for themselves daily. Of the youth in Dyersburg and Dyer County Schools, 60% received free or reduced meals and 95% of these children live in Dyersburg, Newbern Monroe, and Tigrett Tennessee. These children can not afford summer camps and there are no organized recreational programs available in their neighborhoods. In addition, various needs assessment surveys and interviews with parents and youth indicate a lack of community pride.

What has been done: One week after school is out, the Special Summer Education Program (SSEP) begins. In 2004 over 800 children received daily nutritious meals (over 22,000 lunches were served) and over 625 participated in recreation programs offered. Horticulture and leadership projects were carried out by 125 children.

The TSU Community Resource Development Agent assisted in writing job descriptions and training 41 summer education staff. The program partners with the Dyersburg Housing Authority, Newbern Housing Authority, Dyersburg State Community College Upward Bound Program, Dyersburg Police Department, Dyersburg/Newbern Parks and Recreation and local churches and 4-H.

UT Extension was also involved; three 4-H nutrition programs were conducted daily for 225 children. The Extension TNCEP program conducted 10 workshops with children on health and nutrition. Building responsible citizens and leaders was a major goal of the program.

Impact: Surveys with parents showed that 75% of children attending programs are making more nutritious food choices. The Community Center Director stated that approximately one-half of the participants exhibit more respect for their neighbors as a result of the citizenship and leadership emphasis. In 2004, the Dyersburg Police Department shared that summer youth crime declined by 60%. The 41 summer jobs (temporary employment) contributed an extra \$75,000 to the local economy.

Funding: NARETPA; Smith-Lever; Tennessee Department Human Services; Jimmy Dean Foods

Scope of Impact: State Specific

Title: Dreamers of Ideas. . .Entrepreneurs of Tomorrow Capstone

Issue: Southern workers suffer from a unique disadvantage because they have the highest percentage of underemployed in reference to the working poor. The need is for alternative



activities, in other words, diversify the economy that will lead to an increase in employment income and population growth through business ownership.

What has been done: The entrepreneurial program builds upon the success of activities and continuation of work that has been done in past entrepreneurial programs conducted by Tennessee State University (TSU) in eight rural counties in Tennessee and Mississippi.

Impact: Nine small-business owners from both Tennessee and Mississippi applied for a Small Business Administration loan for up to \$15,000 during the Entrepreneur Capstone Conference. Startup business ventures and existing small businesses exchanged ideas and business opportunities across state lines. 40% of 30 small business owners applying for a Small Business Administration Loan were successful in securing the loan in Clay County Mississippi.

Funding: NARETPA

Scope of Impact: Multistate (MS)

Title: A Stronger Community – Improving Leadership Skills in Overton County

Issue: Overton is a rural county, and like other rural communities, it faces many challenges. Leadership development was a need identified by a Total Quality Community Partnership Survey.

What has been done: UT Extension's County Community Resource Development Advisory Group developed and evaluated the only leadership training program the county has ever had, Leadership Overton. A seven day training session on such topics as city and county governments, health, education and the judicial system was conducted using tours, homework assignments, group assignments, guest speakers, debates and round table discussions. The program included a tour of our state legislature and capitol.

Impact: Since its inception, 130 participants have graduated from this program with a greater awareness and appreciation of issues facing Overton County. In fact, six of the current fifteen county commissioners have graduated from the program. The program developed leaders from a cross-section of the community including: government, law enforcement, education, finance, and agriculture. Graduates have consistently reported, in end-of-program interviews and follow-up interviews, that they have a better understanding of agriculture and community issues, and that they are better qualified to accept and serve in leadership roles in the city and county. Leadership Overton has also served as a model program for 15 other county leadership programs in Tennessee.

Funding: Smith-Lever; local Chamber of Commerce

Scope of Impact: State Specific



5.3 Key Theme: 4-H Workforce Preparation

Title: Mini-Society for Entrepreneurial Leadership

Issue: Many young people do not understand how a society is governed. Similarly, they do not know how entrepreneurship affects the economy. Despite the variety of talents that many individuals possess, most people think about working for an employer rather than establishing their own business. Women, United States born minorities and limited resource individuals are particularly prone to these ideologies and working in low wage positions.

What has been done: TSU Cooperative Extension program provided leadership for Mini-Society, a curriculum-based entrepreneurial leadership program for children ages 8-12. The program also highlights government, citizenship, social skills and economics. The Mini-Society program was implemented in five counties and reach 86 young people ages 9-12. Youth created their own society (country name, flower, flag, currency, social policies etc.), learned about entrepreneurship, business plans, citizenship, government, social studies, and economics.

Impact: In Davidson County, teacher observations were used to evaluate the program that served 28 minority youth. The teacher observed that the youth:

- learned to manage issues related to scarcity.
- now understand economic issues, including inflation, depression and recession as well as import and export.

In Blount County, the UT Extension Agent trained 16 public school teachers who conducted Mini-Society with over 320 elementary and middle school students. Surveys and observations from seven teachers showed that:

- 50% were sole owners of their businesses and were responsible for all aspects.
- 25% were partners with shared responsibilities.
- 15% were employees with no business.

Funding: NARETPA; Kauffman Center for Entrepreneurial Leadership Foundation Grant

Scope of Impact: State Specific

Title: Tennessee 4-H Builds Workforce Skills

Issue: Students need to become more aware of careers and the skills needed in order to find a job and to perform well in the workplace. Extension's county advisory committees have stated that workforce preparation is a great need among many Tennessee youth. Surveys conducted with Tennessee youth indicate their interest in learning more about jobs and what skills and education are needed to attain those jobs. Various national studies and government reports cite the need for various life skills (i.e., communications and achieving goals) to be taught to youth in preparation for jobs and careers.



What has been done: UT and TSU Extension conducted workforce preparation programs in 19 Tennessee counties. To evaluate skills in achieving goals and communications, UT Extension created the Tennessee 4-H Life Skills Evaluation System which launched in April, 2004. The system is an online survey builder which uses valid and reliable questions, with reliability having been established through pilot tests with over 1,000 Tennessee youth.

Impact: In Humphreys County, 225 seventh grade 4-H youth were involved in workforce preparation programs with these results:

- 92% reported that completing the Career Interest Inventory increased their knowledge of the career clusters that were of interest to them.
- 83% that researched for a career speech increased their knowledge of that career.
- 92% reported that they had increased their knowledge of skills, training and education needed to seek certain careers.
- 86% reported that by participating in Career Day they had increased their knowledge of at least two careers.
- 94% learned that they must begin to set goals for their future success.
- 86% increased their knowledge of the importance of practicing the Six Pillars of Character to establish the character necessary to be a good employee.

In Moore County, all participants were surveyed at the end of their 4-H series building a workforce ready population. Of the 137 junior high youth involved:

- 94% stated they had gained knowledge about careers and planning for their future jobs.
- 69% stated that they planned a practice change, would do something different in the way they looked at different career paths (examples included: take different classes, do research, and broaden their career thoughts).
- 91% felt this was a useful activity for their age of young people and should be continued with others in the future.
- 89% enjoyed the budgeting activity (Welcome to the Real World) the best and many stated that they had learned that "money did not go as far as you think", "better understood why it is hard to be an adult" and "that you can live without luxuries".

In Blount County, teens were involved in a week-long 4-H Career Camp and workforce preparation activities during the school year. Based on a post activity survey, participants in 4-H Career Camp reported the following:

- 92% (26) said they learned knowledge or skills during job shadowing.
- 100% (33) completed a Power Point Presentation about the career that interests them.
- 71% (20) said they learned a lot about leadership.
- 85% (24) said they learned a lot about what to do during an interview.
- 100% (33) learned to dress appropriately for a professional job shadow.
- 88% (24) learned about purchasing an automobile.
- 92% (25) learned about matching appropriate careers with their personality.



110 Blount County high school 4-H youth were involved in workforce programs targeting goal-setting. As a result of 4-H, post-program surveys showed that:

- 60% said they often or always set high goals and work to achieve them.
- 50% said they often or always stretch their selves by setting challenging goals.
- 80% said they have set a goal for their job or career.

In Robertson County, the Tennessee 4-H Life Skills Evaluation System was used to create post-test only surveys for fifth grade youth. Results of over 500 youth showed that:

- 87% are now able to complete the skill of giving a speech or talk with little or no help.
- 72% are now able to organize thoughts before a speech or talk with little or no help.
- 77% are able to deal with nervousness when giving a speech with little or no help.
- 70% are now able to identify the parts of the speech with little or no help.

Funding: Smith-Lever

Scope of Impact: State Specific

Title: 4-HTV for Rutherford County

Issue: Rutherford County is the fastest growing county in Tennessee with a population of over 200,000 people and second in the United States for new job growth according to the Federal Bureau of Labor Statistics. Youth needed a program to help them understand and prepare for the growth of career opportunities in communications and performing arts.

What has been done: TSU Extension partnered with the Rutherford County cable access television station, the Middle Tennessee State University Communications Department, the TSU Cooperative Extension Media Relations staff, and the county Extension office in the use of materials and equipment for a 4-H television show. A media workshop was conducted for 30 youth. The actual show has made such an impression on the audience that plans are being made for a regional 4-H television show that will be a spin-off of Rutherford County 4-HTV.

Impact: Of the 30 participants of the media workshop and 4-HTV:

- 100% gained knowledge of the layout of an informative television show.
- 80% gained skills in the use of camera equipment.
- 80% demonstrated an increase of confidence in front of the camera.

Funding: NARETPA

Scope of Impact: State Specific



5.4 Key Theme: Better Tennessee Parenting

Title: Tennessee Parenting Apart: Effective Co-Parenting

Issue: Researchers have found that parents' divorce can be detrimental to children's well-being and adjustment during childhood and as adults. Children of divorce have been found to have double or greater risk of lifelong emotional or behavioral problems when compared to children whose parents stay married (Hetherington, 2002). These problems include greater difficulty forming close personal relationships, higher teen marriage rates, higher cohabitation rates, and higher divorce rates as adults (Amato, 2003; Hetherington, 2003; Wallerstein, 2000, Wolfinger, 2003), lower psychological and overall well-being (Acock and Demo, 1994; Amato, 2003), and lower quality of parent-child relationships (Booth and Amato, 2001). Researchers have found that parents who completed a skills-based education program on parenting children through divorce, in contrast to a comparison group of parents who did not do so, were better able to work with their ex-spouses on difficult child-related issues and were more willing to allow their children to spend time with the other parent (Arbutnot and Gordon, 1996) and had lower relitigation rates (Arbutnot, Kramer and Gordon, 1997).

Tennessee has one of the highest divorce rates in the nation, 50% higher than the national average. The high cost of divorce to Tennesseans in the form of the emotional toll on children and families and the financial toll on the state and individuals prompted the Tennessee General Assembly to take action. A 2000 state law requires divorcing parents to attend a minimum of four hours of parent education specifically dealing with parenting through divorce (Child Custody and Visitation: Parenting Plans, 2004). The purpose of this legislation is to help parents develop parenting plans that are in the best interests of their children and to encourage parents to seek alternate means of resolution of future disputes rather than resolving their disagreements through the courts.

What was done: In 2004, Extension FCS Agents in 53 of Tennessee's 95 counties offered the four-hour class *Parenting Apart: Effective Co-Parenting*, an information and skills-based program that utilizes lecture, class discussion, videos, and handouts to inform parents about the potential effects of divorce on their children and provides them with strategies for minimizing those effects. Approximately 3,300 participants completed the Extension class in 2004. Over 16,000 persons have completed the classes in the last four years.

Impact: End-of-class evaluations from 2,496 individuals of the 3,300 who completed the classes in 2004 mirror the 2003 achievements. The 2004 statewide results showed that:

Parenting Knowledge Was Gained

- 94% agree the classes helped them understand about the impact of divorce on children.
- 93% learned about the importance of working together for their children's best interests.
- 91% learned the value of their children having a meaningful relationship with both parents.



Parenting Attitudes Were Changed for the Better

- There was a reduction in the level of resentment at having to attend the class (measured on a scale of 1 to 5 where 1 means not at all resentful and 5 means very resentful) from a mean of 2.47 at the beginning of the class to 1.75 at the end of the class ($N=2435$, $p < .000$).

Parenting Skills Were Gained

- 93% learned techniques for effective communication with their children and the other parent.

Parenting Aspirations Were Changed

- 91% indicated they planned to work with the other parent for the sake of their children.

In FY 2004, three to six month follow-up evaluations were conducted. Participants for the follow-up evaluation were selected randomly from all participants who agreed to participate in follow-up evaluation by signing an informed consent form. All consent forms were placed together, and every fourth individual was selected from the stack. This resulted in a sample of 625 persons. We received responses from 119 individuals for a 19% response. Responses could be matched to the participant information form for 110 persons. Therefore, our usable responses represented 18% of the survey sample. Comparisons of the respondents to everyone who completed the classes revealed only a slight difference (1.5 years) in the age of the participants who responded vs. those who did not participate. No other differences were noted between the two groups.

Participants in the follow-up survey reported a decrease in the following behaviors since completing *Parenting Apart: Effective Co-Parenting* class:

- talking to others about the other parent when angry at the other parent,
- sending messages by the child to the other parent.
- arguing in front of the child
- complaining in front of the child, and
- yelling in front of the child.

75% indicated they had continued to use the printed materials they received in the class.

One participant summed up the results of the class this way, "The class (especially the videos shown) made me even more aware of how the divorce affects the children and how to handle talking and communication with them. Also helps me communicate better with the other parent; and I believe the class did wonders for my ex!"

Funding Sources: Smith-Lever; participant fees

Scope of Impact: State Specific



Title: Relatives Caregivers of Dependent Children

Issue: In the United States there are more than six million children living with grandparents or other relatives. In Tennessee, data reveal that more than 126,000 children live in households headed by grandparents or other relatives. Tennessee has 61,252 grandparents responsible for meeting the basic needs of grandchildren. Some factors that contribute to these dependent children living with relatives include teen pregnancy, mental and physical illness, drug abuse, incarceration, neglect, financial difficulties, and divorce or separation of parents. Caregivers need to be made aware of available resources that will assist them with specific problems they face while having custody of these children.

What has been done: TSU Extension provided education to two FCE (family and community education) groups focusing on relatives as caregivers of non-biological dependent children. Six meetings were held with 48 attending to plan for the *Grandparents and Other Relative Caregivers as Parents of Dependent Children* conference. Partnerships were established with other agencies to plan and conduct the conference with 133 in attendance.

Impact: Of the 133 participants in the *Grandparents and Other Relative Caregivers as Parents of Dependent Children* conference:

- 100% became aware of where to seek help in their community for available resources.
- 72% stated they plan to utilize resources such as assistance with financial needs, medical/mental health care, adult learning, legal problems, and enhancement of parenting skills.
- 85% revealed that they would join a relative caregiver support group in order to provide moral support and encouragement to others who have responsibilities as non-biological parents.

Leadership skills and community involvement were fostered among 11 FCE members who set a goal to present this conference again next year and subsequently every other year with the aim to expanding the program to have multi-county involvement of relative caregivers of dependent children.

Funding: NARETPA

Scope of Impact: State Specific

Title: Healthy Marriage Initiative Targets Minority Marriage Counselors in Memphis

Issue: Strengthening marriages in Tennessee is an endeavor that could result in better quality of life for Tennessee families, especially children, and could save individuals and the state economically through reduced costs for medical care, reductions in the number of low-income families needing financial assistance, and reduced costs associated with divorce. These results (especially economic ones) will only be apparent over the long term.



What was done: In partnership with Families Matter of Memphis, UT Extension conducted a train the trainer session in the Extension curriculum *Before You Tie the Knot*. UT Extension's response was to serve the underserved and make special efforts to contact minority marriage education providers in Memphis-Shelby County.

Impact: UT Extension trained 31 marriage counselors (64% minority). Participants rated the train the trainer session a 4.82 on a Likert-type scale for overall quality and knowledge gained. In addition, 100% of marriage educators in Shelby County signed a contract that they would offer *Before You Tie the Knot* at least once during the coming year.

Funding Sources: Smith Lever

Scope: State Specific

5.5 Key Theme: Child Care

Title: Extension Cares for Tennessee Children and Youth

Issue: According to the 2000 Kids Count State of the Child in Tennessee Report, children who experience poor quality child care are at risk of poor, long-term developmental outcomes such as apathy, poor school skills, and heightened aggression. High-quality child care continues to be a major need for Tennessee children and families. Many parents are left without adequate, affordable, or even safe care for children. Training of child care providers is essential to having enough quality care for children whose parents are in the work force.

What has been done: UT Extension conducted training for child care providers in 17 Tennessee counties with measured outcomes. The training included: poison prevention and identifying poison look-a-likes, eating a rainbow of colors (five to nine a day fruits and vegetables), controlling angry feelings, policies for collecting fees, and other topics. The training included practical demonstrations and materials. This included Weakley County where the Extension FCS Agent wrote original nutrition songs and taught 67 area child care providers.

Impact: In Blount County, 224 child care providers received UT Extension training, and follow-up interviews showed that over 90% of participants reported increased knowledge on all subjects present and over 80% plan to implement some portion of what they learned in their classroom and in relations with parents and staff. Child care providers have also reported that they use the information they receive through the UT Extension newsletter, *Today's Family* and in classes in their personal and professional lives. They also report sharing the information with co-workers and parents.

In Hardin County, seven of the nine child care provider facilities changed their snack menu to include fruit.



In Sullivan, Greene and Washington Counties, 126 child care providers had these outcomes, as measured on a post-program survey:

Child Care Provider Knowledge and Attitudes Gained

- 77% of participants agreed that controlling angry feelings is a skill that children can learn from care givers.
- 55% agreed that it is important for good health to include fruits and vegetables in meal plans for children everyday.
- 65% agreed that they need to pay more attention to the storage and use of potential poisons in day care center.
- 71% of participants feel that they can now provide activities to help children manage anger.

Child Care Provider Skills Improved and Aspirations Changed

- 69% of participants were able to identify and correct potential poison problems in their center.
- 77% are better able to plan creative activities that encourage children to taste colorful foods.
- 67% of participants reported that they can identify tools to help children handle anger.
- 71% agreed to display poison control center phone number in center.
- 69% agreed to use activities to help children deal with angry feelings.

In 2004, a follow-up evaluation was conducted with 27 child care providers who had participated in UT Extension Child Care Training over the past two years. Because of their past training:

- 12 (44%) reported they had increased the amount of physical activities with children.
- 11 (40%) prepared or checked an emergency supply kit.
- 12 (44%) offer appropriate serving sizes to children based on age.
- 11 (40%) served healthier snacks to children (participants listed examples: fruits and vegetables, 100% fruit juice, apples and mini pizzas on English muffins).

Funding: Smith-Lever

Scope of Impact: State Specific

5.6 Key Theme: 4-H Youth in Governance: Citizenship and Civic Engagement

Title: Tennessee 4-H Engages Rural Youth in Governance

Issue: Tennessee 4-H Youth Development enrollment is rural in nature. In 2004, 85% of participants lived on farms or in towns and cities of less than 50,000. By nature, 4-H Youth Development programming in Tennessee engages rural youth. Statewide needs assessment, including results from the National Conversation on Youth Development in the 21st Century,



showed a need for rural teen and adult volunteers to assess local needs; identify local assets; create a unified vision, mission and plan for after-school and summer solutions, and report local successes statewide.

What has been done: Tennessee 4-H became a partner with USDA-CSREES and National 4-H Council in the “Engaging Youth/Serving Communities” initiative. In the first year of this effort, Tennessee 4-H emphasized building statewide momentum through a core group of youth, salaried staff and adult volunteer leaders. The Tennessee Youth-Adult Partnership Training Team included 8 teens, 8 adult volunteers, and 8 agents. This 25-member group is serving in the capacity of trainers in train-the-trainer seminars across the state. This group was trained in the *Youth-Adult Partnerships: A Training Manual* curriculum purchased from the National 4-H Council. A copy of this curriculum was also purchased and placed in each of Tennessee’s 95 counties. Additionally, four training opportunities were held across the state to train staff in the *Youth-Adult Partnerships: A Training Manual* curriculum.

In addition, 36 youth were trained in the Points of Light Youth Leadership Institute (PYLI). The Tennessee 4-H Volunteer Leader Forum was used to train nearly 180 volunteer leaders and Extension staff from across Tennessee in youth-adult partnerships, youth in governance, and other youth engagement activities. In FY 2004, 1745 youth and 881 adults were trained in youth-adult partnerships.

Impact: In just the first year of this initiative, 225 Tennessee youth and 43 adults have worked 2,399 hours in unison on concrete projects with an additional 228 youth and 43 adults engaged as partners in governance activities. Thirteen organizations were involved as partners. A total of 1,748 youth and 889 adults have participated in 8,311 hours of community problem-solving via youth in governance and youth-adult partnerships.

The 25 members of the Tennessee Youth-Adult Partnership Training Team achieved these outcomes:

- 100% indicated that because of the training they were more prepared to work in effective youth-adult partnerships.
- 100% indicated that because of the training their understanding of youth-adult partnerships had increased.
- 95% planned to implement training for others.
- 100% indicated an understanding of their role as a member of the TYAP Training Team.

Outcomes from an end-of-program survey with 36 4-H youth in the Points of Light Youth Leadership Institute indicated that:

- 100% gained knowledge related to decision-making skills.
- 80% increased their basic leadership skills.
- 100% gained knowledge of community mapping, community project planning, communications and diversity.



Funding: Smith-Lever; USDA and National 4-H Council *Engaging Youth Serving Communities I* Rural Youth Development grant

Scope of Impact: State Specific

Title: Tennessee 4-H Engages Youth in Civic Engagement

Issue: To develop citizenship skills that will contribute to our democratic society, young people need to be connected to their local communities, including government.

What has been done: Service learning became a major focus of Tennessee 4-H Youth Development in October 2000. Since then, it has become part of 4-H programs at the county, regional, and state level. Reports show that 49,479 4-H'ers and 4,262 adults conducted more than 1069 service learning projects in 2004. Service learning activities were reported by 82 counties.

More than 626 youth and adults participated in civic engagement/service learning workshops at the state, regional, and national level. At the Prudential Youth Leadership Institute (PYLI), 35 teens developed leadership skills and planned ways to become actively involved in meeting needs in their communities.

Impact: Evaluations, reflection activities, and service activity reports show that 4-H'ers developed a wide variety of skills and knowledge through their service, from teamwork and concern for others to interior design and woodworking skills. Their service learning activities benefited more than 111,753 people and met true community needs in the areas of environment (96 projects), health (13 projects), public safety (4 projects), education (99 projects), other human needs (814 projects), and other community needs (43 projects). 4-H youth and adults committed more than 113,204 hours to the community. When calculated by Independent Sector's nationally accepted dollar value for volunteer time (\$17.19/hour), the 4-H service learning projects are valued at over \$1.9 million. Community beneficiaries rated the effectiveness of 232 projects, with an average rating of 4.42 on a five-point scale, where 5 = highly effective. Consider these examples of exemplary service:

- More than 400 youth and adult leaders at Tennessee 4-H Congress collected items for the neonatal intensive care unit at Vanderbilt Children's Hospital.
- At Tennessee Academic Conference, middle school 4-H'ers reinforced skills learned through 4-H project work as they spent 390 hours serving at 9 sites in Knox County.
- Youth attending Tennessee 4-H Roundup donated items for runaway shelters in Knoxville and also spent 182 hours volunteering at 7 sites in Knox County.

In 2004, Tennessee 4-H Congress included assemblies, workshops, a service project, and other activities to foster the development of the life skills of responsible citizenship. A citizenship



questionnaire was used to measure response frequency to statements evaluating responsible citizenship, and it included a 5-point scale ranging from “definitely false” to “definitely true”. Results indicate that on 20 out of 29 statements indicating increased competency in responsible citizenship, at least 70% of participants responded with “probably true” or “definitely true.” The results further showed that 352 youth (88%) indicated that because of their 4-H experiences, they now:

- Show respect for the flag even if their friends do not.
- Believe that citizens of this country should be loyal to it.
- Believe that if our country were in trouble, they would help any way they could.
- Plan to register to vote when eligible.
- Plan to volunteer to help others in the future.

Funding: Smith-Lever

Scope of the Impact: State Specific

5.7 Key Theme: 4-H Leadership and Volunteerism

Title: TSU Builds Leaders with Teen Leadership Connection

Issue: Being a leader requires specific social, communication and leadership qualities. Many individuals, especially those from limited-resource and/or disadvantaged backgrounds may not know how to access the necessary individual, family, and community resources to become a great leader.

What has been done: Teen Leadership Connection, a curriculum created by Prairie View AandM, targets youth for greater social and life skills; improves their self-esteem; promotes wellness, leadership and teamwork; and emphasizes cultural awareness. Using the Teen Leadership Connection curriculum, a series of educational programs on such topics as communication, leadership, etiquette, positive thinking and positive self talk were conducted with nearly 400 Tennessee youth in three counties. The majority of students served in this program come from families with incomes under \$24,000, where neither parent graduated from college.

Impact: Surveys received from a sample of the 400 youth served indicate:

Communication

- 98% increased their knowledge about verbal and non-verbal communication.

Etiquette

- 100% increased their knowledge about etiquette, conduct tips, and manners.
- 92% demonstrated a gain in skills and reported that they could teach a friend and parents about the information learned.



- 96% reported that the session was helpful.
- 88% indicated that they would use the information learned in their personal lives.

Interviewing Skills

- 90% improved their written, verbal and nonverbal communication skills and indicated that they would use what they learned in the session when they go on an interview.
- 78% learned new information about interviewing and interviewing, written, verbal and nonverbal communication skills.
- 75% felt better prepared to go on an interview.

Positive Thinking and Positive Self Talk

- 89% learned new ways to think positively about themselves.
- 59% learned new information about positive self-talk.

Funding: NARETPA

Scope of Impact: State Specific

Title: 4-H Youth Development Volunteer Program

Issue: Research indicates that the number one deterrent to high-risk behavior in youth is the presence of a caring adult. Tennessee 4-H Youth Development has placed emphasis on volunteer program development. 4-H relies heavily on volunteers to assist in delivering programs to the 382,677 4-H participants in Tennessee.

What has been done: Tennessee 4-H involved 5,730 youth volunteers and 11,504 adult volunteers (17,234 total volunteers) in delivering 4-H programs to Tennessee youth. There were 2,328 adult volunteer leaders and 2,663 youth volunteer leaders trained statewide through 4-H programs in the areas of leadership, parenting, and others in 2004. In addition to local volunteer training, statewide volunteer leader training was provided at the State Volunteer Leader Forum to 105 individuals. The State Committee of 4-H Volunteer Leaders continued to serve in a significant role in planning and conducting the Forum. Tennessee had 36 4-H volunteers educated at the 2004 Southern Region Volunteer Leader Forum in Eatonton, GA.

Impacts: According to the U.S. Bureau of Labor Statistics (2004), on average, an adult who volunteers spends 52 hours a year volunteering and the current estimated dollar value of a volunteer hour is \$17.19 according to the Independent Sector (2004). Based on these estimates, the adults who volunteered with Tennessee 4-H programs in 2004 contributed approximately \$10 million in volunteer time to the positive development of young people.

Funding: Smith-Lever

Scope of Impact: State Specific



5.8 Key Theme: Home Environmental Quality and Safety

Title: Radon and Indoor Air Quality

Issue: The presences of Radon Gas can affect the safety and value of a home. In addition, radon gas is the second leading cause of lung cancer among Tennesseans. The National Academy of Sciences data states that Radon is estimated to cause between 15,000 and 22,000 lung cancer deaths per year.

What has been done: UT Extension used media campaigns, including television public service announcements, newspaper articles and 90-minute radio programs on Nashville radio stations to educate the Tennesseans on the dangers of radon.

In Montgomery County, UT Extension made 1,097 educational contacts to promote radon awareness, and approximately 15,000 viewed UT Extension radon exhibits. UT Extension's 15-member Environmental Advisory Team Volunteers were trained to install test kits and promote radon awareness.

In Overton County, testing for radon in water was added to the water testing program held each year in the county and 17 individuals took the test. Because of the high Radon levels recorded in the past testing periods in Overton County, the Tennessee Department of Environment and Conservation Division of Air Pollution Control gave out 168 free alpha track testing devices to Overton County citizens. UT Extension collaborated with personnel from the Southern Regional Radon Training Center at Auburn University. The group conducted training during June, July and August on subjects ranging from measurement training and mitigation to inspections.

Impact: In Montgomery County, UT Extension trained 15 volunteers who installed year-long radon test kits into 100 homes. In addition, 130 youth and 930 adults gained knowledge of the three key facts about Radon Gas. Volunteers donated over 100 hours to install radon test kits and teach one on one about Radon to participants and 200 hours with other education programs.

In Metro-Nashville/Davidson County, follow-up questionnaires revealed the following:

- 118 persons increased their knowledge of radon and its health effects.
- 65 persons increased their knowledge of household mold and its health effects.
- 39 persons increased their knowledge of the relationship between indoor air quality and health concerns such as asthma and lung cancer.
- 33 persons conducted radon tests in their homes.

In Lincoln County, 25 families tested their homes for radon in 2004, and seven individuals have requested UT Extension information on mitigating the effects of radon in their homes.



In Decatur County, a follow-up survey showed that 79 sixth graders (61%) correctly listed radon as the gas that damages lungs – the survey was six months after their UT Extension radon class.

Funding: Smith-Lever

Scope of Impact: Multistate (AL)

Title: Testing and Evaluation of Off-road Utility Vehicle and Lawn Mower Rollover Protective Structure (ROPS)

Issue: The American Society of Agricultural Engineers S547 ROPS design standard included a new modeling component that would allow ROPS design without actual field upset testing. The influence of the mower deck to determine the vehicle/slope contact points is ignored in the model possibly producing unsafe ROPS designs. This assumption can significantly influence the model results and needed to be explored prior to implementation for ROPS design.

What has been done: A Deere F925 front drive mower was used in the evaluation of ASAE S547 continuous roll field testing and the model. Three continuous rollover tests were conducted using the F925 front drive mower with the factory-installed ROPS using the calibrated foam pad that meets the strength requirements of the ASAE S547 Standard. A continuous roll was observed for all three tests. Additional continuous roll tests were conducted with the extended ROPS in both the regular and inverted positions. Two additional tests were conducted without the deck and the ROPS in regular and inverted locations.

The results show that with a deck, in two test conditions, the model is predicting no continuous roll when continuous roll did occur in the field upset tests. The results of the field upset tests and related model performance demonstrate an inconsistency with the model presented in the ASAE S547 Standard. This model may not accurately predict the roll behavior of lawnmowers with front decks. Model modifications to include the influence of the front deck on the continuous roll behavior are needed prior to being used for ROPS designs.

Impact: Based on these tests, the current model should not be used to predict the roll behavior of front drive mowers. The results of the tests have been reported to the ROPS manufacturing industry. To date, no known front drive mower ROPS has been designed using the current ASAE S547 continuous roll model. The need to revise the current model has been shown. The industry is now aware of this problem and model modifications are underway. These modifications will allow ASAE S547 to be implemented by ROPS manufactures for future front drive mower ROPS designs.

Funding: Hatch

Scope of Impact: International



IV. Stakeholder Input Process

In FY 2004, the Tennessee Agricultural Research and Experiment Station aggressively sought and acted upon input from stakeholders. Stakeholder input is shared between and among Extension and Research personnel at both institutions. One example of this sharing is through monthly administrative team meetings that make stakeholder input a priority. Examples of the exemplary stakeholder input and program responses to this input in FY 2004 are listed below.

Input from Statewide Survey

UT Agricultural Experiment Station conducted a study using the Human Dimensions Laboratory at the University of Tennessee in which phone interviews were conducted with Tennesseans to determine:

- Familiarity and satisfaction with University of Tennessee Institute of Agriculture (UTIA): College of Agricultural Sciences and Natural Resources, Extension, Experiment Station and College of Veterinary Medicine.
- Visitation at the Experiment Station's 11 branch stations across the state.
- Importance of services and research programs.

A random, stratified random sample was drawn to ensure a minimum of 100 completed interviews in each of the 11 counties where a branch station of the UT is located in the state. An additional 500 interviews were completed in the remaining Tennessee counties for a total of 1,635 interviews. Telephone numbers were purchased from Survey Sampling, Inc. Among the findings were these:

- Approximately 10% of the residents of Tennessee had attended a UT Field Day program for agriculture or forestry.
- 19% of Tennessee residents had sought information directly from (or had personally contacted) a UTIA employee, and the most common problems for which they sought information were trees, soil testing/soil problems, insects, fire ants, tobacco production, gardening and livestock and poultry.
- Residents were read a list of UTIA services in random order and asked to tell how important they thought the service was. Each service was perceived as "somewhat important" or "very important" by over 90% of all Tennessee residents. The two most important services were perceived as "somewhat important" or "very important" by over 90% of all Tennessee residents:
 - "Identification of and recommendations for insect damage to crops, plants and trees."
 - "Identification of and recommendations for food safety concerns."

The data confirms that the Tennessee Agricultural Research and Extension System is solving real problems for the people of Tennessee where they live, work and play. The data will be useful in planning and managing programs of the University of Tennessee Institute of Agriculture. The



University of Tennessee is committed to using this stakeholder input to improve services and research for the people of Tennessee.

Input from Extension Advisory Groups

UT and TSU Extension placed emphasis on seeking and using substantial input from stakeholders in 2004 to strengthen stakeholder involvement in all phases of program planning, implementation and evaluation. Contacts with the state's 95 County Agriculture Committees and various local Extension Program Advisory Committees reached 12,520, a 28% increase in the number of advisory contacts over the previous year.

UT Extension and TSU Cooperative Extension Program continued their joint State Extension Advisory Council, a 24-member group representing a broad cross-section of the state. Extension administrators also worked with the Advisory Council in responding to an across-the-board reduction in state budget allocations. The Advisory Council considered scenarios for this budget reduction. In 2004, UT Extension closed its Cumberland District office in Crossville. The Extension administrative structure was redrawn from four districts to three regions.

Input from Limited Resource and Small Farmers

TSU Extension organized an advisory group of small farmers in Lincoln, Maury and Giles Counties. The group spoke of the need to assist the small farmer in vegetable production. The TSU Specialist cooperated with agents, including UT Extension agents, to assist 71 vegetable producers to increase production in FY 2004.

Input from Tennessee Master Gardeners

The UT Department of Plant Sciences conducted a statewide needs assessment to provide direction for the new Tennessee Master Gardener program. The needs assessment included a statewide survey of current Tennessee Master Gardener volunteers, and over two-thirds of the participants indicated that the program needed more consistent volunteer requirements and guidelines. The survey also indicated that more impasses should be made on retaining volunteers, offering them more educational advancement and developing a communication system for county Master Gardener groups and the state. Because of this input, UT Extension:

- Formed a Master Gardener Advocacy Board for greater stakeholder involvement and input.
- Authored new guidelines to improve Master Gardener volunteer service return.
- Launched a Tennessee Master Gardener website and email network to increase communication between and among UT Extension and individual Master Gardeners.

Feedback from the Master Gardeners indicated that just one of the many positive results was that volunteers became aware of the hundreds of offerings for continued education at the county level.

Input from Tennessee Integrated Pest Management Advocates

The Tennessee School IPM Advisory Board has been reactivated and new members added. This new board has helped to shape UT Extension's IPM program for schools by planning Extension programs that will increase adoption of IPM in Tennessee's schools.



Input from Tennessee 4-H Youth and 4-H Adult Leaders

UT Extension strengthened a long tradition of seeking input for 4-H programs from its 21-member State 4-H Council. This group, elected by their peers, includes 18 4-H youth plus one volunteer leader, one Extension professional and one 4-H Foundation member. In addition, 4-H Youth Development continued to seek and act upon stakeholder input from support organizations, including the State 4-H Volunteer Leader Committee, State 4-H Foundation, Inc., Collegiate 4-H and State 4-H Alumni.

Input from Montgomery County Tobacco Growers

UT Extension and Research Advisory Groups in Montgomery County, Tennessee suggested that more should be done to develop a black shank resistant, dark fired-cured tobacco variety with acceptable quality. These growers indicated that a black shank resistant variety would improve farm profits for small acreage tobacco growers. Dark tobacco is produced in a small geographic area of the state. The majority of the state's production is burley tobacco.

UT and UK Extension Tobacco Specialists responded to this input through the establishment of a large test plot on the Dean Hutchison farm in Montgomery County. As a result of this plot, a new variety was released, KTD4. Test results indicate that this new variety will be superior in both yield and quality to existing varieties. Black shank destroyed 10% of the crop in Montgomery County in 2004, and this disease-resistant variety will increase tobacco income by \$1.2 million in the county. Collaborators included tobacco growers, UT and UK researchers and Extension personnel. Estimates from tobacco companies show that 20% of Montgomery County's 2005 crop will be planted to the new KTD4 variety. Estimates are that gross income will increase \$10 million in the entire dark tobacco growing region.

Input from Natural Resource Management Constituents

Advisory groups and key informant interviews revealed that many Tennesseans with a keen interest in natural resource management strongly desired a research and extension focus on the establishment, restoration and management of native grasslands. These grasslands would be for agricultural, wildlife management and esthetic purposes. State and federal planners have targeted establishment of 608,000 acres of native grasses in Tennessee. This represents a \$76 million impact to the economy in restoration efforts alone. Significant benefits would also be realized from agricultural and wildlife-related economic impacts as well.

In 2004, UT Extension and the UT Agricultural Experiment Station responded to this need by making plans for a Chair of Excellence in Native Grassland Restoration and Management in the Department of Forestry, Wildlife and Fisheries. UT established a 27-member steering committee representing six federal, two state and two private organizations. The group secured a \$250,000 commitment from the Tennessee Wildlife Resources Agency. A grassland Chair at UT will further the understanding of native grassland restoration and further boost the economy in Tennessee and the entire Southern Region.



Input from Commercial Clients of Tennessee’s Plant and Pest Diagnostic Lab

A stakeholder survey was conducted in 2004 to determine stakeholder satisfaction and impact of the plant and pest diagnostic lab operated by the University of Tennessee Extension’s Entomology and Plant Pathology specialists. The personnel of this lab conduct diagnoses for plant samples submitted by mail, hand delivery, and digital images (Distance Diagnosis). Stakeholder input was obtained through a mailed questionnaire that asked if the service was quick enough and met their needs for plant pest diagnosis. Over 70 commercial clients were randomly selected for the survey which had a 70% return rate. Results indicated that overall, clients were extremely satisfied with the service.

V. Program Review Process

The program review process established in the FY 2000-2004 Plan of Work was utilized in FY 2004, and this protocol has not changed.

VI. Evaluation of the Success of Multistate and Joint Research and Extension Activities

Issues of Critical Importance

UT Extension and the UT Agricultural Experiment Station cooperate with peer institutions to address a number of issues of critical importance on the state, regional, and national level. In this report, the scope of the impact has been identified for all programs. All departments in the University of Tennessee Institute of Agriculture (UTIA) have personnel with joint appointments in Research and Extension. Examples of critical issues, found in this FY 2004 report, addressed by multistate, multi-institutional, multi-disciplinary and integrated Research and Extension include:

<i>Multi-Disciplinary</i>	<i>Multi-Institutional</i>	<i>Multistate</i>	<i>Integrated Research and Extension</i>
<ul style="list-style-type: none"> ● TN LifeSmarts Program (personal finance, health/safety, and technology) ● Tennessee’s Value Added Agriculture (all agriculture and natural resource disciplines) 	<ul style="list-style-type: none"> ● Dyer County’s Special Summer Education Program (UT and TSU) ● Mini-Society Entrepreneurial Education Program (UT and TSU) 	<ul style="list-style-type: none"> ● Cotton Agronomy and Physiology Research (MS) ● 4-H Volunteer Leader Training (Region) 	<ul style="list-style-type: none"> ● Making Tennessee Forages Work (branch station and on-farm research and demonstration) ● Improved Beef Cattle and Genetics (on-farm research and demonstration)



Needs of Under-served and Under-represented

Tennessee's beef production and marketing demonstrations provide management and marketing information to under-served and under-represented farmers. In 2004, Extension made over 3,000 educational contacts in livestock and livestock marketing with individuals representing racial/ethnic minority groups. One of many examples of serving under-served and limited resource farmers is in Perry County where five producers averaging herds of 48 cows were assisted in earning an additional \$9,600 each by adopting multiple production practices.

Dyer County's Special Summer Education Program was targeted to a limited resource audience. In addition, 4-H clubs and school enrichment groups across Tennessee were targeted to public schools in limited resource communities.

The development of new tobacco varieties continues to serve the needs of small, limited resource farmers in the state's tobacco growing areas. The University of Tennessee has a joint tobacco specialist with the University of Kentucky Cooperative Extension Service which expands the expertise offered to Tennessee tobacco growers in economically depressed areas dependent on tobacco income. In 2004, 17 varieties were tested and one fungicide treatment project was completed on Tennessee farms.

Expected Outcomes and Impacts

Expected outcomes were described fully in the FY 2000-2004 Plan of Work, and all UT and TSU Extension personnel created annual plans through the UT Extension Annual Planning database. These annual plans included multidisciplinary, multi-institutional, multistate and integrated plans. FY 2004 impacts have been described fully in this report, organized by National Goals and key Research and Extension themes.

Toward Greater Effectiveness and Efficiency

The Tennessee Agricultural Research and Extension System continued to explore ways to utilize multistate, integrated, multidisciplinary and multi-institutional approaches to improve Research and Extension. This allowed both the University of Tennessee and Tennessee State University to address timely issues that cross county, state and regional lines. In evaluating the success of these and other activities, UT and TSU Extension and UT Experiment Station find that efforts to offer multi-disciplinary, multi-institutional, integrated and multistate programs have been exemplary in FY 2004. Major indications of effective and efficient programs include:

- The stated performance goals of the FY 2000-2004 Plan of Work were realized.
- Stakeholder input was aggressively sought (i.e., various advisory groups and a statewide phone interview) and FY 2004 programs were initiated or adapted to address stakeholder concerns.



- Greater integration of fiscal and program accountability by UT Extension resulted in an increase in Smith-Lever expenditures for Integrated Research and Extension (72% increase) and Multistate Extension (40% increase) over the previous year.
- UT Experiment Station increased Hatch expenditures for Integrated Research and Extension 13% over the previous year.

VII. Multistate Research and Extension Activities

In FY 2004, the Tennessee Agricultural Research and Extension system made 220,551 educational contacts in multistate Research and Extension programs. The Tennessee Agricultural Research and Extension System is in compliance with multistate targets established by the AREERA of 1998.

Research and Extension Enhance Profits for Tennessee Tobacco Growers (KY, NC and VA)

Two major multistate events in Tennessee held for tobacco growers are TN-KY Tobacco Expo in Middle Tennessee and the Burley Tobacco University which includes growers from Virginia and North Carolina.

Cotton Agronomy and Physiology Research (MS)

This is a multistate research project conducted by UT Experiment Station and Mississippi researchers to improve cotton production in the North Delta Region.

Improving Bermudagrass Sports Turf (NC, KY, TX and NM)

This Extension program served 190 turf professionals from Tennessee, Kentucky, North Carolina, Texas and New Mexico.

Household/Structural IPM Education (MD, MS, IN, MN, WA and HI)

UT Extension specialists cooperated with land grant institutions in six states to provide urban integrated pest management training to 2,324 pest management professionals.

Using Drip Irrigation Techniques to Disperse Wastewater into the Soil (NC and AL)

UT Researchers and Extension Specialists cooperated with land grant institutions in North Carolina and Alabama to offer this water quality education for 54 engineers, installers and regulators.

National 4-H Congress (National)

UT Extension specialists, agents and volunteers serve on committees that conduct and oversee this educational and recognition event.



Southern Region 4-H Leader Forum (Regional)

UT Extension specialists, agents and volunteers conduct sessions and serve in leadership and advisory roles in conducting this annual development event for 4-H volunteers from across the Southern Region. The event is held at the Rock Eagle 4-H Center in Georgia.

Latino Health Coalition (KY)

This project is working to improve health care access for the Hispanic populations of rural Tennessee and Kentucky.

Radon and Indoor Air Quality (AL)

UT Extension partnered with the Southern Regional Radon Training Center at Auburn University to offer education in Overton County.

TSU Cooperative Extension Program

Although not required under the provisions of the AREERA of 1998, TSU Extension faculty cooperate with faculty from other 1862 and 1890 institutions on a host of issues critical to the entire Southern Region. In 2004, examples of collaborations with other 1890s included the FF (Families First) News (Food Stamp Education Program) and Small Business Development and Entrepreneurial Education Programs in Rural Delta Counties of Tennessee and Mississippi.

VIII. Integrated Research and Extension Programs

The Integrated Research and Extension programs conducted by UT Experiment Station, UT Extension and the TSU Cooperative Extension Program reached 359,408 educational contacts in FY 2004. An overview of integrated programs includes:

Making Tennessee Forages Work – Demonstrations plots were established to teach best practices in clover establishment and weed control.

Improved Beef Cattle Genetics – This demonstration and research project was conducted on 17 farms in 16 Tennessee counties to investigate improved genetics using expected progeny differences.

On-Farm Research and Extension Improves Northwest Tennessee Grain Production – Three Western Kentucky Counties join a host of Tennessee counties to participate in the Standardized Variety Trials conducted on local farms. The data is widely disseminated and adoption of higher-producing, disease resistant varieties is high.

Tennessee Research Contributes to National Soil Conservation Tool – UT researchers and programmers had major responsibility for the 2004 implementation of the new Revised Universal Soil Loss Equation in 2,500 USDA-NRCS offices.



Research and Extension Enhance Profits for Tennessee Tobacco Growers – Extensive on-farm research and demonstration plots continued. In Johnson County, five producers tested two new varieties. In Robertson County, seven result demonstrations evaluated 10 burley varieties and five dark varieties. The Fungicide Treatment Research Study was also an integrated tobacco project.

IX. Contact Information

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X. Attachments Required by AREERA Section 105

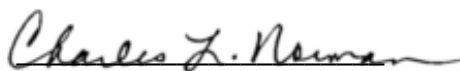
Appendix A: Multistate Activities with Smith-Lever Funds

U.S. Department of Agriculture
 Cooperative State Research, Education, and Extension Service
 Supplement to the Annual Report of Accomplishments and Results
 Multistate Extension Activities and Integrated Activities

Institution The University of Tennessee Extension
 State Tennessee

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds)

Actual Expenditures				
Title of Planned Program/Activity	FY 2001	FY 2002	FY 2003	FY 2004
Multistate Committees, Meetings, Workshops and Conferences	\$330,480	\$101,750	\$79,170	\$153,215
Multistate Projects	\$247,860	\$582,750	\$551,580	\$958,688
Multistate Demonstrations and Field Days	\$59,940	\$29,250	\$60,030	\$72,960
Multistate Curriculum Development and Training	\$171,720	\$212,750	\$179,220	\$274,328
Multistate Total	\$810,000	\$926,500	\$870,000	\$1,459,191


 Director

March 31, 2005
 Date



Appendix B: Integrated Activities with Smith-Lever Funds

U.S. Department of Agriculture
 Cooperative State Research, Education, and Extension Service
 Supplement to the Annual Report of Accomplishments and Results
 Multistate Extension Activities and Integrated Activities

Institution The University of Tennessee Extension
 State Tennessee

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds)

Actual Expenditures				
Title of Planned Program/Activity	FY 2001	FY 2002	FY 2003	FY 2004
Integrated Committees, Meetings, Workshops and Conferences	\$352,600	\$98,550	\$163,800	\$498,523
Integrated Projects	\$377,325	\$1,067,850	\$750,100	\$3,119,330
Integrated Demonstrations and Field Days	\$166,625	\$16,200	\$67,600	\$237,392
Integrated Curriculum Development and Training	\$178,450	\$163,400	\$318,500	\$892,594
Integrated Total	\$1,075,000	\$1,346,000	\$1,300,000	\$4,747,839

Charles L. Newman
 Director

March 31, 2005
 Date



Appendix C: Integrated Activities with Hatch Funds

U.S. Department of Agriculture
 Cooperative State Research, Education, and Extension Service
 Supplement to the Annual Report of Accomplishments and Results
 Multistate Extension Activities and Integrated Activities

Institution Agricultural Experiment Station
 State Tennessee

Check one: Multistate Extension Activities
 Integrated Activities (Hatch Act Funds)
 Integrated Activities (Smith-Lever Act Funds)

Actual Expenditures				
Title of Planned Program/Activity	FY 2001	FY 2002	FY 2003	FY 2004
Competitiveness of Production Systems	636,286	695,597	808,219	1,042,073
Management and Marketing	133,308	31,240		
Food Safety and Processor Level	136,363	116,255	57,835	41,686
Balance Agriculture and Environment	160,025	86,946	9,529	16,422
Promote Sustainable Management	103,667	109,610	28,408	
Utilize Agricultural Waste Products	87,766	69,700	34,480	35,539
Preserve and Enhance Water Supplies	76,802	75,429	57,250	16,421
Total	1,334,217	1,184,777	995,721	1,152,141


 Director

March 10, 2005

 Date



Appendix D: Multistate and Integrated Summary

The following summary provides an overview of Tennessee’s FY 2004 Multistate and Integrated Research and Extension programs.

Program/Activity	Multistate Examples	Integrated Examples
Committees, Meetings, Workshops and Conferences	TN’s Value-Added Agriculture Initiative; Southern Region 4-H Volunteer Leader Forum; KY-TN Tobacco Expo; Sustainability of Private Forest Lands	Heat Tolerant Bluegrass Research; TN Contributes to National Soil Conservation Tool
Projects	Beef Marketing (including Marketing Methods for Feeder Cattle); Cotton Agronomy and Physiology Research; Latino Health Coalition; Household/Structural Integrated Pest Management Education; Integrating IMP Strategies in Stored Wheat; Radon and Indoor Air Quality	Research and Extension Enhance Profits for TN Tobacco Growers (17 varieties tested and one fungicide treatment project); Improved Beef Cattle Genetics; Making Tennessee Forages Work; Hawkins County Fruit and Vegetable Production
Demonstrations and Field Days	UT Standardized Variety Trial Demonstrations; Research and Extension Enhance Profits for TN Tobacco Growers; Improving Bermudagrass Sports Turf; Using Drip Irrigation Techniques to Disperse Wastewater into the Soil; West TN Hay Day; East TN Beef and Forage Field Day	UT Standardized Variety Trial Demonstrations; On-Farm Research and Extension Improves Northwest Tennessee Grain Production
Curriculum Development and Training	TN’s Value-Added Agriculture Initiative; Southeastern Professional Fruit Workers Group; Southern Region program Leaders Network; Staff Development	Tennessee Master Beef Producer Program; Improved Beef Cattle Genetics; Technology Transfer through publications, etc.