# 2010 University of Tennessee Research and Extension and Tennessee State University Extension Combined Annual Report of Accomplishments and Results

**Status: Accepted**

**Date Accepted: 08/15/2011**

## I. Report Overview

### 1. Executive Summary

This report consists of the FY 2010 results and accomplishments of the **Tennessee Agricultural Research and Extension System**. The University of Tennessee Extension and the Tennessee Agricultural Experiment Station (UT AgResearch) comprise the 1862 institution and the Tennessee State University Cooperative Extension Program and the Tennessee State University Institute for Agricultural and Environmental Research comprise the 1890 institution.

This report represents the combined efforts of the University of Tennessee (UT) Extension, the Tennessee Agricultural Experiment Station (UT AgResearch), and the Tennessee State University (TSU) Cooperative Extension Program. UT and TSU Extension extend the knowledge and expertise of the state's two land grant institutions to the 6.2 million people of Tennessee through agents and specialists in all 95 counties.

In May, 2010, Tennessee was faced with massive flooding, including a 100-year flood of the Cumberland River. A total of 42 Tennessee Counties were declared Federal Disaster Areas by the Federal Emergency Management Agency of the United States Department of Homeland Security (FEMA, 2010). Many extension agents took additional job responsibilities in response to the flooding, including securing stray livestock and teaching food safety programs. Despite this hardship, nearly all of the outcome targets established for FY 2010 were met or exceeded.

Our work is providing education that produces solutions to societal, economic and environmental issues. Engagement of the state's citizens occurs where they live, work and play through hundreds of programs which are planned, conducted and evaluated by UT and TSU Extension. In FY 2010, Extension continued its excellence in economic development and outreach.

**Extension's Excellence in Economic Development**: Extension's educational programs in 4 H youth development, agriculture and natural resources, family and consumer sciences and resource development produce substantial returns for Tennessee. Using research, questionnaires, observations and sales records, an estimated impact is $393 million for FY 2010. For every $1 in public funds invested in Extension, $6.59 is returned to the people of Tennessee in increased revenue, increased savings and one time capital purchases.

The recurring economic impacts were estimated at over $147.7 million. These recurring economic values include increased revenue, increased savings and one time capital purchases associated with three Extension programs: Crop Variety Trials, forage systems, and 4-H camping. Using the United States Department of Defense formula, an estimated 2,956 jobs in Tennessee were created or maintained because of the recurring economic impacts produced by Extension.

The one time, non recurring economic values were estimated at over $245 million from seven Extension programs. The programs included in this analysis were nutrition education, health literacy, Tennessee Saves, 4-H scholarships, farm financial planning, better beef marketing, and volunteerism.

**Extension's Excellence in Outreach**: UT and TSU Extension professionals and the volunteers they recruited, trained and managed made over 5.0 million direct contacts through group meetings, on site visits, phone calls, direct mail, and client visits to local Extension offices. In addition, indirect educational methods included mass media, exhibits, and Internet resources.

Data for the Extension portion of this report utilized the Extension reporting system, System for University Planning, Evaluation and Reporting (SUPER). This reporting system, and the process of statewide, outcome based measurement, is still new for Extension. In some cases, the targets set were too ambitious given our resources. In setting the initial outcome targets, a host of factors, including staff vacancies and retirements, were not considered.

**Total Actual Amount of professional FTEs/SYs for this State**

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 450.0 | 43.0 | 300.0 | 0.0 |
| Actual | 450.0 | 43.0 | 295.5 | 0.0 |

## II. Merit Review Process

### 1. The Merit Review Process that was Employed for this year

- Internal University Panel
- External University Panel
- Expert Peer Review

### 2. Brief Explanation

The merit review and peer review processes established in the latest Plan of Work were fully implemented in FY 2010. For the second straight year, UT Extension conducted an external university panel review with program development and evaluation specialists from Virginia Tech and the University of Maryland. This review panel found that the Tennessee Plan of Work was of exceptional quality. The panel's major suggestion was to continue a strong needs assessment and evaluation process focused on measuring substantial outcome indicators.

## III. Stakeholder Input

### 1. Actions taken to seek stakeholder input that encouraged their participation

- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Targeted invitation to selected individuals from general public
- Survey specifically with non-traditional groups
- Survey of selected individuals from the general public
- Other (Local and State Advisory Councils)

**Brief explanation.**

In FY 2010, UT and TSU Extension made 27,627 contacts (a 48% increase over FY 2009) for needs assessment purposes, with these methods highlighted:

- 407 advisory committee meetings
- 151 focus groups
- 1077 inteviews with key informants

Tennessee Extension Agents placed special emphasis on involving youth and other under represented groups in needs assessment activities. Of these needs assessment contacts, 70% were young people under 18 years of age. A special accomplishment was the involvement of racial and ethnic minority groups; 1,586 contacts (19% of total) represented racial-ethnic minority groups. In FY 2009, only 12% of the total needs assessment contacts were from racial/ethnic minority groups.

**2(A). A brief statement of the process that was used by the recipient institution to identify individuals and groups stakeholders and to collect input from them**

**1. Method to identify individuals and groups**

- Use Advisory Committees
- Open Listening Sessions
- Needs Assessments

**Brief explanation.**

All Extension Agents receive instruction in selecting needs assessment strategies and in selecting individuals for Advisory Committees. Community leaders selected for Advisory Committees are chosen to represent the diversities (i.e., gender, age, racial/ethnic, socio-economic, political, educational, etc.) of the county or area served. Extension Agents recruit individuals who have participated in past and current Extension programs; and they recruit individuals who have not used Extension to serve on local advisory committees and participate in open listening sessions.

**2(B). A brief statement of the process that was used by the recipient institution to identify individuals and groups who are stakeholders and to collect input from them**

**1. Methods for collecting Stakeholder Input**

- Meeting with traditional Stakeholder groups
- Survey of traditional Stakeholder groups
- Meeting with traditional Stakeholder individuals
- Meeting with the general public (open meeting advertised to all)
- Survey specifically with non-traditional individuals

**Brief explanation.**

The System for University Planning, Evaluation and Reporting (SUPER) tracks Extension's needs assessment efforts across Tennessee. In FY 2010, Extension conducted 151 different focus groups and 1077 interviews with key informants. Regarding interviews with key informants, 47% involved individuals who were not previously active in Extension (defined as those not previously on an Extension mailing list). These individuals were indentified in various ways such as asking Advisory Committee members and community leaders to suggest names.

UT AgResearch holds periodic meetings with various research user groups at the department,

research center, and Institute level, as well as an annual meeting of academic department heads, research center directors, and selected principal investigators. This session is very helpful in refining our focus as we share different perspectives on the expressed needs of various constituents.

**3. A statement of how the input will be considered**

- In the Budget Process
- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Staff Hiring Process
- In the Action Plans
- To Set Priorities

**Brief explanation.**

The State Action Agendas (state plans of work) delineated programs, curricula, partners and resources for addressing stakeholder concerns. Individual plans were created and implemented by Extension Agents and Specialists based on the results of the needs assessment. The plans were monitored and adjusted by Regional Program Leaders and Department Heads. In FY 2010, stakeholder input was used to identify volunteer leaders, identify new audiences, and identify and secure locations for Extension programs. Stakeholder input was used to modify three programs, as described below:

• A statewide evaluation protocol was adopted for Science, Engineering and Technology programs across 4-H youth development clubs, project groups, and school enrichment. This evlauation protocol involved a survey of science process skills for all youth participants.

• UT Extension entered the second year as a partner in the Tennessee Farmland Legacy Partnership, a coalition of government agencies, farmer organizations, and community groups working to keep the state's farmland viable. Collaborators include Cumberland Region Tomorrow (a grassroots planning organization in Middle Tennesee), Tennessee Department of Agriculture, The Land Trust for Tennessee, and USDA Natural Resources Conservation Service.

• In response to the economic downturn, UT Extension entered the second year of a revised Tennessee Saves program. Stakeholder input was instrumental in changing the focus of Extension's Tennessee Saves programming from savings and investment education to coping with economic loss.

**Brief Explanation of what you learned from your Stakeholders**

All of the input received was used to formulate a State Extension Strategic Plan for 2010-2020. This document, titled Advancing Tennessee, is a guide for identifying emerging issues, redirecting Extension programs, building state action agendas and setting program priorities. Performance measures are being written based on this planning effort and the current knowledge base. Stakeholder input at the local, regional and statewide level is used to monitor and adjust deployment of the strategic plan. To illustrate this important process, consider that stakeholder input was used to modify these programs for this 2012-2016 plan, as described below:

• Increasing urbanization and a loss of farmland in the state caused much concern among Tennessee citizens. Extension is part of a coalition to preserve farmland. The Tennessee Farmland Preservation Trust includes state agencies such as Agriculture, Environment & Conservation, and Tourism. The role of Extension in this effort is in estate planning education and land use education

for farmers and landowners.

• Extension's Tennessee Saves programming will continue to focus on coping with economic loss rather than simply saving and investing. This need is driven by a host of factors, most notably: the current economic downturn, job loss, and economic hardships caused by massive 2010 flooding in the state.

• A new program "Homefront to Heartland" will work to educate and empower women in agriculture and small business.

## IV. Expenditure Summary

| 1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS) | | | |
|---|---|---|---|
| Extension | | Research | |
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 8583627 | 2807434 | 5413379 | 0 |

| 2. Totaled Actual dollars from Planned Programs Inputs | | | | |
|---|---|---|---|---|
| | Extension | | Research | |
| | Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| Actual Formula | 8583627 | 2807434 | 5413379 | 0 |
| Actual Matching | 37108442 | 2807434 | 31539305 | 0 |
| Actual All Other | 7368327 | 0 | 7410724 | 0 |
| Total Actual Expended | 53060396 | 5614868 | 44363408 | 0 |

| 3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous | | | | |
|---|---|---|---|---|
| Carryover | 2572340 | 0 | 0 | 0 |

# V. Planned Program Table of Content

## V(A). Planned Program (Summary)

**Program # 1**

**1. Name of the Planned Program**

4-H Positive Youth Development

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities | 10% | 10% | 0% | |
| 806 | Youth Development | 90% | 90% | 0% | |
| | **Total** | 100% | 100% | 0% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 138.0 | 13.0 | 0.0 | 0.0 |
| Actual | 162.0 | 15.0 | 0.0 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 3090105 | 950834 | 0 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 12899383 | 950834 | 0 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 649973 | 0 | 0 | 0 |

## V(D). Planned Program (Activity)

**1. Brief description of the Activity**

In FY 2010, this planned program was expanded from a single focus on "preparing for the world of work" to include science, engineering, and technology. This change was made based on stakeholder feedback.

Clubs/Project Groups - In FY 2010, 65 Tennessee counties organized over 2,500 4-H clubs where workforce preparation was the major emphasis. Project work was emphasized, and the experiential learning model will be used to highlight jobs and careers aligned with 4-H projects. Curricula empasized practical skills which align with jobs and careers. Major science, engineering and technology projects included sustainable energy, including hydroelectric and wind.

School Enrichment - Various school enrichment programs in 50 Tennessee counties focused on workforce preparation. Youth were exposed to jobs and careers with the objective to set a goal for their future job or career. Mass media was used to inform parents, participants and stakeholders about program opportunities and achievements.

**2. Brief description of the target audience**

Tennessee youth in grades 4-12 were targeted for this program. To encourage participation of underserved and minority youth, the majority of programs were delivered in public schools.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 278002 | 0 | 1410473 | 1596406 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 5 | 0 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of volunteers utilized in delivering this program.

| Year | Actual |
|---|---|
| 2010 | 7599 |

**Output #2**

**Output Measure**

- Number of exhibits produced.

| Year | Actual |
|---|---|
| 2010 | 7073 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Achieving Goals: Number of youth who now put their goal in writing. |
| 2 | Achieving Goals: Number of youth who now report they set high goals. |
| 3 | Achieving Goals: Number of high school youth who have set a goal for their job or career. |
| 4 | Communicating: Number of youth who can express ideas with a poster, exhibit, or other display. |
| 5 | Communicating: Number of youth who can use technology to help themselves express ideas. |
| 6 | Communicating: Number of youth who have learned at least five jobs in which communication skills are important. |
| 7 | Communicating (Public Speaking): Number of youth who can deal with their nervousness when giving a speech or talk. |
| 8 | Communicating (Public Speaking): Number of youth who can select a topic for a speech or talk. |
| 9 | Communicating (Public Speaking): Number of youth who can speak loudly enough to be heard when giving a speech or talk. |
| 10 | Communicating (Public Speaking): Number of youth who feel comfortable sharing their thoughts and feelings in a speech or talk. |
| 11 | Youth Gain Science Process Skills Through Tennessee Extension 4-H Science Programs |

**Outcome #1**

**1. Outcome Measures**

Achieving Goals: Number of youth who now put their goal in writing.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15000 | 10328 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 806 | Youth Development |

**Outcome #2**

**1. Outcome Measures**

Achieving Goals: Number of youth who now report they set high goals.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15000 | 7397 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 806 | Youth Development |

**Outcome #3**

**1. Outcome Measures**

Achieving Goals: Number of high school youth who have set a goal for their job or career.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 500 | 8611 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 806 | Youth Development |

**Outcome #4**

**1. Outcome Measures**

Communicating: Number of youth who can express ideas with a poster, exhibit, or other display.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15000 | 22311 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 806 | Youth Development |

**Outcome #5**

**1. Outcome Measures**

Communicating: Number of youth who can use technology to help themselves express ideas.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15000 | 12369 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 806 | Youth Development |

**Outcome #6**

**1. Outcome Measures**

Communicating: Number of youth who have learned at least five jobs in which communication skills are important.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15000 | 12703 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 806 | Youth Development |

**Outcome #7**

**1. Outcome Measures**

Communicating (Public Speaking): Number of youth who can deal with their nervousness when giving a speech or talk.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 30000 | 34211 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 806 | Youth Development |

**Outcome #8**

**1. Outcome Measures**

Communicating (Public Speaking): Number of youth who can select a topic for a speech or talk.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 30000 | 38784 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 806 | Youth Development |

**Outcome #9**

**1. Outcome Measures**

Communicating (Public Speaking): Number of youth who can speak loudly enough to be heard when giving a speech or talk.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 35000 | 33910 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 806 | Youth Development |

**Outcome #10**

**1. Outcome Measures**

Communicating (Public Speaking): Number of youth who feel comfortable sharing their thoughts and feelings in a speech or talk.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 30000 | 21057 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 806 | Youth Development |

**Outcome #11**

**1. Outcome Measures**

Youth Gain Science Process Skills Through Tennessee Extension 4-H Science Programs

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 10719 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
The National Science Foundation?s (NSF), ?Science and Engineering Indicators 2006,? concluded that most Tennessee 4th, 8th, and 12th graders did not demonstrate proficiency in the

knowledge and skills taught at their grade level in science and mathematics.

**What has been done**

The purpose of Energizing Tennessee 4-H is to stimulate youths? interest in science, while teaching them the science of energy. The program uses fun, hands-on activities as a method of delivery; and is a partnership between Tennessee 4-H and the Tennessee Department of Economic and Community Development, Office of Energy Policy. 40 counties and 1 4-H center conducted ?Energizing Tennessee 4-H? with 43,223 youth contacts from January 1 to June 30, 2010.

**Results**

13,922 youth were involved in evaluated programs that focused on science, engineering, and technology. Intact groups of 4-H youth were randomly selected for post-test only questionnaires. The questionnaires were valid and reliable instruments from the University of Tennessee Program Evaluation Network, an online tool used to measure and evaluate statewide outcomes. This study demonstrated that 10, 719 (77%) of youth gained science process skills including collecting data and analyzing results.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 803 | Sociological and Technological Change Affecting Individuals, Families, and Communities |
| 806 | Youth Development |

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Competing Public priorities

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies and Data Collection)**

**Evaluation Results**

To evaluate this program, our main tool was the Program Evaluation Network. This is an online software that contains 36 valid and reliable questionnaires with standard outcome indictaors. Local Extension 4-H Agents use this software to evaluate their programs. This is a custom-built software by the University of Tennessee Extension. Today, it is used by Extension personnel at Tennessee State University, Alcorn State University, Virginia Tech, Virginia State, University of Maine and Michigan State University.

**Key Items of Evaluation**

## V(A). Planned Program (Summary)

**Program # 2**

**1. Name of the Planned Program**

Agronomic Crop Systems

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 112 | Watershed Protection and Management | 0% | 0% | 1% | |
| 133 | Pollution Prevention and Mitigation | 0% | 0% | 1% | |
| 201 | Plant Genome, Genetics, and Genetic Mechanisms | 0% | 0% | 1% | |
| 202 | Plant Genetic Resources | 0% | 0% | 1% | |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants | 0% | 0% | 1% | |
| 204 | Plant Product Quality and Utility (Preharvest) | 0% | 0% | 1% | |
| 205 | Plant Management Systems | 50% | 50% | 1% | |
| 206 | Basic Plant Biology | 0% | 0% | 1% | |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants | 5% | 5% | 1% | |
| 212 | Pathogens and Nematodes Affecting Plants | 5% | 5% | 1% | |
| 213 | Weeds Affecting Plants | 0% | 0% | 1% | |
| 215 | Biological Control of Pests Affecting Plants | 0% | 0% | 1% | |
| 216 | Integrated Pest Management Systems | 0% | 0% | 1% | |
| 601 | Economics of Agricultural Production and Farm Management | 40% | 40% | 87% | |
| | **Total** | 100% | 100% | 100% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 86.0 | 8.0 | 62.0 | 0.0 |
| Actual | 13.5 | 1.0 | 0.0 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| **Smith-Lever 3b & 3c** | **1890 Extension** | **Hatch** | **Evans-Allen** |
| 257508 | 79237 | 0 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 1074948 | 79237 | 0 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 444104 | 0 | 0 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

This program was organized via the Innovation-Decision Process (Rogers, 1995). It is important to organize the agronomic crop systems planned program activity in this way because producers of various row crops, in various locations in the state are in different stages of this process for the array of research-based practices. Based on needs assessments conducted by Extension Specialists, the following pactices were targeted in 2010:

- conservation-tillage
- planting insect-tolerant crops
- planting herbicide-tolerant crops
- spaying crops with foliar fungicide to manage disease
- using recommended varieties of soybeans or corn (based on UT field trial results)

**Knowledge:** Newspaper articles, radio programs, websites and newsletters were used to build awareness of UT Extension resources and practices for more profitable production. Mass media also highlighted pests and pesticides in a timely manner.

**Persuasion:** Farm visits and group meetings were used to showcase practices.

**Decision:** Group meetings and classes were held in which Extension specialists taught detailed production practices to producers.

**Implementation:** On-farm demonstrations and on-farm research trials were conducted, particularly in the 31 West Tennessee counties, to highlight research-based practices.

**Confirmation:** Farm visits and telephone calls by Extenison personnel assisted producers to continue use of the practices, respond to environmental factors, and realize greater profits.

(Please note: This is an Extension-only program; research efforts are covered under Global Food Security and Hunger.)

### 2. Brief description of the target audience

The primary audience for this program were Tennessee row crop producers, and the secondary audience were the professionals, business owners/cooperatives, and government officials who serve row crop producers.

## V(E). Planned Program (Outputs)

**1. Standard output measures**

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 67815 | 300000 | 3532 | 250000 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 9 | 0 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of exhibits displayed to promote awareness and participation in this planned program.

| Year | Actual |
|---|---|
| 2010 | 63 |

**Output #2**

**Output Measure**

- Number of research-based publications distributed as part of this program.

| Year | Actual |
|---|---|
| 2010 | 5063 |

**Output #3**

**Output Measure**

- Exploitation of the strong resistance mechanism in epazote to the plant parasitic nematode, Meloidogyne incognita (Bernard).

Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- Publish disease and nematode ratings for soybean producers. (Newman)

Not reporting on this Output for this Annual Report

**Output #5**

**Output Measure**

- Release a new soybean variety tailored to Tennessee needs. (Pantalone)

Not reporting on this Output for this Annual Report

**Output #6**

**Output Measure**

- Release new maize parental lines. (West)

Not reporting on this Output for this Annual Report

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Row Crops Production: Number of participants who implemented one or more management practices based on data provided by UT (e.g., conservation tillage, plant population, growth retardants, IPM strategies, disease and weed control). |
| 2 | Row Crops Production: Number of producers, farm workers and other ag professionals who received pesticide certification, recertification and pesticide safety training. |
| 3 | Row Crops Production: Number of participants who improved their income by following the recommended best management practices for crop production, including plant pest management. |
| 4 | Row Crops Production: Number of producers using recommended varieties of soybeans or corn. |
| 5 | Agronomic testing of corn, soybean, wheat, grain sorghum and oats, varieties tested. (Allen) |

## Outcome #1

### 1. Outcome Measures

Row Crops Production: Number of participants who implemented one or more management practices based on data provided by UT (e.g., conservation tillage, plant population, growth retardants, IPM strategies, disease and weed control).

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 100 | 973 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

## Outcome #2

### 1. Outcome Measures

Row Crops Production: Number of producers, farm workers and other ag professionals who received pesticide certification, recertification and pesticide safety training.

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 250 | 973 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |

**Outcome #3**

**1. Outcome Measures**

Row Crops Production: Number of participants who improved their income by following the recommended best management practices for crop production, including plant pest management.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 421 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |
| 601 | Economics of Agricultural Production and Farm Management |

**Outcome #4**

**1. Outcome Measures**

Row Crops Production: Number of producers using recommended varieties of soybeans or corn.

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

Agronomic testing of corn, soybean, wheat, grain sorghum and oats, varieties tested. (Allen)

Not Reporting on this Outcome Measure

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Competing Programmatic Challenges

**Brief Explanation**

In May, 2010, Tennessee was faced with massive flooding, including a 100-year flood of the Cumberland River. A total of 42 Tennessee Counties were declared Federal Disaster Areas by the Federal Emergency Management Agency of the United States Department of Homeland Security (FEMA, 2010). This event greatly affected all agriculutral production in the state. Despite this hardship, nearly all of the outcome targets established for FY 2010 were met or exceeded.

**V(I). Planned Program (Evaluation Studies and Data Collection)**

## Evaluation Results

### Key Items of Evaluation

## V(A). Planned Program (Summary)

**Program # 3**

**1. Name of the Planned Program**

Animal Systems

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 123 | Management and Sustainability of Forest Resources | 0% | 0% | 1% | |
| 135 | Aquatic and Terrestrial Wildlife | 0% | 0% | 1% | |
| 301 | Reproductive Performance of Animals | 15% | 15% | 1% | |
| 302 | Nutrient Utilization in Animals | 0% | 0% | 1% | |
| 303 | Genetic Improvement of Animals | 10% | 10% | 1% | |
| 304 | Animal Genome | 0% | 0% | 1% | |
| 305 | Animal Physiological Processes | 0% | 0% | 1% | |
| 306 | Environmental Stress in Animals | 0% | 0% | 1% | |
| 307 | Animal Management Systems | 60% | 60% | 1% | |
| 311 | Animal Diseases | 15% | 15% | 1% | |
| 315 | Animal Welfare/Well-Being and Protection | 0% | 0% | 90% | |
| | **Total** | 100% | 100% | 100% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 37.0 | 3.5 | 27.0 | 0.0 |
| Actual | 36.0 | 3.0 | 0.0 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| **Smith-Lever 3b & 3c** | **1890 Extension** | **Hatch** | **Evans-Allen** |
| 686690 | 211296 | 0 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 2866529 | 211296 | 0 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 407091 | 0 | 0 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

This is an Extension-only program, as the research portion has been moved to Global Food Security and Hunger.

The Master Beef Producer Program was led by a team of University of Tennessee Extension specialists and agents, with the support and involvement of representatives of state agencies, businesses and organizations that have an interest in the state's cattle industry. Master Beef Producer programs were only taught by agents who completed the comprehensive training curriculum. Industry professionals, veterinarians, and other local industry leaders were included as a part of the teaching team.

### 2. Brief description of the target audience

Producers, veterinarians, and others associated with the animal industry.

Tennessee cattle producers are primarily cow-calf operators. All of the state's cow-calf operators compose the target audience for this planned program.

## V(E). Planned Program (Outputs)

### 1. Standard output measures

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 129298 | 58500 | 12794 | 0 |

### 2. Number of Patent Applications Submitted (Standard Research Output)

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

### 3. Publications (Standard General Output Measure)

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| Actual | 1 | 0 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of exhibits displayed to promote awareness of and participation in this planned program.

| Year | Actual |
|---|---|
| 2010 | 28 |

**Output #2**

**Output Measure**

- Number of research-based publications distributed as part of this program.

| Year | Actual |
|---|---|
| 2010 | 17918 |

**Output #3**

**Output Measure**

- Development of a 'hand-held' diagnostic device for Johne's disease by merging our diagnostic method and microfluidic technology. (Eda)

| Year | Actual |
|---|---|
| 2010 | 1 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Extension Economic Impact: The total economic impact of Extension animal systems programs. (The target is expressed in millions of dollars.) |
| 2 | Beef Production and Marketing: Number of beef producers who utilized improved sires, artificial insemination or other genetic improvement methods. |
| 3 | Adoption of reproduction-enhancing media additive for cattle embryo transfer, annual uses in Tennessee (Schrick). |
| 4 | Reduction in mastitis in Tennessee dairy cattle by genetic marker screening, percent reduction (Oliver). |
| 5 | Educational assistance was provided to beef producers resulting in increased Tennessee Department of Agriculture cost-share assistance for improved facilities, equipment and genetics. |
| 6 | Dairy producer involvement in the Tennessee Quality Milk Producer (TQMP) program (Oliver). |
| 7 | Beef Production and Marketing: Number of beef producers who improved marketing methods. |
| 8 | Beef Production and Marketing: Number of producers who improved forages for livestock by broadleaf weed control, planting clover, stockpiling fescue or planting warm-season grasses. |
| 9 | Beef Production and Marketing: The number of calves managed according to Beef Quality Assurance (BQA) guidelines. |
| 10 | Sales of multiple ovulation embryo transfer (MOET) technology for cattle embryo transfer, dollars (Schrick) |
| 11 | Small Ruminant |

## Outcome #1

### 1. Outcome Measures

Extension Economic Impact: The total economic impact of Extension animal systems programs. (The target is expressed in millions of dollars.)

### 2. Associated Institution Types

- 1862 Extension

### 3a. Outcome Type:

Change in Condition Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 249000000 | 82138004 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Livestock sales in Tennessee total over $1 billion annually. Tennessee has 3.5 million acres of forages and 2.1 million head of beef cattle. Producers need education in maintaining or improving production efficiency, marketing, product quality and food safety.

**What has been done**
UT Extension conducted 1587 group meetings, including field days and Master Beef Producer programs, reaching 38,503 contacts. Extension personnel made more than 6,000 farm visits reaching 14,453 contacts to teach best practices and offer technical expertise on animal production issues.

**Results**
The economic impact of the Extension beef program in FY 2010 was estimated at $82 million based on questionnaires and observation of producer adoption. The economic estimate included five practices: managing calves according to beef quality assurance guidelines, covering round hay bales, using bulls with greater genetic potential, using hay feeding rings, and improved marketing (such as the use of alliances).

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 307 | Animal Management Systems |

**Outcome #2**

**1. Outcome Measures**

Beef Production and Marketing: Number of beef producers who utilized improved sires, artificial insemination or other genetic improvement methods.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 350 | 4527 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 303 | Genetic Improvement of Animals |

**Outcome #3**

**1. Outcome Measures**

Adoption of reproduction-enhancing media additive for cattle embryo transfer, annual uses in Tennessee (Schrick).

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

Reduction in mastitis in Tennessee dairy cattle by genetic marker screening, percent reduction (Oliver).

Not Reporting on this Outcome Measure

**Outcome #5**

**1. Outcome Measures**

Educational assistance was provided to beef producers resulting in increased Tennessee Department of Agriculture cost-share assistance for improved facilities, equipment and genetics.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 7000000 | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 307 | Animal Management Systems |

**Outcome #6**

**1. Outcome Measures**

Dairy producer involvement in the Tennessee Quality Milk Producer (TQMP) program (Oliver).

Not Reporting on this Outcome Measure

**Outcome #7**

**1. Outcome Measures**

Beef Production and Marketing: Number of beef producers who improved marketing methods.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 400 | 4475 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 307 | Animal Management Systems |

**Outcome #8**

**1. Outcome Measures**

Beef Production and Marketing: Number of producers who improved forages for livestock by broadleaf weed control, planting clover, stockpiling fescue or planting warm-season grasses.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 500 | 6286 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 302 | Nutrient Utilization in Animals |
| 307 | Animal Management Systems |

**Outcome #9**

**1. Outcome Measures**

Beef Production and Marketing: The number of calves managed according to Beef Quality Assurance (BQA) guidelines.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 1200 | 206779 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Beef Quality Assurance (BQA) continues to be a need for Tennessee beef producers.

**What has been done**
Extension agents and specialists made special efforts to certify beef producers in BQA through group and individual teaching. Newspaper articles and radio programs were used to promote BQA.

**Results**
In Tennessee, 8734 beef producers sold 206,779 calves manged according to BQA guidlines to increase returns by $6,616,928 in FY 2010.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 307 | Animal Management Systems |
| 315 | Animal Welfare/Well-Being and Protection |

**Outcome #10**

**1. Outcome Measures**

Sales of multiple ovulation embryo transfer (MOET) technology for cattle embryo transfer, dollars (Schrick)

Not Reporting on this Outcome Measure

**Outcome #11**

**1. Outcome Measures**

Small Ruminant

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Goats afford the small limited resource landowner(s) an alternative enterprise. The goat provides food security, high quality protein (for human consumption), biological land enhancement and many ?value-added? products to increase revenue generated on a holistically sustainable rural farm. With the decrease in planted tobacco acreage and income from this traditional crop, the production of goats becomes a natural alternative. Tennessee continues to rank second in meat goats in the U.S. The total number of meat goat in Tennessee in 2010 was slightly lower than 2009 (133,000 head) due to a damaging spring flood and severe drought during the summer/fall. Meat goat numbers have been significantly increasing within the U.S. since the early 1990?s; but goat meat consumption has surpassed available supply, based on ethnic group statistics. The importation of goat meat (30 pound carcass equivalent) surpassed export in 1994. This past year, importation has decreased due to fluctuating weather circumstances in export countries. There is no longer an export value for goat meat; the import value has tripled and is still on the rise. Therefore, from expressed circumstances, goat meat production becomes a viable alternative agricultural crop.

**What has been done**
The Master Meat Goat Producer program was designed to specifically address the above circumstance. This program is for agricultural extension agents, 4-H agriculture agents, and producers along with Future Farmer of America instructors and 4-H leaders. Once these individuals have been through the In-Service trainings, they can then return to their respective counties and share the knowledge with producers in their areas. The Small Ruminant College is a two-day annual event focusing on specific challenges in the industry that year. Along with inside lectures, outside hands-on demonstrations are held with the attendees participating. Proceedings are provided for continuing education. The Tennessee Browsing Academy is a three-day mixture of hands-on and lecture out in the field with the goats. This program targets invasive weed abatement, cut-over timberlands, stream bank restoration, and maintaining the edges of crop lands.

**Results**
Attendees become intensely aware of livestock behavior, interactions with the environment and an appreciation for goat meat production to increase sales. They become more confident and willing to try new approaches and adaptations to old adages. As the clients take this learned skill set of information home and implement these practices on their own farms, they qualify to receive matching funds from the TN Agricultural Enhancement Program. To date, more than 700 families have been through the Master Meat Goat Producer Program, 35 families (2010) through the

Small Ruminant College and 24 individuals (2010) participated in the Tennessee Browsing Academy.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 307 | Animal Management Systems |

## V(H). Planned Program (External Factors)

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

**Brief Explanation**

{No Data Entered}

## V(I). Planned Program (Evaluation Studies and Data Collection)

**Evaluation Results**

The Extension Evaluation Specialist provided leadership for a statewide economic assessment of Extension beef programs. This assessment involved every County Extension Agent working in beef production in the state.

The economic impact of the Extension beef program in FY 2010 was estimated at $82 million based on questionnaires and observation of producer adoption. The economic estimate included five practices: managing calves according to beef quality assurance guidelines, covering round hay bales, using bulls with greater genetic potential, using hay feeding rings, and improved marketing (such as the use of alliances).

**Key Items of Evaluation**

The economic assessment used in this program was developed over a three-year period. The assessment has been used for the past two years, and it has been well-received by various state-level stakeholders. High-quality and valid evaluation studies require much time and effort, and in the case of production agriculture, these assessments often require a local Extension Agent to keep detailed records and make extensive observations.

## V(A). Planned Program (Summary)

**Program # 4**

**1. Name of the Planned Program**

Sustainable Energy

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 102 | Soil, Plant, Water, Nutrient Relationships | 0% | 0% | 7% | |
| 123 | Management and Sustainability of Forest Resources | 0% | 0% | 2% | |
| 131 | Alternative Uses of Land | 0% | 0% | 2% | |
| 135 | Aquatic and Terrestrial Wildlife | 0% | 0% | 1% | |
| 201 | Plant Genome, Genetics, and Genetic Mechanisms | 0% | 0% | 3% | |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants | 0% | 0% | 5% | |
| 205 | Plant Management Systems | 0% | 0% | 12% | |
| 206 | Basic Plant Biology | 0% | 0% | 2% | |
| 212 | Pathogens and Nematodes Affecting Plants | 0% | 0% | 3% | |
| 215 | Biological Control of Pests Affecting Plants | 0% | 0% | 2% | |
| 307 | Animal Management Systems | 0% | 0% | 1% | |
| 402 | Engineering Systems and Equipment | 0% | 0% | 4% | |
| 404 | Instrumentation and Control Systems | 0% | 0% | 7% | |
| 501 | New and Improved Food Processing Technologies | 0% | 0% | 3% | |
| 511 | New and Improved Non-Food Products and Processes | 0% | 0% | 33% | |
| 512 | Quality Maintenance in Storing and Marketing Non-Food Products | 80% | 80% | 3% | |
| 601 | Economics of Agricultural Production and Farm Management | 0% | 0% | 3% | |
| 603 | Market Economics | 10% | 10% | 1% | |
| 605 | Natural Resource and Environmental Economics | 10% | 10% | 5% | |
| 610 | Domestic Policy Analysis | 0% | 0% | 1% | |
| | **Total** | 100% | 100% | 100% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 0.0 | 0.0 | 42.0 | 0.0 |
| Actual | 2.0 | 1.0 | 55.8 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 42918 | 13206 | 595317 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 1455985 | 13206 | 7159999 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 146826 | 0 | 2525254 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Economic research will estimate the capacity of U.S. agriculture to generate a supply of feedstock to sustain a bioenergy and bioproducts industry. Expansion curves for the growth of the bioenergy and bioproducts industries will be developed by estimating a national bioenergy and bioproducts demand for agricultural feedstock, the agricultural resources demanded, and the price and income impacts on the agricultural sector. The economic and land use impacts of alternative sizes of the bioenergy and bioproducts industries and the corresponding economic feasibility to generate feedstock from agricultural sources will also be estimated.

Engineering research objectives are to develop a knowledge base and/or equipment related to the influence particle size on biomass densification, to identify the most economical ways of size-reducing, separating and transporting biomass feedstocks, and to improve existing approaches and develop new approaches to produce valuable chemical products from common agricultural sources such as seed oils, proteins, and carbohydrates. Our research-oriented biorefinery is now online to study the full range of processes involved in converting cellulosic biomass to ethanol. Producers are growing the required biomass feedstock for the biorefinery.

### 2. Brief description of the target audience

The primary audiences for our sustainable energy research include agricultural and forestry producers, energy consumers (both individuals and businesses), and policy-makers.

## V(E). Planned Program (Outputs)

### 1. Standard output measures

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| Actual | 4362 | 116549 | 494 | 0 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 1

**Patents listed**

Switchgrass Promoter and Uses Thereof, Stewart, Neal C. (KNOXVILLE, TN, US) , Mann, David George James (KNOXVILLE, TN, US)

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| Actual | 0 | 57 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Peer-reviewed technical resource pages in online BioWeb resource (Rials).

| Year | Actual |
|---|---|
| 2010 | 1400 |

**Output #2**

**Output Measure**

- The discovery that springtails in the genus Pogonognathellus are composed of numerous, mostly geographically-limited species largely invalidates the last century of research in North America on the role of these ecologically important arthropods, since several species often occur together. It is impossible to know to what species earlier researchers were referring; therefore, much of our knowledge of these springtails in our environments must be redone. (Bernard)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #3**

**Output Measure**

- A national study of how meeting potential energy and carbon policies might impact the U.S. agriculture and forestry sectors as well as the economy was conducted. Results suggest that under a properly designed RES, economic returns to the agriculture and forestry sectors are significant and are projected to be widespread across the United States. Analysis shows that Agriculture can supply significant quantities of biomass to meet these policies increasing net farm income by $100 billion over the 15 years period of the study, adding $200 billion to the nation?s economy and 800,000 jobs. (English)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #4**

**Output Measure**

- Agricultural mulches formed from biobased poly(lactic acid) using nonwovens textile technology provide the desired balance of strength and biodegradability that enable their large-scale use. (Hayes)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #5**

**Output Measure**

- Collaborative research has resulted in an extensive exploration of cellulolytic activity in insect digestive fluids. The range of activities, between species, region of digestive tract, and to different cellulose substrates has directed new exploration with goals of practical application in biofuel production systems. A second thrust clarifies the extent of cellulolytic activity against different cellulose substrates and at several key insect developmental stadia. (Jurat-Fuentes and Klingeman)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #6**

**Output Measure**

- Our corporate training seminars in statistical process control and advanced data mining have documented direct financial benefits to the participating companies ranging from approximately $20,000 to $300,000 per year. (Young)

| Year | Actual |
|---|---|
| 2010 | 1 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Research-oriented biorefinery to test range of processes for biomass to cellulosic ethanol (Tiller). |
| 2 | Majority of first-pass biomass size reduction done with knife grids or other techology more efficient than rotary (Womac). |
| 3 | In-field size reduction and/or compacting done on majority of cellulosic biomass harvested in Tennessee (Womac). |
| 4 | Number of growers producing switchgrass as an energy crop. (Jackson) |
| 5 | Number of acres of switchgrass grown in Tennessee as an energy crop. (Jackson) |
| 6 | Average yield of switchgrass varieties (from introduction to well-managed stands) in Tennessee, tons per acre. (West & Larson) |
| 7 | Farmer-owned biomass cooperative to help capture economic advantage of bioenergy production (Tiller). |
| 8 | Switchgrass weed control (Rhodes) |
| 9 | Switchgrass storage (Yu) |
| 10 | Seeding and Fertilization Rates for Biomass Crops (Tyler, West, and Larson) |
| 11 | Reducing hygroscopicity in wood composites (Wang) |

**Outcome #1**

**1. Outcome Measures**

Research-oriented biorefinery to test range of processes for biomass to cellulosic ethanol (Tiller).

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 1 | 1 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 402 | Engineering Systems and Equipment |
| 511 | New and Improved Non-Food Products and Processes |
| 605 | Natural Resource and Environmental Economics |

**Outcome #2**

**1. Outcome Measures**

Majority of first-pass biomass size reduction done with knife grids or other techology more efficient than rotary (Womac).

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 0 | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 402 | Engineering Systems and Equipment |
| 511 | New and Improved Non-Food Products and Processes |
| 603 | Market Economics |
| 605 | Natural Resource and Environmental Economics |

**Outcome #3**

**1. Outcome Measures**

In-field size reduction and/or compacting done on majority of cellulosic biomass harvested in Tennessee (Womac).

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 0 | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 402 | Engineering Systems and Equipment |
| 511 | New and Improved Non-Food Products and Processes |
| 603 | Market Economics |
| 605 | Natural Resource and Environmental Economics |

**Outcome #4**

**1. Outcome Measures**

Number of growers producing switchgrass as an energy crop. (Jackson)

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 75 | 75 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|

| | |
|---|---|
| 205 | Plant Management Systems |
| 511 | New and Improved Non-Food Products and Processes |
| 603 | Market Economics |
| 605 | Natural Resource and Environmental Economics |

**Outcome #5**

**1. Outcome Measures**

Number of acres of switchgrass grown in Tennessee as an energy crop. (Jackson)

Not Reporting on this Outcome Measure

**Outcome #6**

**1. Outcome Measures**

Average yield of switchgrass varieties (from introduction to well-managed stands) in Tennessee, tons per acre. (West & Larson)

Not Reporting on this Outcome Measure

**Outcome #7**

**1. Outcome Measures**

Farmer-owned biomass cooperative to help capture economic advantage of bioenergy production (Tiller).

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 1 | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 512 | Quality Maintenance in Storing and Marketing Non-Food Products |
| 603 | Market Economics |
| 605 | Natural Resource and Environmental Economics |

**Outcome #8**

**1. Outcome Measures**

Switchgrass weed control (Rhodes)

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Weed competition has been cited by numerous state, regional and national expert scientists as the number one limiting factor to the successful establishment of switchgrass for biofuels.

**What has been done**
In 2008 we initiated a concentrated research and Extension educational program in switchgrass weed management in support of the Tennessee Biofuels Initiative.

**Results**
Our efforts led to the granting of numerous state and one federal label for herbicides for use in switchgrass for biofuel and helped to elevate the visibility of TN on the national biofuel research front. Moreover, it helped to protect the UTIA's initial $1,175,850 investment in switchgrass producer contracts and, to the successful completion of the 5100 acres-planted goal by 2010.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |
| 215 | Biological Control of Pests Affecting Plants |

**Outcome #9**

**1. Outcome Measures**

Switchgrass storage (Yu)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
We need to make ethanol more competitive in the market place without impacting producer profits, while providing producers a potential value-added industry.

**What has been done**
Our research in the logistics of biomass feedstock for biofuel industry has expanded our knowledge on various preprocessing systems in the switchgrass supply chain. Based on our findings, a field experiment using an industrial baler to preprocess about 170 acres of switchgrass is currently being conducted in Vonore, Tennessee.

**Results**
Chopping and densify baling has the potential of reducing feedstock cost delivered to a bio-refinery by about 40% compared with conventional hay methods. Adoption of this technology could reduce the cost of a gallon of ethanol created from cellulose by $0.30/gallon.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |
| 511 | New and Improved Non-Food Products and Processes |
| 512 | Quality Maintenance in Storing and Marketing Non-Food Products |
| 601 | Economics of Agricultural Production and Farm Management |

| | |
|---|---|
| 603 | Market Economics |
| 605 | Natural Resource and Environmental Economics |

**Outcome #10**

**1. Outcome Measures**

Seeding and Fertilization Rates for Biomass Crops (Tyler, West, and Larson)

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Switchgrass can provide high cellulose biomass for conversion to biofuels such as ethanol.

**What has been done**
Seeding rate, nitrogen rate and cultivar studies have been underway for seven years on four different soil and landscape situations at the Milan Research and Education Center.

**Results**
These data have resulted in a lowering of the seeding rate recommendation from 9 kg/ha pure live seed to 6.7. The data have also indicated that in most situations the 67 kg/ha nitrogen rate is sufficient for maximum biomass over the seven growing seasons.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |
| 601 | Economics of Agricultural Production and Farm Management |

## Outcome #11

### 1. Outcome Measures

Reducing hygroscopicity in wood composites (Wang)

### 2. Associated Institution Types

- 1862 Research

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Dimensional stability and durability are two main concerns about wood and wood-based composites. Hygroscopic nature of wood is the main reason for moisture absorption and consequently swelling and instability in dimensions of wood and wood-based products. Moisture also provides proper condition for growing fungus and molds on wood-based composites.

**What has been done**
Our research has demonstrated that extraction of some amorphous carbohydrates (hemicellulose and amourphous cellulose), which are the most hydrophilic component of wood, from wood strands can significantly decrease hygroscopicity and improve mold resistant and dimensional stability of oriented strandboard. Extracted sugars can use for producing different chemicals especially use for making bioethanol.

**Results**
This research has the potential for improving the nanoindentation testing methods for wood materials. A basic understanding of nanoindentation technique on wood material is required for continued improvement of characterization of bio-composites.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 511 | New and Improved Non-Food Products and Processes |
| 605 | Natural Resource and Environmental Economics |

## V(H). Planned Program (External Factors)

### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- null

### Brief Explanation

{No Data Entered}

## V(I). Planned Program (Evaluation Studies and Data Collection)

### Evaluation Results

{No Data Entered}

### Key Items of Evaluation

{No Data Entered}

## V(A). Planned Program (Summary)

**Program # 5**

**1. Name of the Planned Program**

Economic Infrastructure and Commerce

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms | 0% | 0% | 7% | |
| 202 | Plant Genetic Resources | 0% | 0% | 4% | |
| 601 | Economics of Agricultural Production and Farm Management | 30% | 30% | 11% | |
| 602 | Business Management, Finance, and Taxation | 4% | 4% | 6% | |
| 603 | Market Economics | 4% | 4% | 16% | |
| 604 | Marketing and Distribution Practices | 26% | 26% | 10% | |
| 607 | Consumer Economics | 6% | 6% | 1% | |
| 608 | Community Resource Planning and Development | 10% | 10% | 31% | |
| 609 | Economic Theory and Methods | 10% | 10% | 0% | |
| 610 | Domestic Policy Analysis | 10% | 10% | 0% | |
| 901 | Program and Project Design, and Statistics | 0% | 0% | 14% | |
| | **Total** | 100% | 100% | 100% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 26.0 | 2.5 | 19.0 | 0.0 |
| Actual | 31.0 | 3.0 | 19.0 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| **Smith-Lever 3b & 3c** | **1890 Extension** | **Hatch** | **Evans-Allen** |
| 600853 | 184884 | 774487 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 2508213 | 184884 | 1780407 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 461820 | 0 | 330785 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Research analysis includes assessment of market potential, market feasibility studies for new agri-industry ventures, buyer and consumer preferences studies, market segmentation analysis and buyer profiling, analysis of new product acceptance, analysis of marketing alternatives, and analysis of valuation of product attributes. To evaluate the impacts of various policies, management strategies, or economic conditions on a farm's bottom line and financial strength, we are developing a set of representative farms that encompass major segments of agriculture in Tennessee. Methods for evaluating risk include risk-based econometric models, risk-based mathematical programming models, generalized stochastic dominance criteria, dynamic optimization, and subjective probability assessment criteria.

The Extension MANAGE program helped families analyze their total farming business so they could make informed decisions regarding their future. In FY 2010, Extension staff trained in farm and financial management helped families to:

- 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
- determine appropriate production practices

In addition to individualized farm and financial planning assistance, Extension provided hundreds of workshops to help farmers improve their financial situation.

### 2. Brief description of the target audience

Audiences include limited-resource and small farmers, farmers transitioning from tobacco to other crops, policy-makers at the state, federal, and municipal level, and businesses looking to expand or relocate to Tennessee.

## V(E). Planned Program (Outputs)

### 1. Standard output measures

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 13901 | 46300 | 7954 | 0 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 3 | 18 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of exhibits displayed to promote program awareness and participation.

| Year | Actual |
|---|---|
| 2010 | 21 |

**Output #2**

**Output Measure**

- Numer of research-based publications distributed as part of this program.

| Year | Actual |
|---|---|
| 2010 | 9000 |

**Output #3**

**Output Measure**

- Economic growth (income, jobs, and small businesses) is stronger in communities with extensive networks between entrepreneurs and persons working in creative occupations (for example, applied sciences, arts, teaching). This is especially true in areas endowed with abundant natural amenities. (Lambert)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #4**

**Output Measure**

- Results from the analysis of alternative weaning dates helps producers understand the relationship between weather factors and herd adjustments to optimize weaning and marketing dates for feeder calves. (McLemore)

| Year | Actual |
|---|---|
| 2010 | 1 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Land Ownership Information Program: Number of African-American landowners who increased their knowledge of property rights and responsibilities. |
| 2 | Land Ownership Information Program: Number of African-American landowners who developed farm management plans. |
| 3 | Land Ownership Information Program: Number of African-American landowners who developed estate plans to reduce the financial and legal risks farm family businesses face as they transition betwen generations. |
| 4 | Farm Financial Analysis and Planning: Number of farm families and rural business operators who implemented partial budgeting decisions (examples include sell calves now or later, evaluating equitable leasing arrangements and mach |
| 5 | Farm Financial Analysis and Planning: Number of farm families and rural business operators implementing improved record systems. |
| 6 | Farm Financial Analysis and Planning: Number of farm families who developed whole farm plans to improve their farm financial performance. |
| 7 | Correlation between local job growth and in-migration of seniors |
| 8 | Cotton production |
| 9 | Leadership Development |
| 10 | Training in the Use of Emerging Technologies (Youth Leadership and Community Development) |

**Outcome #1**

**1. Outcome Measures**

Land Ownership Information Program: Number of African-American landowners who increased their knowledge of property rights and responsibilities.

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15 | 338 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 601 | Economics of Agricultural Production and Farm Management |
| 607 | Consumer Economics |

**Outcome #2**

**1. Outcome Measures**

Land Ownership Information Program: Number of African-American landowners who developed farm management plans.

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15 | 193 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 601 | Economics of Agricultural Production and Farm Management |
| 607 | Consumer Economics |

**Outcome #3**

**1. Outcome Measures**

Land Ownership Information Program: Number of African-American landowners who developed estate plans to reduce the financial and legal risks farm family businesses face as they transition betwen generations.

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15 | 143 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 601 | Economics of Agricultural Production and Farm Management |
| 607 | Consumer Economics |

**Outcome #4**

**1. Outcome Measures**

Farm Financial Analysis and Planning: Number of farm families and rural business operators who implemented partial budgeting decisions (examples include sell calves now or later, evaluating equitable leasing arrangements and mach

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 300 | 1264 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 601 | Economics of Agricultural Production and Farm Management |

## Outcome #5

### 1. Outcome Measures

Farm Financial Analysis and Planning: Number of farm families and rural business operators implementing improved record systems.

### 2. Associated Institution Types

- 1862 Extension

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 300 | 583 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 601 | Economics of Agricultural Production and Farm Management |

## Outcome #6

### 1. Outcome Measures

Farm Financial Analysis and Planning: Number of farm families who developed whole farm plans to improve their farm financial performance.

### 2. Associated Institution Types

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 250 | 315 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 601 | Economics of Agricultural Production and Farm Management |

**Outcome #7**

**1. Outcome Measures**

Correlation between local job growth and in-migration of seniors

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

A study looking at senior migration into the Southeastern US examined the impact of migrating cohorts on changes in job and business establishment growth.

**Results**

Results suggest that the correlation between job growth and in-migration of this cohort was uniformly positive in non-metropolitan counties where job growth was low to moderate, but not significant in non-metropolitan counties where job growth was highest. A comparison of the distributions revealed that the pay-off in terms of job growth could be relatively large (a 1 - 3% increase in jobs) in counties with relatively low populations densities with access to urban centers, and non-core counties with relatively low or very low population densities. However, there was a considerable amount of variability associated with these pay-offs, suggesting that decision makers considering senior recruitment as a job development strategy might consider senior recruitment as a component of a broader package of economic development strategies. (Park?)

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 602 | Business Management, Finance, and Taxation |
| 607 | Consumer Economics |
| 608 | Community Resource Planning and Development |

**Outcome #8**

**1. Outcome Measures**

Cotton production

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Producers desire to minimize seed, technology, harvest and machinery costs.

**What has been done**

Production trials were run with various seeding densities and planting patterns.

**Results**

Irrigated cotton produced equivalently high net returns at seeding rates above 7.2 per square meter, with any combination of row spacing, configuration, and number of seeds per meter of row. Under nonirrigated conditions, net returns were maximized at seeding rates between 5.4 and 14.3 square meter, except in solid planted 38-cm rows. Planting in a 2x1 skiprow pattern generated savings of seed and technology costs, and of harvest labor and machinery costs, that shifted profit potential away from solid plantings under these conditions. (Larson)

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 601 | Economics of Agricultural Production and Farm Management |

**Outcome #9**

**1. Outcome Measures**

Leadership Development

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

With the downward trends in formal associations and engagement, there is growing concern about how to address current complex problems. Rural and urban areas alike are affected by changing economies, demographics, social norms, family structures, and societal emphases. Local issues range from recidivism, to local job opportunities, to care-giving, and to local talent out-migration. Local problems are also exacerbated by national concerns such as the economy, education funding, terrorism, disease, war, and violence. Without concerted attention, these problems will only grow. To prevent such problems from growing, these issues must be addressed through the collaborative effort of involved and engaged community members.

Leadership in the 21st century requires a new vision of management. Many community leaders are often thrust into their role with little or no leadership training. Out-migration by youth and

skilled individuals from traditionally rural counties and limited resource communities has resulted in fewer ?traditional? leaders. As community demographics shift, more leaders need to be drawn from overlooked ?non-traditional? groups or sources. These include leaders who are retirees, youth, women and ethnic or social minorities. Leadership development for these groups or the people working with these leaders needs to be more systematic and intentional. As a result, more training for innovative collaboration, problem-solving, transparent decision making, and effective advocacy is needed.

**What has been done**

There were 2,935 direct contacts made over the course of the year. Contacts were made at workshops, conferences, area meetings, county visits and in-service trainings. 20,730 indirect contacts were made through newspaper articles, emails and publications. Twenty-six volunteers provided leadership programming to youth and adults in Davidson and Dyer counties. The Leadership Development Program reached 753 participants during. Twenty-six volunteers provided leadership development education in three counties in Tennessee. More than 1005 youth received leadership education and teambuilding training. In Hardeman County, 97 young adults received training in ?Entrepreneurial Leadership.? Follow-up interviews with participants were conducted that revealed that the training inspired them to volunteer for new leadership roles and join 4-H in their county. Training was provided in Dyer County where 16 youth and five adults received teambuilding and leadership training. Leadership training was conducted during three regional meetings with 274 extension educators and stakeholders.

In the DREAM Mentoring Project, 20 young men received mentoring and leadership development training from 20 DREAM Project mentors. The DREAM Project resulted from the collaboration between Tennessee State University Extension and the Tennessee State University Honors Program. It was designed to address the lack of leadership development training for young black men and is in its second year of implementation. The mentors were former mentees themselves and volunteered to mentor this year?s incoming cohort.

Hardeman County Junior Achievers Leadership Training, allowed for 62 youth to receive leadership and teambuilding training as part of a funded USDA Rural Development grant in Hardeman, TN. This is the result of collaboration between TSU Extension and Research, Hardeman County and the Hardeman County School District. The Community Toolkit curriculum was taught in two counties (Dyer and Hardeman). Thirty handouts were developed and passed on ?Community Development: Building Effective Teams?.

**Results**

Impact data was collected using surveys and through extension educator, stakeholder and youth comments. At least 90% of the 124 adult participants in the programs offered during 2010 learned more about entrepreneurial leadership. At least 85% of the 108 youth participants in the summer workshops learned more about teambuilding and positive youth development. At least 95% of the extension educators learned more about strategic planning and leadership. Community Leader Training was conducted in Dyer County. Approximately 27 community leaders and 1 extension agent and 2 program assistants received training on the importance of building effective teams. The Community Toolbox curriculum was used to train the community leaders and extension staff. Several community leaders indicated that they would use the training to work better with the youth groups and the community organizations they are leading.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 608 | Community Resource Planning and Development |

## Outcome #10

### 1. Outcome Measures

Training in the Use of Emerging Technologies (Youth Leadership and Community Development)

### 2. Associated Institution Types

- 1890 Extension

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
With the rapid pace of technological change and the potential to transform the way programs and services are delivered, information technology training is a vital component within any set organization. Online learning has shown an exponential growth during the last decade, allowing colleges and universities to serve a broader and sometimes underserved population (Allen and Seaman, 2004; 2005). Judith Wesser stated that, ?of all the pressures for educational change, technology plays a unique role; it serves as both impetus for change and as a tool for bringing forth that very same change.
Extension personnel are not aware of how to adopt he use emerging technologies in program development and delivery. The uncertainty of technology applications hinder personnel from taking advantage to provide personnel with the tools to jump start their use of emerging technologies.

**What has been done**
Technology Curriculum was created and implemented in the L.E.T.S. (Leadership Entrepreneurship and Technology Series), the program was implemented in 3 counties across Tennessee; 105 youth and adults received training on the use of emerging technologies and mobile devices for Entrepreneurship endeavors. Mobile Information Technology Training Modules were developed and implemented in 8 Tennessee counties in 2010. More than 2,000 direct contacts were made in K-12 Schools, before and aftercare settings. The indirect contacts of 3,800 were made through exhibits, and online media.

**Results**
There were 5,905 participants that were reached and trained. Participants noted the need for additional training to implement technology into programs, business and curriculum. While 90% of participants receiving training were familiar with the terms social media, social marketing, Internet browsing, mobile technologies and electronic book-keeping, 95% believed they needed additional

training to implement these concepts effectively. Eighty-five percent noted the interest in incorporating technology such as social media marketing, electronic record keeping and using mobile devices to enhance their skills. 84% of program participants reported that they learned new skills.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 608 | Community Resource Planning and Development |

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies and Data Collection)**

**Evaluation Results**

**Key Items of Evaluation**

## V(A). Planned Program (Summary)

**Program # 6**

### 1. Name of the Planned Program

Environmental and Water Quality Impacts

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 101 | Appraisal of Soil Resources | 0% | 0% | 4% | |
| 102 | Soil, Plant, Water, Nutrient Relationships | 0% | 0% | 24% | |
| 112 | Watershed Protection and Management | 0% | 0% | 4% | |
| 123 | Management and Sustainability of Forest Resources | 0% | 0% | 6% | |
| 133 | Pollution Prevention and Mitigation | 0% | 0% | 18% | |
| 135 | Aquatic and Terrestrial Wildlife | 0% | 0% | 12% | |
| 205 | Plant Management Systems | 0% | 0% | 7% | |
| 212 | Pathogens and Nematodes Affecting Plants | 0% | 0% | 5% | |
| 213 | Weeds Affecting Plants | 0% | 0% | 3% | |
| 307 | Animal Management Systems | 0% | 0% | 3% | |
| 402 | Engineering Systems and Equipment | 0% | 0% | 6% | |
| 404 | Instrumentation and Control Systems | 0% | 0% | 4% | |
| 721 | Insects and Other Pests Affecting Humans | 0% | 0% | 4% | |
| | **Total** | 0% | 0% | 100% | |

## V(C). Planned Program (Inputs)

### 1. Actual amount of professional FTE/SYs expended this Program

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 0.0 | 0.0 | 40.0 | 0.0 |
| Actual | 0.0 | 0.0 | 22.6 | 0.0 |

### 2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---|---|---|---|
| **Smith-Lever 3b & 3c** | **1890 Extension** | **Hatch** | **Evans-Allen** |
| 0 | 0 | 635152 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 0 | 0 | 1521364 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 0 | 0 | 772218 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

We are developing economic and policy data by accessing existing sources, generating data from computer models, and surveying market participants. This data is analyzed using appropriate statistical and econometric methods. Watershed scale model assessments are conducted utilizing field-level estimates of alternative management practices (AMPs). Changes in water quality in impaired watersheds resulting from the evaluation of AMPs are measured. The cost of meeting different water quality standards at different points within a watershed and the potential impact of different environmental policies on Tennessee's agriculture are evaluated. A model used to project land use change estimates the probability of land development of individual parcels as a function of parcel-level attributes.

Soil research is fundamental to our environmental program.The erosion, sediment transport, and contaminant transport capabilities of the RUSLE2 soil erosion model continue to be refined as the model's use increases nationally and around the world. Soil samples are thoroughly characterized in terms of elemental composition, particle size, mineralogy, and other soil chemical and flow characteristics using standard techniques. New methods for decreasing the expense of measuring soil properties by agricultural producers and fellow researchers are developed.

As new waste treatment approaches are introduced, we provide research-based evaluation of appropriate technologies for Tennessee. Background information on the water quality is collected in various watershed areas, including one where baseline environmental data is being used to evaluate the impact of a dairy production unit on the area.

### 2. Brief description of the target audience

This is currently a research-only targeted program, so the target audience is weighted toward basic/applied research clients.

## V(E). Planned Program (Outputs)

### 1. Standard output measures

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 0 | 0 | 0 | 0 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| Actual | 0 | 28 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Reduce water-flux measurement error of heat-pulse probe, percent error (Lee).
  Not reporting on this Output for this Annual Report

**Output #2**

**Output Measure**

- GPS-based underwater video mapping has been successfully completed and analyzed for optimal habitat in the Driftwood River (Rayed bean mussel), Citico Creek (several endangered species), Obed Wild and Scenic River (Spot fin chub), and Big South Fork River and Recreation Area (various endangered mussel and fish). (Ayers)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #3**

**Output Measure**

- Developed physics-based vehicle terrain interaction model for US Army. (Ayers)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #4**

**Output Measure**

- The Eastern Native Grasslands Alliance is a cost-effective and very efficient way to expand the communication, knowledge, and cooperation of a wide array of stakeholders concerned with grasslands management in the eastern US. By linking many organizations and interest groups,

common ground can be established leading to common action and in turn, far more progress than would otherwise be possible. (Gray)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #5**

**Output Measure**

- The SMART Center has the potential to provide assistance to communities and other entities dealing with new stormwater regulations, helping train competent stormwater professionals, and providing research support for the development and testing of stormwater practices. (Buchanan & Yoder)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #6**

**Output Measure**

- Developed a superior method to describe the area of a hole cut into a round pipe, which is necessary to accurately describe water flow through said hole. (Tyner)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #7**

**Output Measure**

- Demonstrated the inadequacy of solely employing soil cores for determining the suitability of a water perching horizon across vast water impoundments that possess vertical drainage features, and demonstrates the application of continuous geophysical profiling technologies for subsurface profiling of landforms possessing seismic fissures. (Freeland)

| Year | Actual |
|---|---|
| 2010 | 1 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Percent of Tennessee major row-crop acreage under some form of no-till or conservation tillage (Tennessee Agriculture 2007). |
| 2 | Greenhouse and nursery crop use of bioactive natural products in place of conventional pesticide on tomato, percent of operators adopting (Gwinn). |
| 3 | Design and use of geo-referenced snorkelcam (Ayers) |
| 4 | Development of bioassessment models (Gray) |
| 5 | Effect of perennial switchgrass soil carbon storage (Tyler) |
| 6 | Effects of bacteria and viruses on soil processes (Debruyn and Radosevich) |
| 7 | Spectral-based real-time crop health sensors (Wilkerson) |
| 8 | Pathogen fate and preferential flow in soil (Freeland) |

**Outcome #1**

**1. Outcome Measures**

Percent of Tennessee major row-crop acreage under some form of no-till or conservation tillage (Tennessee Agriculture 2007).

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 89 | 90 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 112 | Watershed Protection and Management |
| 133 | Pollution Prevention and Mitigation |

**Outcome #2**

**1. Outcome Measures**

Greenhouse and nursery crop use of bioactive natural products in place of conventional pesticide on tomato, percent of operators adopting (Gwinn).

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 1 | 1 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 102 | Soil, Plant, Water, Nutrient Relationships |
| 133 | Pollution Prevention and Mitigation |

**Outcome #3**

**1. Outcome Measures**

Design and use of geo-referenced snorkelcam (Ayers)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Better tools are needed to examine aquatic populations and their habitat.

**What has been done**
A new ?snorkelcam? snorkel mounted underwater videomapping system was developed by an undergraduate student and utilized in a TES mapping project at Citico Creek of the Cherokee National Forest. The team is now making multiple units to do more comprehensive snorkel mapping.

**Results**
The unit records geo-referenced video images for populations and species diversity, and shows the habitat/environment as well.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 112 | Watershed Protection and Management |
| 133 | Pollution Prevention and Mitigation |
| 135 | Aquatic and Terrestrial Wildlife |
| 307 | Animal Management Systems |
| 404 | Instrumentation and Control Systems |

**Outcome #4**

**1. Outcome Measures**

Development of bioassessment models (Gray)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
There is a need to preserve and enhance regional biodiversity in western Tennessee.

**What has been done**
Developed bioassessment models to monitor ecological restoration at hardwood bottomland sites enrolled in the Wetlands Reserve Program.

**Results**
Three important results: 1) Vegetation and bird community structure can be used to monitor state of ecological restoration, 2) frogs rapidly colonize bottomland restoration sites, and 3) salamanders use only mature forested wetlands.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 112 | Watershed Protection and Management |
| 123 | Management and Sustainability of Forest Resources |
| 135 | Aquatic and Terrestrial Wildlife |
| 307 | Animal Management Systems |

**Outcome #5**

**1. Outcome Measures**

Effect of perennial switchgrass soil carbon storage (Tyler)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Soil organic matter is important in maintaining soil quality and soil productivity.

**What has been done**
Long-term study (in third year) sampling of soil CO2 in 700 acres of switchgrass.

**Results**
The use of the perennial crop, switchgrass for biofuel production has resulted in increases in soil organic matter of 1% or more in the fifth season compared to initial soil levels. Greater soil carbon storage will result in better soil and less carbon dioxide emission to the atmosphere.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 101 | Appraisal of Soil Resources |
| 102 | Soil, Plant, Water, Nutrient Relationships |
| 205 | Plant Management Systems |

**Outcome #6**

**1. Outcome Measures**

Effects of bacteria and viruses on soil processes (Debruyn and Radosevich)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Microorganisms (especially bacteria) are central to soil processes. It is thought that viruses that infect these bacteria should also be important to soil processes, however very little is known about soil viruses.

**What has been done**
Our work has contributed to a better understanding of the spatial and temporal dynamics of these organisms under different land management. A particular group of bacteria, the Gemmatimonadetes, is quite abundant in soils, suggesting they play an important role in soils.

**Results**
This group is not easily cultivated in the lab, therefore nothing is known of this role. We have obtained and characterized an isolate from this group, greatly advancing our understanding of their ecology.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 101 | Appraisal of Soil Resources |

| | |
|---|---|
| 102 | Soil, Plant, Water, Nutrient Relationships |
| 133 | Pollution Prevention and Mitigation |
| 212 | Pathogens and Nematodes Affecting Plants |

**Outcome #7**

**1. Outcome Measures**

Spectral-based real-time crop health sensors (Wilkerson)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Crop sensors, in conjunction with previous yield history, can be combined to optimize nitrogen application rates within a field.

**What has been done**
We have conducted field evaluation of this technology for the last four seasons.

**Results**
Spectral-based, real-time crop health sensors are now being commercialized and adopted by producers.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 101 | Appraisal of Soil Resources |
| 102 | Soil, Plant, Water, Nutrient Relationships |
| 112 | Watershed Protection and Management |
| 205 | Plant Management Systems |
| 404 | Instrumentation and Control Systems |

**Outcome #8**

**1. Outcome Measures**

Pathogen fate and preferential flow in soil (Freeland)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Soil naturally safeguards groundwater from contamination. Fully understanding this filtering mechanism is essential, as zoonotic pathogens cause a large percentage of U.S. food-related illnesses and deaths. Most of the outbreaks are traceable to contaminated water exposure from uncooked foods or liquids that were improperly irrigated, rinsed, contained, or handled.

**What has been done**
This project's goal is to prevent zoonotic pathogens from entering into the U.S. food supply from agricultural production. Groundwater contamination occurs whenever the filtration capacity of soil is inadequate, overwhelmed, or bypassed. Conventional theory assumes non-preferential flow to supply sufficient time and surface area for the soil to filter contaminants. However, we have observed contaminants entering the groundwater regime via hydraulic transport by following long-established preferential flow pathways. Along these pathways, contaminants are supposedly filtered. Pathogen die-off and re-growth rates are largely unknown, as is also the filtration process for the wide variety of soil types.

**Results**
To safeguard groundwater supplies, knowing pathogen population decay rates from filtration, in-situ, over extended distances of natural gradient, as a function of time and distance from their initial deposition, is indispensable in establishing adequate design set backs away from protected water sources. Furthermore, precise subsurface mapping of preferential flow pathways allows for determining both pathogen source and fate, and implementing groundwater protection measures.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 112 | Watershed Protection and Management |

| | |
|---|---|
| 133 | Pollution Prevention and Mitigation |
| 404 | Instrumentation and Control Systems |
| 721 | Insects and Other Pests Affecting Humans |

## V(H). Planned Program (External Factors)

### External factors which affected outcomes

- Public Policy changes
- Competing Public priorities

### Brief Explanation

{No Data Entered}

## V(I). Planned Program (Evaluation Studies and Data Collection)

### Evaluation Results

{No Data Entered}

### Key Items of Evaluation

{No Data Entered}

## V(A). Planned Program (Summary)

**Program # 7**

**1. Name of the Planned Program**

Family Economics

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 801 | Individual and Family Resource Management | 100% | 100% | 0% | |
| | **Total** | 100% | 100% | 0% | |

## V(C). Planned Program (Inputs)

### 1. Actual amount of professional FTE/SYs expended this Program

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 20.0 | 2.0 | 0.0 | 0.0 |
| Actual | 14.0 | 1.0 | 0.0 | 0.0 |

### 2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---|---|---|---|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 257508 | 79236 | 0 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 1074948 | 79236 | 0 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 207894 | 0 | 0 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

In 2010, Extension supported 10 regional and local social marketing campaigns organized by UT and TSU Extension and supported by coalitions of volunteers across Tennessee. The Tennessee toolkit for savings lesson plans and activities for teaching financial and savings education was used in schools, workplaces, community centers and other locations to teach youth and adults. Extension maintained a partnership with national Extension "Finanacial Security in Later Life" initiative and with the "America

Saves" national organization and other national and state partners with the TN Jumpstart Coalition. Extension deployed its On My Own curriculum and youth TN Saves in over 100 financial education simulations annually throughout the state. Additional classes, newletters, news releases and community events were conducted for adult audiences.

**2. Brief description of the target audience**

Youth and adults were targeted for this program. UT Extension is a national leader in creating, testing and validating family economic programs for reaching different target audiences, such as youth ages 9-18, young adults, coalition members and consumers.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 62354 | 2135918 | 37560 | 414402 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 1 | 0 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of exhibits displayed to promote program awareness and participation.

| Year | Actual |
|---|---|
| 2010 | 99 |

## Output #2

### Output Measure

- Number of research-based publications distributed as part of this program.

| Year | Actual |
|---|---|
| 2010 | 33505 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | TN Saves: Number of participants who estimated their retirement income needs. |
| 2 | TN Saves: Number of participants identified ways to reduce debt. |
| 3 | TN Saves: Number of participants who set financial or retirement goals. |
| 4 | Youth Finanacial Education Simluation: Number of participants who felt more strongly that they needed to get a good education. |
| 5 | TN Saves: Number of participants who followed a spending plan. |
| 6 | TN Saves: Number of participants who initiated or increased savings. |
| 7 | TN Saves: Number of participants who made a change in a financial practice to avoid being a victim of fraud or predatory practices. |
| 8 | TN Saves: Number of participants who reduced debt. |
| 9 | TN Saves: Statewide economic impact from reduced debt, increased savings and increased investment. (This outcome target is expressed in millions of dollars.) |

**Outcome #1**

**1. Outcome Measures**

TN Saves: Number of participants who estimated their retirement income needs.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 10000 | 7387 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 801 | Individual and Family Resource Management |

**Outcome #2**

**1. Outcome Measures**

TN Saves: Number of participants identified ways to reduce debt.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 10000 | 7387 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 801 | Individual and Family Resource Management |

**Outcome #3**

**1. Outcome Measures**

TN Saves: Number of participants who set financial or retirement goals.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 20000 | 29017 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 801 | Individual and Family Resource Management |

**Outcome #4**

**1. Outcome Measures**

Youth Finanacial Education Simluation: Number of participants who felt more strongly that they needed to get a good education.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15000 | 14957 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 801 | Individual and Family Resource Management |

**Outcome #5**

**1. Outcome Measures**

TN Saves: Number of participants who followed a spending plan.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 6000 | 21331 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 801 | Individual and Family Resource Management |

**Outcome #6**

**1. Outcome Measures**

TN Saves: Number of participants who initiated or increased savings.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 10000 | 10549 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 801 | Individual and Family Resource Management |

**Outcome #7**

**1. Outcome Measures**

TN Saves: Number of participants who made a change in a financial practice to avoid being a victim of fraud or predatory practices.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 6000 | 22324 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 801 | Individual and Family Resource Management |

## Outcome #8

### 1. Outcome Measures

TN Saves: Number of participants who reduced debt.

### 2. Associated Institution Types

- 1862 Extension

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 12000 | 17975 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 801 | Individual and Family Resource Management |

## Outcome #9

### 1. Outcome Measures

TN Saves: Statewide economic impact from reduced debt, increased savings and increased investment. (This outcome target is expressed in millions of dollars.)

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 21600000 | 216000000 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 801 | Individual and Family Resource Management |

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Competing Public priorities
- Competing Programmatic Challenges

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies and Data Collection)**

**Evaluation Results**

**Key Items of Evaluation**

## V(A). Planned Program (Summary)

**Program # 8**

**1. Name of the Planned Program**

Food Safety, Quality, and Nutrition

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 112 | Watershed Protection and Management | 0% | 0% | 4% | |
| 133 | Pollution Prevention and Mitigation | 0% | 0% | 3% | |
| 205 | Plant Management Systems | 0% | 0% | 7% | |
| 307 | Animal Management Systems | 0% | 0% | 3% | |
| 308 | Improved Animal Products (Before Harvest) | 0% | 0% | 4% | |
| 311 | Animal Diseases | 0% | 0% | 7% | |
| 312 | External Parasites and Pests of Animals | 0% | 0% | 2% | |
| 315 | Animal Welfare/Well-Being and Protection | 0% | 0% | 1% | |
| 403 | Waste Disposal, Recycling, and Reuse | 0% | 0% | 1% | |
| 501 | New and Improved Food Processing Technologies | 0% | 0% | 21% | |
| 502 | New and Improved Food Products | 0% | 0% | 9% | |
| 511 | New and Improved Non-Food Products and Processes | 0% | 0% | 1% | |
| 702 | Requirements and Function of Nutrients and Other Food Components | 0% | 0% | 1% | |
| 703 | Nutrition Education and Behavior | 0% | 0% | 1% | |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins | 100% | 100% | 22% | |
| 722 | Zoonotic Diseases and Parasites Affecting Humans | 0% | 0% | 3% | |
| 806 | Youth Development | 0% | 0% | 6% | |
| 901 | Program and Project Design, and Statistics | 0% | 0% | 4% | |
| | **Total** | 100% | 100% | 100% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Extension | Research |
|---|---|

| Year: 2010 | 1862 | 1890 | 1862 | 1890 |
|---|---|---|---|---|
| Plan | 97.0 | 9.0 | 34.0 | 0.0 |
| Actual | 2.0 | 1.0 | 25.4 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| **Smith-Lever 3b & 3c** | **1890 Extension** | **Hatch** | **Evans-Allen** |
| 42918 | 13206 | 567207 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 179158 | 13206 | 3199610 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 134458 | 0 | 443012 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Extension used the Power U curriculum in Tennessee schools and afterschool programs. Extension personnel and volunteers used the curriculum to teach diet quality to young adolescents. The program was delivered through 10 interactive lessons.

In the Safe Food for Tennessee initiative, lessons were be delivered in homes, schools, community centers, churches, and other accessible locations to consumers. The lessons in "Cook's Corner" and "Safe Food for You" were designed to change attitudes, skills and behaviors in regards to safe food handling practices.

Youth participants received food safety education using Fight BAC and other curricula through their school classroom, community center, after-school program, or other locations. Direct methods (group meetings, classes, demonstrations, and on-site visits) and indirect methods (newsletters, TV media programs, web sites, newspaper articles and radio programs) emphasized the following:

- how to use MyPyramid.gov and followng Dietray Guidelines.
- how to use the Healthy Plate Method.
- decreasing consumption of high-fat foods like fried foods, bologna, hot dogs, etc.
- increasing consumption of fruits, vegetables and whole-grains.
- using a thermometer to check the internal temperature of food.
- using a thermometer to check the internal temperature of the refrigerator.

We conduct applied and basic research in food-borne risks and nutrition to address high priority issues for consumers of food products. We disseminate information gained from these studies to food industries and consumers through outreach programs, including workshops and educational events at the county level, and through a variety of publications.

Research projects in food safety are multi-pronged in their objectives. A major thrust is characterization of the antimicrobial activity of novel natural (i.e., plant-, animal- or microbial-based) compounds and better targeting through controlled-delivery encapsulation systems and incorporation into nanofibers and packaging films. Encapsulation strategies include micelles, liposomes, chitosans,

supercritical carbon dioxide, high pressure homogenization and ultrasound. Novel molecular biology strategies are used to identify stress mechanisms in bacteria that allow them to resist interventions.

Studies are underway on how non-thermal processing (high pressure, ultrasound, solvents) affect the functional properties of proteins for food and non-food applications. Supercritical carbon dioxide will be used to produce biopolymers encapsulation systems for flavors and nutraceuticals and to modify functional properties of proteins.

**2. Brief description of the target audience**

Tennesseans targeted included consumers and youth. Because of the prevalence of obesity in the state, all consumers are potentially members of the target audience. However, the TNCEP and EFNEP programs serve the state's limited resource population. In addition, the TSU Food Nutrition Education Program targeted eligible food stamp recipients.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 143122 | 89110 | 68358 | 0 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 1 | 36 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of exhibits displayed to promote program awareness and participation.

**Year** **Actual**

| | |
|---|---|
| 2010 | 693 |

**Output #2**

**Output Measure**

- Number of research-based publications distributed as part of this program.

| Year | Actual |
|---|---|
| 2010 | 905 |

**Output #3**

**Output Measure**

- If petroleum prices continue to increase, we may identify several applications for chitosan to replace cellulose in the pharmaceutical or plastics industries (Zivanovic).
  Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- Jalapeno peppers contaminated with Salmonella could not be disinfected effectively with conventional methods. Cutting off the top and bottom of peppers with a sharp knife to remove the stem and blossom ends was highly effective in reducing Salmonella to very low or non-detectable levels. (Draughon)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #5**

**Output Measure**

- The protein polymers lab continues to develop new functional properties for protein quaternary structures. It was found that various physicochemical stimuli are able to modify the physicochemical and binding properties of protein quaternary structures such as the casein micelles from bovine milk. (Harte)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #6**

**Output Measure**

- Studies on the inactivation of viruses by high pressure homogenization (HPH) show the potential of this technology to retain the sensory and nutritional value of fluid food while inactivating microorganisms. (Harte)

| Year | Actual |
|---|---|
| 2010 | 1 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Safe Food Handling Practices for Consumers: Number of participants surveyed more often washed items that came in contact with raw meat, chicken or seafood with hot, soapy water before continuing to cook. |
| 2 | Safe Food Handling Practices for Consumers: Number of participants surveyed who more often washed their hands with soap and warm running water before eating. |
| 3 | Safe Food Handling Practices for Consumers: Number of participants surveyed who more often washed their hands with soap and warm running water before preparing food. |
| 4 | Tennessee Shapes Up: Number of participants who decreased consumption of high-fat foods such as chips, fast food, fried foods, sausage, bacon, bologna, hot dogs, etc. |
| 5 | Tennessee Shapes Up: Number of participants who decreased consumption of high-sugar foods and sweetened beverages, such as soft drinks, Kool Aide type beverages, sweetened tea, etc. |
| 6 | Tennessee Shapes Up: Number of participants who increased consumption of dairy foods. |
| 7 | Tennessee Shapes Up: Number of participants who increased consumption of fruits. |
| 8 | Tennessee Shapes Up: Number of participants who increased consumption of vegetables. |
| 9 | Tennessee Shapes Up: Number of participants increased consumption of whole grains. |
| 10 | Tennessee Shapes Up: Number of participants who improved their blood sugar. |
| 11 | Tennessee Shapes Up: Number of participants who improved their cholesterol levels. |
| 12 | Pending chitosan being granted GRAS (Generally Recognized As Safe) status, our research will lead to applications in edible films and food additives with anti-microbial and thickening properties (Zivanovic). |
| 13 | Adoption of a homogenization pasteurization process as an alternative to thermal processing by small or mid-sized juice processors (Davidson). |
| 14 | Listeria and Salmonella transfer (Draughon) |

## Outcome #1

### 1. Outcome Measures

Safe Food Handling Practices for Consumers: Number of participants surveyed more often washed items that came in contact with raw meat, chicken or seafood with hot, soapy water before continuing to cook.

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 3000 | 4890 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

## Outcome #2

### 1. Outcome Measures

Safe Food Handling Practices for Consumers: Number of participants surveyed who more often washed their hands with soap and warm running water before eating.

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 3000 | 6207 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

**Outcome #3**

**1. Outcome Measures**

Safe Food Handling Practices for Consumers: Number of participants surveyed who more often washed their hands with soap and warm running water before preparing food.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 3000 | 6207 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

**Outcome #4**

**1. Outcome Measures**

Tennessee Shapes Up: Number of participants who decreased consumption of high-fat foods such as chips, fast food, fried foods, sausage, bacon, bologna, hot dogs, etc.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 6000 | 4810 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |

**Outcome #5**

**1. Outcome Measures**

Tennessee Shapes Up: Number of participants who decreased consumption of high-sugar foods and sweetened beverages, such as soft drinks, Kool Aide type beverages, sweetened tea, etc.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 6000 | 4018 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |

**Outcome #6**

**1. Outcome Measures**

Tennessee Shapes Up: Number of participants who increased consumption of dairy foods.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 6000 | 12237 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |

**Outcome #7**

**1. Outcome Measures**

Tennessee Shapes Up: Number of participants who increased consumption of fruits.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 6000 | 21117 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |

**Outcome #8**

**1. Outcome Measures**

Tennessee Shapes Up: Number of participants who increased consumption of vegetables.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 6000 | 17459 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |

## Outcome #9

### 1. Outcome Measures

Tennessee Shapes Up: Number of participants increased consumption of whole grains.

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 6000 | 13271 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |

## Outcome #10

### 1. Outcome Measures

Tennessee Shapes Up: Number of participants who improved their blood sugar.

Not Reporting on this Outcome Measure

## Outcome #11

### 1. Outcome Measures

Tennessee Shapes Up: Number of participants who improved their cholesterol levels.

Not Reporting on this Outcome Measure

## Outcome #12

### 1. Outcome Measures

Pending chitosan being granted GRAS (Generally Recognized As Safe) status, our research will lead to applications in edible films and food additives with anti-microbial and thickening properties (Zivanovic).

### 2. Associated Institution Types

- 1862 Research

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 0 | 0 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
{No Data Entered}

**What has been done**
{No Data Entered}

**Results**
{No Data Entered}

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 501 | New and Improved Food Processing Technologies |
| 502 | New and Improved Food Products |

| | |
|---|---|
| 702 | Requirements and Function of Nutrients and Other Food Components |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |

**Outcome #13**

**1. Outcome Measures**

Adoption of a homogenization pasteurization process as an alternative to thermal processing by small or mid-sized juice processors (Davidson).

Not Reporting on this Outcome Measure

**Outcome #14**

**1. Outcome Measures**

Listeria and Salmonella transfer (Draughon)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Consumers who are elderly, have immune suppression or are pregnant are particularly at risk from eating contaminated meat and poultry.

**What has been done**
A national risk assessment on the risk of listeriosis and death from consuming luncheon meats was released based on our work.

**Results**
Listeria monocytogenes was found twice as often in RTE meat and poultry sliced in the deli of smaller groceries compared to the larger chain groceries. Therefore, ready-to-eat meat and poultry sliced at larger grocery store chains was much safer than products sliced at small grocery store delis or small regionalized grocery stores. Small grocers are less likely to have food safety professionals on their staff and may not have strong food safety programs for their deli due to insufficient resources.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 501 | New and Improved Food Processing Technologies |
| 712 | Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins |
| 722 | Zoonotic Diseases and Parasites Affecting Humans |

## V(H). Planned Program (External Factors)

### External factors which affected outcomes

- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Programmatic Challenges

### Brief Explanation

## V(I). Planned Program (Evaluation Studies and Data Collection)

### Evaluation Results

{No Data Entered}

### Key Items of Evaluation

{No Data Entered}

## V(A). Planned Program (Summary)

**Program # 9**

**1. Name of the Planned Program**

Forestry, Wildlife, and Fishery Systems

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 123 | Management and Sustainability of Forest Resources | 76% | 76% | 44% | |
| 125 | Agroforestry | 7% | 7% | 0% | |
| 133 | Pollution Prevention and Mitigation | 0% | 0% | 10% | |
| 135 | Aquatic and Terrestrial Wildlife | 12% | 12% | 32% | |
| 301 | Reproductive Performance of Animals | 0% | 0% | 3% | |
| 605 | Natural Resource and Environmental Economics | 5% | 5% | 11% | |
| | **Total** | 100% | 100% | 100% | |

## V(C). Planned Program (Inputs)

### 1. Actual amount of professional FTE/SYs expended this Program

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 8.0 | 1.0 | 45.0 | 0.0 |
| Actual | 5.0 | 1.0 | 23.4 | 0.0 |

### 2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---|---|---|---|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 85836 | 26412 | 145627 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 358316 | 26412 | 2047533 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 367324 | 0 | 1141757 | 0 |

## V(D). Planned Program (Activity)

**1. Brief description of the Activity**

UT and TSU Extension partnered with the Tennessee Forestry Association in conducting group meetings to inform forest landowners of issues pertaining to forestry and wildlife. Volunteers were recruited and trained to present at group meetings, provide information, demonstrate equipment and provide materials for demonstrations. UT and TSU Extension provided education at local, regional and statewide events, such as the Tennessee Forest Festival to inform the general public about forest management issues. Demonstartions were provided for landowners and forestry workers. Extension Agents and Specialists educated attendees at County Forestry Landowners Association meetimgs.

UT and TSU Extension continued one-on-one contacts with landowners throughout the year and used mass media and newsletters to inform the general public on issues and educational opportunities related to natural resources. Both UT and TSU Extension provided leadership for conducting programs that targeted limited resource landowners with TSU providing specialist leadership for this effort.

For Tennessee's forestry sector, UT AgResearch continues biological control of Hemlock Woolly Adelgid by known predators and new species and release technologies.We evaluate methods of increasing seedling success, and techniques for improving reforestation.We exploit genetic variation in nursery and field characteristics of native hardwood and coniferous forest tree species.We try novel strategies to address exotic forest tree pests and corresponding forest restoration. We establish collections of woody plants, including species and cultivars, and plants having potential commercial value as forest species or for landscape development, from which materials may be obtained for breeding/propagation.

For wood products manufacturing, we characterize key parameters associated with the formation of durable, high-performance composite materials, and establish new statistical methods to advance intelligent manufacturing practices. We explore new methods to produce carbon fibers from low-quality raw materials and are developing a process for bonding plastic or polymer to lignocellulosic fibers (using ultrasonic vibration) as a replacement for toxic wood preservatives.

We identify approaches and services to landowners that would enable them to realize a wide range of landownership benefits while fostering stewardship and sustainability of private forest lands in Tennessee. Both qualitative (e.g., personal interviews and focus groups) and quantitative (e.g., survey responses) data are collected and analyzed to better understand landowners understanding of management.

Although manipulative studies of tree seedlings and saplings are cost effective and quick, recent research has shown that they may not allow for valid predictions on mature trees. Therefore, direct experiments on large trees or forested catchments have been developed. Experiments are being conducted on local forest research sites developed by the Department of Energy (DOE). Each are large-scale, multi-year, multi-investigator experiments.

UT AgResearch wildlife and fisheries research evaluates and quantifies the effects of deer on agricultural production and identifies associated land-use patterns and biological and ecological factors that could be used for reducing that impact.We monitor target avian species and relate specific population parameters to factors affecting forest health and sustainability, and develop new forest management prescriptions that promote sustainability.We develop prediction methods and evaluate selected aquatic species in existing and new production systems adapted to Tennessee's climate and geography.

**2. Brief description of the target audience**

The target audiences for this program were forest landowners, the professionals and volunteers who serve them, as well as those who enjoy the state's wildlife resources.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 15873 | 492152 | 6347 | 30000 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 1

**Patents listed**

Wood Adhesives Containing Reinforced Additives for Structural Engineering Products, Wang, Siqun (Knoxville, TN, US), Xing, Cheng (Edmonton, CA)

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 4 | 28 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Release of Hemlock Woolly Adelgid predators reared in Tennessee (Parkman).

| Year | Actual |
|---|---|
| 2010 | 95000 |

**Output #2**

**Output Measure**

- Golden-winged warbler conservation strategy in place for the Cumberland Mountains of Tennessee (Buehler).

| Year | Actual |
|---|---|
| 2010 | 0 |

**Output #3**

**Output Measure**

- Desktop scanners can be used to estimate seed-head area of moist-soil plants and accurately

predict seed yield and energetic carry capacity (i.e., duck-energy days, DED) using simple linear regression models. The UTIA Wetlands Program developed a website (http://fwf.ag.utk.edu/mgray/DED/DED.htm) explaining the necessary procedures to use this technology, and now offers a service to process seed heads for biologists. (Gray)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #4**

**Output Measure**

- We have completed a 2-year field study demonstrating that Lonestar tick populations in a middle Tennessee retirement community are infested with three species of Ehrlichia, and that current tick mitigation measures in the community are insufficient to protect residents from the risk of tick-borne disease. (Hickling)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #5**

**Output Measure**

- Research was conducted at LYBIL to improve rearing success. Results indicated the type of adelgid bouquet used to rear St beetles did not affect the beetle?s survival, and density of Laricobius larvae in aestivation soil containers had no effect on subsequent survival. (Parkman)

| Year | Actual |
|---|---|
| 2010 | 1 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Forest Landowner Education: Number of landowners who now understand the ecology of forest development and succession (using forest management plans or contacting a professional forester.) |
| 2 | Forest Landowner Education: Number of landowners who improved profitability (marketing) of forest ownership. |
| 3 | Acres of production of freshwater prawn in Tennessee as an alternative income source (Wilson). |
| 4 | Cattle Impact on Farm Ponds (Gray) |
| 5 | Protecting amphibians from ranavirus (Gray) |

## Outcome #1

### 1. Outcome Measures

Forest Landowner Education: Number of landowners who now understand the ecology of forest development and succession (using forest management plans or contacting a professional forester.)

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 100 | 218 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 123 | Management and Sustainability of Forest Resources |

## Outcome #2

### 1. Outcome Measures

Forest Landowner Education: Number of landowners who improved profitability (marketing) of forest ownership.

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 100 | 301 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 123 | Management and Sustainability of Forest Resources |

**Outcome #3**

**1. Outcome Measures**

Acres of production of freshwater prawn in Tennessee as an alternative income source (Wilson).

Not Reporting on this Outcome Measure

**Outcome #4**

**1. Outcome Measures**

Cattle Impact on Farm Ponds (Gray)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Livestock access to farm ponds affects water quality.

**What has been done**
There were four major findings in 2010: (1) periphyton species richness was greater in farm ponds with no cattle access, (2) mean biovolume of pollution-sensitive taxa (e.g., Achnanthidium minutissimum, Cymbella sp.) was greater in no-access ponds, (3) pollution-tolerant taxa (e.g., Gomphonema sp, Navicula sp.) were more abundant in cattle-access ponds, and (4) differences in several water quality parameters (e.g.., turbidity, Kjeldahl nitrogen) likely drove periphyton community responses.

**Results**
These results provide evidence that periphyton can be used to monitor changes in water quality associated with livestock operations. Additionally, if improvement in water quality is a goal, cattle farmers should take advantage of USDA conservation programs that provide funds for fencing cattle from watersheds and developing alternative water sources.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 133 | Pollution Prevention and Mitigation |
| 135 | Aquatic and Terrestrial Wildlife |

**Outcome #5**

**1. Outcome Measures**

Protecting amphibians from ranavirus (Gray)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Ranavirus may be contributing to the declines of gopher frogs in the southeastern United States.

**What has been done**
Three major findings in 2010: (1) a ranavirus that was isolated from morbid American bullfrog tadpoles at an aquaculture facility was 2 ? 10X more lethal than wild strains, (2) exposure to ranavirus for 3 days is sufficient to initiate infection and disease, and (3) tadpoles of the widely distributed wood frog (Lithobates sylvaticus) experience 100% mortality and rare gopher frog (Lithobates capito) tadpoles experience >80% mortality when exposed to ranavirus for 3 days.

**Results**
These findings indicate that USDA should establish regulations following OIE recommendations that require ranavirus-negative certification prior to the commercial shipment of amphibians. Wood frogs may play a role in amplifying viral concentrations in water sources due to their high susceptibility.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 135 | Aquatic and Terrestrial Wildlife |

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

**Brief Explanation**

## V(I). Planned Program (Evaluation Studies and Data Collection)

### Evaluation Results

### Key Items of Evaluation

## V(A). Planned Program (Summary)

**Program # 10**

**1. Name of the Planned Program**

Health and Safety

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 402 | Engineering Systems and Equipment | 5% | 5% | 0% | |
| 403 | Waste Disposal, Recycling, and Reuse | 0% | 0% | 20% | |
| 511 | New and Improved Non-Food Products and Processes | 0% | 0% | 48% | |
| 724 | Healthy Lifestyle | 70% | 70% | 1% | |
| 804 | Human Environmental Issues Concerning Apparel, Textiles, and Residential and Commercial Structures | 0% | 0% | 30% | |
| 805 | Community Institutions, Health, and Social Services | 25% | 25% | 1% | |
| | **Total** | 100% | 100% | 100% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 15.0 | 2.0 | 9.0 | 0.0 |
| Actual | 14.0 | 1.0 | 0.0 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 257508 | 79236 | 0 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 1074948 | 79236 | 0 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 329000 | 0 | 0 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

**Dining with Diabetes** was a three-session course which was offered throughout the state. This course was taught by Extension Family and Consumer Sciences Agents who coordinated with local health officials to target people with diabetes and/or thier caregivers.

**Arthritis Self-Help** was delivered in six sessions. Each session was two-hours in length. Participants were provided with the book, The Arthritis Helpbook, written by Kate Lorig and James Fries. This evidence-based program was designed to increase the self-confidence of participants to manage their arthritis. In FY 2010, it was deleivered by Extension, in partnership with the Tennessee Chapter of the Arthritis Foundation, the Tennessee Department of Health's Arthritis Control Program, and the University of Tennessee Medical Center's Department of Family Medicine. Specific efficacy-enhancing strategies used in this program were:

- Contracting: Weekly contracting helps participants master something new.
- Feedback: Opportunity is provided to report and record progress and explore different behaviors.
- Modeling: People learn more and try harder when they are motivated by people whom they perceive to be like themselves. Program participants and the trainer serve as models. The course has an emphasis on modeling.
- Reinterpreting Symptoms and Changing Beliefs: People are pretty rational. They act based on beliefs. If people believe arthritis is a wear and tear disease, then they may not think they can exercise. If they think that nothing can be done for their arthritis, they are probably right. Throughout this program, there is a great emphasis on changing such beliefs.
- Persuasion: By seeing others in the class contract and succeed, even the most reluctant participant will often choose to take part. It is hard not to go along with others. The facilitator urges participants to do a little more than they are doing now, such as walking four blocks instead of two.

**Tai Chi** targeted arthritis sufferers. Extension offered this exercise instructional program to individuals throughtout the state. Research has shown that this regimen builds strength and is helps those with arthritis to reduce pain and increase mobility.

Investigations will continue to produce lyocell from agrifibers and consumer wastes. Undervalued cellulose sources such as hardwoods and softwood pulps, recycled newsprint, bagasse, and kudzu will be explored as starting materials for lyocell solutions. Solution properties will be measured and related to processing. The effects of different delignification and post treatments on dyeability of bagasse fibers will be determined.

Ease of mower rollover has been determined, and currently available ROPS have been tested for a full-size front drive lawnmower. The modeling aspect of the standard has been evaluated to determine the accuracy of simulating a vehicle rollover. ROPS test results for the currently available ROPS have been reported to the manufacturer. Follow-up recommendations and concerns relative to the application of the ASAE S547 Standard may be developed.

### 2. Brief description of the target audience

The target audiencewas inclusive of consumers and limited resource individuals and families. The Dining with Diabetes program targeted individuals with this chronic disease and the caregivers, health profesionals and volunteers who serve them.

## V(E). Planned Program (Outputs)

### 1. Standard output measures

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 34273 | 407142 | 4539 | 40000 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 1 | 3 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of exhibits built and displayed to promote program awareness and participation.

| Year | Actual |
|---|---|
| 2010 | 43 |

**Output #2**

**Output Measure**

- Number of research-based publications distributed as part of this program.

| Year | Actual |
|---|---|
| 2010 | 29054 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Arthritis Self-Help Course: Number of participants surveyed who have less pain from their arthritis. |
| 2 | Arthritis Self-Help Course: Number of participants surveyed who take fewer medications for their arthritis pain. |
| 3 | Dining with Diabetes: Number of participants surveyed who reduced weight. |
| 4 | Dining with Diabetes: Number of participants surveyed who reduced A1c. |
| 5 | Dining with Diabetes: Number of participants surveyed who reduced blood cholesterol. |
| 6 | Dining with Diabetes: Number of participants surveyed who reduced blood pressure. |
| 7 | Dining with Diabetes: Number of participants surveyed who eat at least five servings of fruits and vegetables each day. |
| 8 | Dining with Diabetes: Number of participants surveyed who now use artificial sweeteners. |
| 9 | Dining with Diabetes: Number of participants surveyed who use spices and other seasonings to cut back on fat, sugar, and salt. |
| 10 | Tai Chi: Number of participants surveyed who continue doing the Tai Chi after the Tai Chi program ends. |
| 11 | Tai Chi: Number of participants surveyed who have no pain from arthritis. |
| 12 | Sanitary Operating Procedure adoption by daycare programs in Tennessee pending grant funding, centers involved (Draughon). |
| 13 | Emergency Preparedness |

**Outcome #1**

**1. Outcome Measures**

Arthritis Self-Help Course: Number of participants surveyed who have less pain from their arthritis.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 368 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #2**

**1. Outcome Measures**

Arthritis Self-Help Course: Number of participants surveyed who take fewer medications for their arthritis pain.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 368 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #3**

**1. Outcome Measures**

Dining with Diabetes: Number of participants surveyed who reduced weight.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 689 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #4**

**1. Outcome Measures**

Dining with Diabetes: Number of participants surveyed who reduced A1c.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 454 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #5**

**1. Outcome Measures**

Dining with Diabetes: Number of participants surveyed who reduced blood cholesterol.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 689 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #6**

**1. Outcome Measures**

Dining with Diabetes: Number of participants surveyed who reduced blood pressure.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 510 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #7**

**1. Outcome Measures**

Dining with Diabetes: Number of participants surveyed who eat at least five servings of fruits and vegetables each day.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 583 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #8**

**1. Outcome Measures**

Dining with Diabetes: Number of participants surveyed who now use artificial sweeteners.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 995 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #9**

**1. Outcome Measures**

Dining with Diabetes: Number of participants surveyed who use spices and other seasonings to cut back on fat, sugar, and salt.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 995 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #10**

**1. Outcome Measures**

Tai Chi: Number of participants surveyed who continue doing the Tai Chi after the Tai Chi program ends.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 698 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #11**

**1. Outcome Measures**

Tai Chi: Number of participants surveyed who have no pain from arthritis.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 200 | 575 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

## Outcome #12

### 1. Outcome Measures

Sanitary Operating Procedure adoption by daycare programs in Tennessee pending grant funding, centers involved (Draughon).

Not Reporting on this Outcome Measure

## Outcome #13

### 1. Outcome Measures

Emergency Preparedness

### 2. Associated Institution Types

- 1890 Extension

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Children?s health and safety in child care is an essential foundation of quality and children?s optimal development. States are currently responsible for developing health and safety requirements for child care providers who are subject to regulation and for monitoring provider?s compliance with these requirements. Much research has been devoted to child care health and safety and covers a broad spectrum: from the occurrence and prevention of injury and infection in child care, to healthy practices within child care settings, state health and safety standards and licensing regulations, and the coordination of health and early childhood services.

**What has been done**
Mobilizing against Threats to Community Health trainings at child care centers and conferences was implemented in Tennessee, Alabama and Louisiana in 2010. More than 2016 direct contacts were made in Center-based classrooms and conferences. The indirect contacts of 1513 were made through exhibits, newspaper articles and publications.

**Results**
Surveys were administered to program participants in order to ascertain from them changes in knowledge, attitude, and/ or behavior. Eighty ?five percent indicated emergency preparedness

awareness; 50 percent had written health information on file; 65 percent had prepared emergency preparedness kits; 80 percent knew where to obtain large scale disaster or emergency information. Additionally, there has been an increase of participants who were encouraged to developed personal emergency preparedness kits and plans for their families.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 805 | Community Institutions, Health, and Social Services |

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Competing Public priorities
- Competing Programmatic Challenges

**Brief Explanation**

**V(I). Planned Program (Evaluation Studies and Data Collection)**

**Evaluation Results**

**Key Items of Evaluation**

## V(A). Planned Program (Summary)

**Program # 11**

**1. Name of the Planned Program**

Horticultural Systems

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms | 0% | 0% | 10% | |
| 202 | Plant Genetic Resources | 0% | 0% | 6% | |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants | 0% | 0% | 4% | |
| 204 | Plant Product Quality and Utility (Preharvest) | 0% | 0% | 1% | |
| 205 | Plant Management Systems | 60% | 60% | 20% | |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants | 10% | 10% | 10% | |
| 212 | Pathogens and Nematodes Affecting Plants | 0% | 0% | 10% | |
| 213 | Weeds Affecting Plants | 10% | 10% | 23% | |
| 216 | Integrated Pest Management Systems | 10% | 10% | 10% | |
| 312 | External Parasites and Pests of Animals | 10% | 10% | 0% | |
| 607 | Consumer Economics | 0% | 0% | 6% | |
| | **Total** | 100% | 100% | 100% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 0.0 | 0.0 | 31.0 | 0.0 |
| Actual | 31.5 | 3.0 | 25.9 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| **Smith-Lever 3b & 3c** | **1890 Extension** | **Hatch** | **Evans-Allen** |
| 600853 | 184884 | 381756 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 2508213 | 184884 | 2018437 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 150769 | 0 | 466081 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Variety evaluation of several different vegetable crops was conducted to determine suitability to climate, soils and cultural practices for state producers. Yields, quality and market potential were evaluated to assess potential production by growers seeking additional crops or alternative crops. Crops suitable for greenhouse production in farmers' tobacco transplant greenhouses were evaluated for profitability and product quality with respect to local and state markets.

UT AgResearch efforts determine the effectiveness of various control technologies, develop new genetic cultivars of plants from in-house breeding programs or, in some cases, find naturally resistant populations of plants by searching the southeast U.S. (i.e. for anthracnose resistant dogwoods).

Research is conducted at selected Research and Education Centers across Tennessee, and at several farmer-cooperator locations in key areas of horticultural production in Tennessee. Substantial investments have been made in construction and renovation of greenhouse facilities on campus and at certain Research and Education Centers. These are being utilized extensively in the conduct of our research.

### 2. Brief description of the target audience

- Farmers/producers who have traditional livestock and tobacco operations, but are looking to improve income through the Green Industry
- Master Gardeners who volunteer to provide community service through horticulture
- Business owners who need research-based information to start, maintain or expand their greenhouse, landscaping, or nursery buisness.

## V(E). Planned Program (Outputs)

### 1. Standard output measures

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 116741 | 836027 | 6352 | 0 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| Actual | 9 | 13 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Horticultural workshops and conferences.

| Year | Actual |
|---|---|
| 2010 | 0 |

**Output #2**

**Output Measure**

- UT reported the presence of Agrilus subrobustus as a first-time capture in east TN, that has since been found in middle TN. This non-native beetle is believed to be restricted to mimosa as a larval host plant, thus may play a future role in control of this non-native and invasive tree. (Klingeman)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #3**

**Output Measure**

- We have established the largest sports turf research program in the world, with the partnership with Astroturf to break ground on the Center for Athletic Field Safety. Sports turf research focuses on safer athletic fields for youth sports as well as improving college and professional athletic fields. (Sorochan)

| Year | Actual |
|---|---|
| 2010 | 0 |

**Output #4**

**Output Measure**

- A genetic linkage map for Cornus florida (flowering dogwood) was constructed. It is among only a few for ornamental woody plants and will allow exploration of the genome, gene discovery and marker-assisted selection in the dogwood breeding program. (Trigiano)

| Year | Actual |
|---|---|
| 2010 | 1 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

**Outcome #1**

1. **Outcome Measures**

Projected licenses for dogwood cultivars (M. Windham).

Not Reporting on this Outcome Measure

**Outcome #2**

1. **Outcome Measures**

Target number of research laboratories using our reverse-genetic tool for Phytophthora gene function analysis (Lamour).

Not Reporting on this Outcome Measure

**Outcome #3**

1. **Outcome Measures**

Annual Tennessee economic contribution of Encore azaleas based on TAES research, dollars (M. Windham).

Not Reporting on this Outcome Measure

**Outcome #4**

1. **Outcome Measures**

Dogwood cultivars (Trigiano)

2. **Associated Institution Types**

- 1862 Research

3a. **Outcome Type:**

Change in Knowledge Outcome Measure

3b. **Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

3c. **Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Demonstration of non-significant loss of genetic diversity of flowering dogwood in the eastern United States is important to selection/breeding of new dogwood cultivars for Tennessee nusery industry.

**What has been done**
The genetic diversity of flowering dogwood in the GSMNP is intact despite massive dieoffs due to dogwood anthracnose.

**Results**
Dogwoods in the park will not disappear as once thought.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 202 | Plant Genetic Resources |
| 212 | Pathogens and Nematodes Affecting Plants |

**Outcome #5**

**1. Outcome Measures**

Tennessee Extension Commercial Ornamental Horticulture Program Produces Economic Returns

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Challenges facing the commercial horticulture industry include marketing, integrated pest management, sustainable cultural practices, environmental and human health risks, invasive species, regulations, and profitability.

**What has been done**
Extension agents and area Extension specialists conducted commercial nursery and landscape

educational programs reaching over 104,500 direct contacts during 2010. Best production and landscape management practices were taught at approximately 175 group meetings and over 400 on-site visits. Over 50 newspaper articles supported the direct contacts.

**Results**

The total economic impact of Extension's commercial ornamental and landscape horticulture programming was estimated at $240,000 in increased savings, increased income, and one-time capital purchases (Donaldson 2009). In addition, 903 professionals increased their knowledge of green industry services and marketing practices; and 516 professionals added additional services and/or marketing practices.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

**Outcome #6**

**1. Outcome Measures**

Development of Improved Treatment Methods for Japanese Beetle and Imported Fire Ant

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Current post- and pre-harvest treatment methods for imported fire ant and Japanese beetle management in field-grown nursery stock are expensive, hazardous, impractical or require shipping delays. Some treatment methods like the current fire ant post-harvest drench protocol, which requires a twice daily for three consecutive days drench in chlorpyrifos, has multiple problematic issues (i.e., hazardous, expensive, and shipping delays). Unfortunately, many commercial nursery producers continue to use impractical treatment methods like post-harvest drenches and dips because there are no better alternatives at the present time.

**What has been done**

Root ball drench treatments in combination with ball rotation were again investigated during this reporting period to confirm results from the last reporting period and develop support data for new fire ant and Japanese beetle treatments that are more practical for growers (i.e., less total drenches). Tree Ring pre-harvest irrigation treatments were again investigated during this evaluation period, plus 5-gallon buckets were also evaluated for the first time as a possible method to apply pre-harvest insecticides for fire ant and Japanese beetle grub control. Five gallon buckets are used most frequently by nursery growers to irrigate nursery stock due to a lower cost than Tree Rings. Tractor applied pre-harvest pyrethroid band sprays against fire ants were repeated at a field grown nursery in combination with mound injection treatments in an effort to eliminate larger, more difficult to control fire ant mounds.

**Results**

Root ball rotation again improved control of both Japanese beetle and fire ants. Two or four total drenches were effective with rotation for most insecticides evaluated, which is a reduction in total drench number for growers, who must currently apply 6 drenches to comply with federal fire ant regulations. Drenches are not approved for treatment of field-grown nursery stock in Japanese beetle regulations, but data from these tests support drench effectiveness with rotation. Root balls in these studies were 30 cm diameter, so larger 60 cm diameter root balls commonly used by the nursery industry need to be evaluated with effective insecticides. Five gallon bucket treatments were very effective for treating soil, which was subsequently toxic to fire ants in laboratory bioassays. Tree Ring and bucket tests with Japanese beetle have not been completed at this time, but will be evaluated spring 2011. As in the last reporting period, tractor applied pyrethroid bands in combination with injections targeting large-sized mounds were very effective at eliminating fire ants from nursery sites (presently 100% control at 13 weeks after treatment). Evaluations of the tractor-applied pyrethroid/individual mound test are still on-going through spring 2011.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Government Regulations
- Competing Programmatic Challenges

**Brief Explanation**

**V(I). Planned Program (Evaluation Studies and Data Collection)**

**Evaluation Results**

The Extension commerical horticulutre was evaluated using an economic impact

calculator developed at the University of Tennessee. Local Extension Agents used the calculator to track savings and investments by clients who had requested technical assitance from Extension. Most of these clients were greenhouse owners/operators.

The total economic impact of Extension's commercial ornamental and landscape horticulture programming was estimated at $240,000 in increased savings, increased income, and one-time capital purchases from the six counties involved in this evaluation study. The economic impact calculator demonstrated its value in evaluating this program statewide (in all 95 counties) in the coming years. The calculator is also being used by Extension personnel in other states.

**Key Items of Evaluation**

## V(A). Planned Program (Summary)

**Program # 12**

**1. Name of the Planned Program**

Human Development

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 802 | Human Development and Family Well-Being | 100% | 100% | 0% | |
| | **Total** | 100% | 100% | 0% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Plan | 23.0 | 2.0 | 0.0 | 0.0 |
| Actual | 18.0 | 1.0 | 0.0 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 343345 | 105648 | 0 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 1433264 | 105648 | 0 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 707916 | 0 | 0 | 0 |

## V(D). Planned Program (Activity)

**1. Brief description of the Activity**

This program involved professionals, parents, child care providers, older adults, and community leaders. The target audiences were child care providers, adolescents, and parents who are divorced or incarcerated, court-orederd parents and relatives as caregivers.

The following were used to help the target audience gain awareness: displays, exhibits, community events, newspaper articles, radio programs, TV shows and newsletters. In addition, fact sheets and resource lists for parents, teachers and professionals were dissiminated. Extension FCS Agents in over 60 of Tennessee's 95 counties offered the four-hour class Parenting Apart: Effective Co-Parenting, an information and skills-based program that used lecture, class discussion, videos, and handouts to inform parents about the potential effects of divorce on their children. This course provided parents with strategies for minimizing those effects.

**2. Brief description of the target audience**

The target audiences for this planned program were Tennessee child care providers, parents, and adolescents. While all parents of infants and young children are targeted for literacy programs, parents seeking a divorce were especially targeted for parenting instruction because of the added demands of co-parenting. Tennessee child care providers working full-time are required to have 18 hours and child care center directors are required to have 24 hours of instruction annually. Tennessee parents seeking a divorce were directed by the courts to a four-hour co-parenting class. In many communities in the state, UT Extension is the only provider of this instruction.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 24465 | 133496 | 0 | 0 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 11 | 0 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Number of exhibits displayed to promote program awareness and participation.

| Year | Actual |
|---|---|
| 2010 | 224 |

**Output #2**

**Output Measure**

- Number of research-based publications distributed as part of this program.

| Year | Actual |
|---|---|
| 2010 | 1016 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Parenting Skills for Incarcerated Inmates: Number of inmates who acquired knowledge about the importance of effective communication required to build parent/child relationships. |
| 2 | Parenting Skills for Incarcerated Inmates: Number of inmates who demonstrated their knowledge of positive parent/child relationships by writing to their child. |
| 3 | Child Care/Parenting: Number of parents and childcare providers who report using suggested guidance techniques more often. |
| 4 | Parenting Skills for Incarcerated Inmates: Number of inmates who now have an ongojng relationship with their children and demonstrate the need not to violae the law. |
| 5 | Child Care/Parenting: Number of parents and child care providers who report putting down or blaming their child less. |
| 6 | Child Care/Parenting: Number of parents and child care providers who report talking, singing and playing more with their children than before the program. |
| 7 | Divorcing Parents: Number of parents who plan to decrease exposure of their children to parental conflict. |
| 8 | Court-Ordered Parents: Number who report feeling better and less stressed about their abilities as parents. |
| 9 | Natural Playgrounds Design Process |

**Outcome #1**

**1. Outcome Measures**

Parenting Skills for Incarcerated Inmates: Number of inmates who acquired knowledge about the importance of effective communication required to build parent/child relationships.

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15 | 15 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 802 | Human Development and Family Well-Being |

**Outcome #2**

**1. Outcome Measures**

Parenting Skills for Incarcerated Inmates: Number of inmates who demonstrated their knowledge of positive parent/child relationships by writing to their child.

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 15 | 15 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 802 | Human Development and Family Well-Being |

**Outcome #3**

**1. Outcome Measures**

Child Care/Parenting: Number of parents and childcare providers who report using suggested guidance techniques more often.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 300 | 727 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 802 | Human Development and Family Well-Being |

**Outcome #4**

**1. Outcome Measures**

Parenting Skills for Incarcerated Inmates: Number of inmates who now have an ongojng relationship with their children and demonstrate the need not to violae the law.

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 10 | 10 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 802 | Human Development and Family Well-Being |

**Outcome #5**

**1. Outcome Measures**

Child Care/Parenting: Number of parents and child care providers who report putting down or blaming their child less.

Not Reporting on this Outcome Measure

**Outcome #6**

**1. Outcome Measures**

Child Care/Parenting: Number of parents and child care providers who report talking, singing and playing more with their children than before the program.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 300 | 166 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 802 | Human Development and Family Well-Being |

## Outcome #7

### 1. Outcome Measures

Divorcing Parents: Number of parents who plan to decrease exposure of their children to parental conflict.

### 2. Associated Institution Types

- 1862 Extension

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 1000 | 2248 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 802 | Human Development and Family Well-Being |

## Outcome #8

### 1. Outcome Measures

Court-Ordered Parents: Number who report feeling better and less stressed about their abilities as parents.

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | 100 | 377 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 802 | Human Development and Family Well-Being |

**Outcome #9**

**1. Outcome Measures**

Natural Playgrounds Design Process

**2. Associated Institution Types**

- 1890 Extension

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

Natural playgrounds have recently gained wide attention due to their significant childhood health and education-related benefits. Natural playgrounds embrace the concept of nature-based learning. These facilities are an alternative design approach that replaces man-made play

structures with natural elements based on the premise that outdoor experiences have an enhanced positive impact on children?s physical, social and intellectual development. Natural playgrounds are designed as outdoor educational environments emphasizing natural elements as learning tools, and including water, soil, wind, topography, birds, bees, bugs, snails, snakes, squirrels, flowers and plant materials including edible vegetables and fruits. Natural playground educational curriculum is adapted from standard core curriculum from pre-middle school education programs to respond to the unique elements and goals f these outdoor facilities.

**What has been done**

In 2009 the Tennessee State University?s Comprehensive Area Resources Efforts (Tennessee CARES) Early Head Start Program secured grant funding to design and construct 6 natural playgrounds at their Early Head Start sites in the rural communities of Humboldt, Trenton, Dresden, Martin, and Paris Tennessee. The Tennessee CARES Early Head Start programs provide educational opportunities and parenting support for infant and toddler children and their parents. These programs provide much needed support services for primarily single parent, low income, and minority families. Ms. Janice Lovell, Coordinator with the Tennessee State University Center of Excellence in Learning Sciences organized these efforts. In March, 2010 I was invited to prepare the designs for these natural play facilities and coordinate their construction. The designs have been completed and construction is scheduled to commence early in 2011.

**Results**

The six natural playgrounds to be constructed in rural Tennessee are the first of these facilities designed and constructed in the State. The natural playgrounds design process involved contact with a number of groups in the form of informal meetings, discussions and presentations. Contact included formal presentations of the design concepts and informal meetings with teachers and staff from the six Tennessee Early Head Start sites, as well as meetings with local community administration and elected officials.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 802 | Human Development and Family Well-Being |

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

- Government Regulations

**Brief Explanation**

{No Data Entered}

**V(I). Planned Program (Evaluation Studies and Data Collection)**

**Evaluation Results**

**Key Items of Evaluation**

## V(A). Planned Program (Summary)

**Program # 13**

**1. Name of the Planned Program**

Childhood Obesity

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 603 | Market Economics | 0% | 0% | 17% | |
| 701 | Nutrient Composition of Food | 5% | 5% | 0% | |
| 702 | Requirements and Function of Nutrients and Other Food Components | 0% | 0% | 33% | |
| 703 | Nutrition Education and Behavior | 95% | 95% | 33% | |
| 724 | Healthy Lifestyle | 0% | 0% | 17% | |
| | **Total** | 100% | 100% | 100% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Actual | 94.0 | 9.0 | 3.4 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 1802561 | 720883 | 106295 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 7524640 | 720883 | 329940 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 3361152 | 0 | 62071 | 0 |

## V(D). Planned Program (Activity)

**1. Brief description of the Activity**

Obesity has reached epidemic proportions in Tennessee with two of three adults and four of ten school age children overweight or obese. In 2010, this program worked to reduce obesity rates in the state and helped Tennesseans live healthier lives.

Our microbiological food safety research program seeks to improve detection of, and develop physical and chemical intervention methods for, bacterial and fungal foodborne pathogens.In addition, we want to develop education and monitoring programs for at-risk populations or those who serve food to at-risk populations. Improving food safety is a collaborative effort between scientists in the microbiological food safety and food biopolymer chemistry research groups. Proteins and polysaccharides will be studied for their potential to serve as carriers to help improve the availability of bioactive food antimicrobials and other components in food matrices or in the human gastrointestinal tract, or for their direct antimicrobial effects in packaging, on surfaces or in foods.

We are also active in nutrition-related cancer research. A common mechanism of modifying tumor growth and cancer risk may lie in the ability to alter intracellular calcium levels, and by doing so, we may be able to develop nutritional therapies to combat cancers.

**2. Brief description of the target audience**

Target audiences were health care professionals, educators, the general public, and affected children.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 67787 | 8787184 | 43338 | 0 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 8 | 16 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Published research demonstrating the role of diet (omega 3 fatty acids and energy restriction) in preventing and /or reversing obesity and associated metabolic complications. (Moustaid-Moussa)

| Year | Actual |
|---|---|
| 2010 | 1 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | educate the audience (nutritionists, biologists and other health professionals) about available resources to use comprehensive systems genetics. (Moustaid-Moussa) |
| 2 | Tennessee Shapes Up: Number of participants who ate more whole grains |
| 3 | Tennessee Shapes Up: Number of participants who decreased consumption of high-sugar foods. |
| 4 | Tennessee Shapes Up: Number of participants who eat at least six meals together as a family each week. |
| 5 | Tennessee Shapes Up: Number of participants who lost weight. |
| 6 | Tennessee Shapes Up: Number of participants who engaged in physical activity for at least 30 minutes five or more days during most weeks. |
| 7 | Healthy Steps: Tennessee's Obesity Prevention Program for Pre-Schoolers |
| 8 | Power U: Extension's Obesity Prevention Program for Tennessee's 4th Grade Children |

**Outcome #1**

**1. Outcome Measures**

educate the audience (nutritionists, biologists and other health professionals) about available resources to use comprehensive systems genetics. (Moustaid-Moussa)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 1 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
The objective of this conference is to educate the audience (nutritionists, biologists and other health professionals) about available resources to use comprehensive systems genetics as a tool for linking genetic variation to nutrient metabolism and energy balance and the overlying effects on health and disease.

**What has been done**
We held this systems genetics symposium during the Experimental Biology (EB) meeting, April 24-28, 2010 at Anaheim, California. This symposium was sponsored by the American Society for Nutrition's Nutrient-Gene Research Interest Section.

**Results**
Our primary objectives were to educate the audience about the use of systems genetics as a tool for linking genetic variation to nutrient metabolism and energy balance and the overlying effects on health. Invited speakers were experts across nutrition, obesity and genetics fields. The systems genetics approach is extensible to any nutrition area or any organism of interest ranging from invertebrates to humans, thus as we expected, the venue for this meeting (EB) and the broad impact of such subject attracted a significant and cross-disciplinary audience; we had over 200 participants. The is due in part to the high quality and organization of the conference and the outstanding expert speakers. It also reflects the fact that very few conferences address effects of genetic/individual variation on biological responses to nutrients or the available novel animal models and cutting edge resources for nutritional genetics and genomics research.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |

| | |
|---|---|
| 724 | Healthy Lifestyle |

**Outcome #2**

**1. Outcome Measures**

Tennessee Shapes Up: Number of participants who ate more whole grains

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 4379 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |
| 724 | Healthy Lifestyle |

**Outcome #3**

**1. Outcome Measures**

Tennessee Shapes Up: Number of participants who decreased consumption of high-sugar foods.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 4018 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |

**Outcome #4**

**1. Outcome Measures**

Tennessee Shapes Up: Number of participants who eat at least six meals together as a family each week.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 2395 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |

**Outcome #5**

**1. Outcome Measures**

Tennessee Shapes Up: Number of participants who lost weight.

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 1692 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |

## Outcome #6

### 1. Outcome Measures

Tennessee Shapes Up: Number of participants who engaged in physical activity for at least 30 minutes five or more days during most weeks.

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 4080 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 724 | Healthy Lifestyle |

## Outcome #7

### 1. Outcome Measures

Healthy Steps: Tennessee's Obesity Prevention Program for Pre-Schoolers

### 2. Associated Institution Types

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Too many young children are gaining unhealthy amounts of weight leading to chronic disease at increasingly younger ages.

**What has been done**
Healthy Steps, a nutrition and physical activity curriculum was implemented in 22 Tennessee counties in 2010. 7,135 direct contacts were made in Voluntary Pre-K, Head Start and center-based classrooms; 43,742 indirect contacts were made through exhibits, newspaper articles, publications and television. Approximately 958 contact hours were recorded by teachers and volunteers working with Healthy Steps.

**Results**
459 teachers completed surveys at the end of the program to document outcomes:
434 of 459 (94%) of teachers surveyed reported preschool children in their classes were more actively engaged in physical activity.
478 of 492 (97%) of teachers reported preschool children in their classes were more willing to taste fruit.
461 of 492 (94%) of teachers reported preschool children in their classes were more willing to taste vegetables.
431 of 442 (98%) of teachers reported preschool children in their classes were more willing to taste whole-grain foods.
307 of 373 (82%) of teachers reported using physical activities from Healthy Steps at least three times per week.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |
| 724 | Healthy Lifestyle |

## Outcome #8

### 1. Outcome Measures

Power U: Extension's Obesity Prevention Program for Tennessee's 4th Grade Children

### 2. Associated Institution Types

- 1862 Extension
- 1890 Extension

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Tennessee youth are among the most obese in the nation. This has serious health consequences and may impact their ability to be productive members of society.

**What has been done**
The Power U program was implemented in 37 Tennessee Counties. This included 443 classrooms implementing Power U. There were a total of 723 group meetings with 15,304 educational contacts. There were an additional 88,912 educational contacts through exhibits, newspaper articles, TV and radio programs, and other promotional items. A total of 673 volunteers hours reported to support Power U. Power U is an interactive curriculum that makes learning fun for both the student and teacher. Fourth graders learn how to make healthy choices and fun act ivies for increasing physical activity. Through tasting parties, students are exposed to a variety of new fruits and vegetables. The foods are presented in ways that are pleasing to 4th graders.

**Results**
Impact data was collected using a behavior checklist survey and through teacher and parent comments.
65 percent (n= 7281)decreased their intake of high-sugar foods including beverages.
82 percent (7,207) increased the time they spent in physical activity.
72 percent (n=7377) increased intake of dairy foods.

Increasing intake of dairy foods and decreasing intake of high-sugar foods increases their likelihood of the food?s adoption and is important for healthy prevention of obesity. Increasing physical activity and decreasing intake of sugar helps maintain caloric balance essential for

healthy weight.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 703 | Nutrition Education and Behavior |
| 724 | Healthy Lifestyle |

## V(H). Planned Program (External Factors)

### External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

### Brief Explanation

## V(I). Planned Program (Evaluation Studies and Data Collection)

### Evaluation Results

### Key Items of Evaluation

## V(A). Planned Program (Summary)

**Program # 14**

**1. Name of the Planned Program**

Climate Change

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 102 | Soil, Plant, Water, Nutrient Relationships | 0% | 0% | 17% | |
| 132 | Weather and Climate | 0% | 0% | 17% | |
| 133 | Pollution Prevention and Mitigation | 0% | 0% | 10% | |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants | 0% | 0% | 10% | |
| 206 | Basic Plant Biology | 0% | 0% | 7% | |
| 403 | Waste Disposal, Recycling, and Reuse | 0% | 0% | 7% | |
| 511 | New and Improved Non-Food Products and Processes | 0% | 0% | 32% | |
| | **Total** | 0% | 0% | 100% | |

## V(C). Planned Program (Inputs)

### 1. Actual amount of professional FTE/SYs expended this Program

| Year: 2010 | Extension | | Research | |
|---|---|---|---|---|
| | 1862 | 1890 | 1862 | 1890 |
| Actual | 0.0 | 0.0 | 0.0 | 0.0 |

### 2. Actual dollars expended in this Program (includes Carryover Funds from previous years)

| Extension | | Research | |
|---|---|---|---|
| Smith-Lever 3b & 3c | 1890 Extension | Hatch | Evans-Allen |
| 0 | 0 | 0 | 0 |
| 1862 Matching | 1890 Matching | 1862 Matching | 1890 Matching |
| 0 | 0 | 0 | 0 |
| 1862 All Other | 1890 All Other | 1862 All Other | 1890 All Other |
| 0 | 0 | 3114 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

Cross-cutting research in this area is covered under the Sustainable energy planned program.

Increasing greenhouse gases in the atmosphere are predicted to increase average global temperatures and alter regional precipitation. Drought is predicted to increase with a warming global climate. Forests in the southeastern United States are expected to be particularly vulnerable to declines in precipitation.

### 2. Brief description of the target audience

Target audiences include the general public, agricultural and forestry producers, business owners, and policy-makers.

## V(E). Planned Program (Outputs)

### 1. Standard output measures

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| Actual | 0 | 0 | 0 | 0 |

### 2. Number of Patent Applications Submitted (Standard Research Output)

**Patent Applications Submitted**

Year: 2010

Actual: 0

**Patents listed**

### 3. Publications (Standard General Output Measure)

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| Actual | 0 | 8 | 0 |

## V(F). State Defined Outputs

**Output Target**

**Output #1**

**Output Measure**

- Carbon stock has been evaluated above and below ground in selected treatment combinations in conjunction with Oak Ridge National Lab, Argonne National lab and the Pacific Northwest Lab. Extensive sampling of above ground biomass and below ground root biomass has been

done. The data indicate considerable accumulation of carbon in the system. Soil carbon percent in the top 5 cm has increased by up to 0.9% when the initial levels in 2004 are compared to levels in 2008. (Tyler)

| Year | Actual |
|---|---|
| 2010 | 1 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Biorefinery lignin utilization (Harper) |

**Outcome #1**

**1. Outcome Measures**

Biorefinery lignin utilization (Harper)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
We need to utilize biorefinery lignin to make high value products to improve the economics and environmental impact of energy production.

**What has been done**
UT has been producing lignin from locally grown feedstocks. This lignin is being processed in a manner to tailor it to carbon fiber production.

**Results**
Utilization of biorefinery lignin as feedstocks for carbon fiber production can make biorefining economically feasible and contribute an additional $4 billion annually to rural economies.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 132 | Weather and Climate |
| 403 | Waste Disposal, Recycling, and Reuse |
| 511 | New and Improved Non-Food Products and Processes |

**V(H). Planned Program (External Factors)**

**External factors which affected outcomes**

### Brief Explanation

{No Data Entered}

## V(I). Planned Program (Evaluation Studies and Data Collection)

### Evaluation Results

{No Data Entered}

### Key Items of Evaluation

{No Data Entered}

## V(A). Planned Program (Summary)

**Program # 15**

**1. Name of the Planned Program**

Global Food Security and Hunger

### V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

| KA Code | Knowledge Area | %1862 Extension | %1890 Extension | %1862 Research | %1890 Research |
|---|---|---|---|---|---|
| 102 | Soil, Plant, Water, Nutrient Relationships | 0% | 0% | 2% | |
| 133 | Pollution Prevention and Mitigation | 0% | 0% | 2% | |
| 201 | Plant Genome, Genetics, and Genetic Mechanisms | 0% | 0% | 3% | |
| 202 | Plant Genetic Resources | 0% | 0% | 4% | |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants | 0% | 0% | 7% | |
| 204 | Plant Product Quality and Utility (Preharvest) | 0% | 0% | 2% | |
| 205 | Plant Management Systems | 50% | 50% | 10% | |
| 206 | Basic Plant Biology | 0% | 0% | 7% | |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants | 5% | 5% | 10% | |
| 212 | Pathogens and Nematodes Affecting Plants | 5% | 5% | 18% | |
| 213 | Weeds Affecting Plants | 0% | 0% | 2% | |
| 215 | Biological Control of Pests Affecting Plants | 0% | 0% | 2% | |
| 216 | Integrated Pest Management Systems | 0% | 0% | 6% | |
| 301 | Reproductive Performance of Animals | 0% | 0% | 6% | |
| 302 | Nutrient Utilization in Animals | 0% | 0% | 4% | |
| 303 | Genetic Improvement of Animals | 0% | 0% | 3% | |
| 304 | Animal Genome | 0% | 0% | 3% | |
| 305 | Animal Physiological Processes | 0% | 0% | 6% | |
| 306 | Environmental Stress in Animals | 0% | 0% | 3% | |
| 601 | Economics of Agricultural Production and Farm Management | 40% | 40% | 0% | |
| | **Total** | 100% | 100% | 100% | |

## V(C). Planned Program (Inputs)

**1. Actual amount of professional FTE/SYs expended this Program**

| Extension | Research |
|---|---|

| Year: 2010 | 1862 | 1890 | 1862 | 1890 |
|---|---|---|---|---|
| Actual | 27.0 | 3.0 | 110.8 | 0.0 |

**2. Actual dollars expended in this Program (includes Carryover Funds from previous years)**

| Extension | | Research | |
|---|---|---|---|
| **Smith-Lever 3b & 3c** | **1890 Extension** | **Hatch** | **Evans-Allen** |
| 515024 | 158472 | 2207538 | 0 |
| **1862 Matching** | **1890 Matching** | **1862 Matching** | **1890 Matching** |
| 2149897 | 158472 | 13482015 | 0 |
| **1862 All Other** | **1890 All Other** | **1862 All Other** | **1890 All Other** |
| 0 | 0 | 1666432 | 0 |

## V(D). Planned Program (Activity)

### 1. Brief description of the Activity

This planned program represents Extension's efforts primarily in corn, soybeans, commercial fruits and vegetables. In FY 2010, Extension emphasized: conservation tillage; planting insect-tolerant crops; planting herbicide-tolerant crops; spraying crops with foliar fungicide to manage disease; and using recommended varieties (based on UT field trial results).

From a research perspective, molecular, marker-assisted and traditional breeding techniques are used to develop genetic lines and varieties of corn, soybeans, tobacco, and wheat which are adapted, high-yielding, and disease-resistant. Varieties of these crops and cotton are evaluated in replicated field research plots at our Research and Education Centers and with producer cooperators in selected counties. Likewise, cropping systems research addressing tillage systems and rotation schemes are conducted to develop production system information.

We conduct surveillance for exotic and invasive organisms using both conventional and molecular technologies.We research the effects of biological, cultural and chemical control technology for efficacy and effect on productivity of cropping systems under study.We search for new organisms to use in integrated control programs for pests and diseases of those agronomic systems that are predicted to be in danger of severe damage from new, emerging, and re-emerging pests and diseases.

Economic data are developed from field experiments on agricultural experiment stations, through surveys of producers, and through simulation modeling. Data are analyzed using standard methods for estimating yield response functions, budgeting, optimization techniques, risk analysis procedures, simulation modeling, and other methods of economic analysis as appropriate.

In the area of animal production and health, we conduct applied and basic research in animal health, nutrition, physiology, and genomics to address high priority problems of the livestock industries.
We disseminate information gained from these studies to producers, veterinarians, and others associated with the animal industries through outreach programs and publications.

Surveillance of possible disease vectors is maintained throughout the insect season; suspected vectors are tested for appropriate viruses. Risk factor analysis test results are compared between sites where disease risk is high vs. those where disease risk is low. Mastitis susceptible and resistant dairy cows are used to identify potential genes, immune components, and other factors associated with and

responsible for mastitis resistance. A series of trials uses pigs to test various feeding regimens and feed additives to determine effects on the number of antibiotic resistant foodborne pathogens occurring in those animals and their environment. Additional studies are detecting the prevalence of antibiotic resistant bacteria associated with cattle and surrounding environments. These studies should help determine strategies to limit such foodborne risks.

**2. Brief description of the target audience**

The primary audience for this program was Tennessee row crop producers, and the secondary audience was the professionals, business owners/cooperatives, and government officials who serve row crop producers.

The primary audience for the animal portion of this program was producers, veterinarians, and others associated with the animal industry. Tennessee cattle producers are primarily cow-calf operators.

A larger, additional audience is US and global food producers.

**V(E). Planned Program (Outputs)**

**1. Standard output measures**

| 2010 | Direct Contacts Adults | Indirect Contacts Adults | Direct Contacts Youth | Indirect Contacts Youth |
|---|---|---|---|---|
| **Actual** | 0 | 0 | 0 | 0 |

**2. Number of Patent Applications Submitted (Standard Research Output)**

**Patent Applications Submitted**

Year: 2010

Actual: 2

**Patents listed**

Methods of Improving Nutritional Value of Plants, Armel, Gregory Russell (Knoxville, TN, US), Kopsell, Dean Adam (Knoxville, TN, US), Brosnan, James T. (Knoxville, TN, US), Horvath, Brandon J. (Knoxville, TN, US), Sorochan, John C. (Knoxville, TN, US)

Environmental Stress-inducible Promoter and its Application in Crops , Cheng, (Max) Zong-Ming (Knoxville, TN, US), Ye, Xia (Zhengzhou, CN)

**3. Publications (Standard General Output Measure)**

**Number of Peer Reviewed Publications**

| 2010 | Extension | Research | Total |
|---|---|---|---|
| **Actual** | 13 | 93 | 0 |

**V(F). State Defined Outputs**

**Output Target**

**Output #1**

**Output Measure**

- Exploitation of the strong resistance mechanism in epazote to the plant parasitic nematode, Meloidogyne incognita (Bernard).
  Not reporting on this Output for this Annual Report

**Output #2**

**Output Measure**

- Publish disease and nematode ratings for soybean producers. (Newman)

| Year | Actual |
|---|---|
| 2010 | 0 |

**Output #3**

**Output Measure**

- Release a new soybean variety tailored to Tennessee needs. (Pantalone)
  Not reporting on this Output for this Annual Report

**Output #4**

**Output Measure**

- We have discovered two native predators that are under review for their potential as biological control agents for the pest complex on black walnut that may preserve the economic value of the estimated 1.64 million black walnut trees with a value of $430 million annually in urban and forest environments. (Lambdin)

| Year | Actual |
|---|---|
| 2010 | 2 |

**Output #5**

**Output Measure**

- Weaning is stressful on the physiology of the pig. Supplementation of a pre-weaning diet with an omega-3 polyunsaturated fatty acid source had minimal influence on modifying this stress response. (Kattesh)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #6**

**Output Measure**

- Demonstrated a positive nutritional impact of a common herbicide currently labeled for use on sweet corn. This has now become intellectual property as a U.S. provisional patent. (Kopsell)

| Year | Actual |
|---|---|

| | |
|---|---|
| 2010 | 1 |

**Output #7**

**Output Measure**

- Providing a high fiber supplement to beef calves tempers the animals' stress response due to weaning when fenceline or total separation is employed. (Kattesh)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #8**

**Output Measure**

- Research demonstrated that whole-tree cages can enhance establishment of predatory beetles agains the Hemlock Woolly Adelgid to enhance the survival of eastern hemlock. (Grant and Wiggins)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #9**

**Output Measure**

- Protocols have been developed for hydroponic production of off-season strawberries in low-tech polyethylene covered greenhouses. Trials have demonstrated successful season-long control of aphids, whiteflies, spider mites and thrips using predators/parasitoids. Current trials are evaluating the economical feasible of using IPM-biological control of greenhouse strawberry pests. (Deyton & Sams)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #10**

**Output Measure**

- Development of a reproductive tract scoring system allows dairy producers and veterinarians to identify cows that are inefficient for artificial insemination programs and enable economic decisions to be soundly made. (Schrick and Edwards)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #11**

**Output Measure**

- Demonstrated that the male management technique of double interspiking improves fertility in broiler breeder chickens. (Smith)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #12**

**Output Measure**

- Results of genotype and allelic frequency evaluation suggest that the advantageous allele is less prevalent in herds of cattle which are less affected by fescue toxicosis than are spring-calving Angus cattle grazed on tall fescue. This may be a by-product of selection for longevity, fertility, and growth in cow-calf herds affected by FT. (Waller)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #13**

**Output Measure**

- New wheat variety TN902 will increase yields by 5 bushels/acre, adding over 1 million bushels to Tennessee's wheat harvest, and more than $7 million in farmgate income. (West)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #14**

**Output Measure**

- Since its inception in 2001, the Pigeon River Restoration Project has re-introduced 20 species of fish, including more than 28,000 individuals, into the Pigeon River. Five species have re-established reproducing populations, and successful recruitment has been observed in four additional species. (Wilson)

| Year | Actual |
|---|---|
| 2010 | 1 |

**Output #15**

**Output Measure**

- Some reports from other areas of the country have indicated that animal waste application, such as poultry manure, can reduce the incidence of nematode. Data from a three year study in TN indicate no effect on the nematode from waste application. Animal waste is better utilized on non-nitrogen fixing crops such as corn or cotton which need the additional nitrogen for maximum yields. (Tyler)

| Year | Actual |
|---|---|
| 2010 | 1 |

**V(G). State Defined Outcomes**

## V. State Defined Outcomes Table of Content

| O. No. | OUTCOME NAME |
|---|---|
| 1 | Snap bean production economy (Canaday) |
| 2 | Molecular and Genomic Plant Defense Mechanisms (Chen) |
| 3 | Better Cattle Reproduction Using Biochemicals (Godkin) |
| 4 | Thousand Cankers disease on black walnut (Grant) |
| 5 | Cotton seeding rates (Gwathmey) |
| 6 | Helping Pigs Thrive After Weaning (Kojima) |
| 7 | Forest Protection in Great Smoky Mountains (Lambdin and Wiggins) |
| 8 | Corn production (Newman) |
| 9 | Genetic improvement of soybean yields (Pantalone) |
| 10 | Abandonment of Precision Agricultural Technology (Roberts) |
| 11 | Wheat: Number of acres utlized precision agriculture technologies for variable rate application of plant growth regulators, defoliants or pesticides. |
| 12 | Wheat: Number of producers adopted UT recommended resistance management strategies to control pests (weeds, insects, diseases). |
| 13 | Soybeans: Number of acres of soybeans scouted by a producer or independent crop consultant to help make crop management decisions. |
| 14 | Soybeans: Number of producers who adopted UT recommended resistance management strategies to control pests (weeds, insects and diseases). |
| 15 | Corn: Number of producers who reported harvesting higher corn yields and/or better quality crops using university trial results. |
| 16 | Corn: Percentage increase in corn yield by using recommended crop management strategies for insects, weeds or plant diseases (outcome expressed as a percentage increase). |
| 17 | Extension Producers $48.9 Million Economic Impact through Corn, Soybean, and Wheat Production Programs |

## Outcome #1

### 1. Outcome Measures

Snap bean production economy (Canaday)

### 2. Associated Institution Types

- 1862 Research

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
In terms of planted acreage, snap beans are Tennessee?s number one vegetable crop. Farm receipts for this crop typically total over $9,000,000 per year.

**What has been done**
We tested alternate seed treatments.

**Results**
Instead of using untreated seed and muriate of potash, growers could potentially double their snap bean yield and gross returns if they used a seed treatment of trifloxystrobin + metalaxyl coupled with use of sulfate of potash.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |
| 212 | Pathogens and Nematodes Affecting Plants |

**Outcome #2**

**1. Outcome Measures**

Molecular and Genomic Plant Defense Mechanisms (Chen)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
One of our major projects is focused on understanding the molecular and genomic basis of plant defense mechanisms against insects, which are constant threat to agricultural production.

**What has been done**
A number of critical defense genes have been isolated from various crops and model plants by my lab.

**Results**
These findings provide a knowledge base and novel molecular tools for genetic improvement of crops with enhanced insect resistance through genetic engineering and breeding.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 202 | Plant Genetic Resources |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |

## Outcome #3

### 1. Outcome Measures

Better Cattle Reproduction Using Biochemicals (Godkin)

### 2. Associated Institution Types

- 1862 Research

### 3a. Outcome Type:

Change in Knowledge Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
Early embryonic mortality is the major cause of reproductive failure in domestic livestock. The maintenance of early pregnancy is dependent on signaling between the maternal reproductive tract and its occupant, the embryo. Lipid mediators are essential signaling molecules that regulate the estrous cycle and pregnancy.

**What has been done**
The goals of this research are to identify the function of these essential molecules, the enzymes that produce them, and the mechanisms by which they function. The results of this investigation will provide new knowledge concerning lipid mediator control of the estrous cycle and pregnancy that will be used to develop novel strategies to improve reproductive efficiency.

**Results**
Results demonstrate that specific PLA2 enzymes differentially regulate uterine and conceptus production of lipid mediators and suggest that regulation of PLA2 expression with specific PLA2 inhibitors and/or promoters may provide novel and robust strategies for fertility regulation.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 301 | Reproductive Performance of Animals |
| 302 | Nutrient Utilization in Animals |
| 305 | Animal Physiological Processes |

## Outcome #4

### 1. Outcome Measures

Thousand Cankers disease on black walnut (Grant)

### 2. Associated Institution Types

- 1862 Research

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**
A new disease threat, thousand cankers disease (insect/pathogen complex), of black walnut was documented in four counties in eastern Tennessee in 2010 (first documentation in native range of black walnut).

**What has been done**
Researchers immediately began investigating this disease.

**Results**
Results prompted Tennessee Department of Agriculture to enact quarantines and buffer areas in affected counties to limit the spread and impact of this new disease and its vector into major walnut-producing areas of the eastern U.S. Biological and epidemiological research is underway to provide necessary information to develop an effective Best Management Plan for thousand cankers disease.

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |
| 212 | Pathogens and Nematodes Affecting Plants |

**Outcome #5**

**1. Outcome Measures**

Cotton seeding rates (Gwathmey)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
The project's findings on optimal seeding rates influenced cotton producers' approach to planting in alternative row widths and patterns.

**What has been done**
Cotton produced equivalently high net returns at rates above 7.2 seeds per m2, except under certain non-irrigated conditions.

**Results**
These findings bear directly on the seeding rate decision by cotton producers in Tennessee and similar environments.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 204 | Plant Product Quality and Utility (Preharvest) |
| 205 | Plant Management Systems |

**Outcome #6**

**1. Outcome Measures**

Helping Pigs Thrive After Weaning (Kojima)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Weaning constitutes a tremendous stress on the pig resulting in weight loss and increased mortality.

**What has been done**
Experiments conducted in our laboratory have confirmed that a single intramuscular injection of SD33 prior to weaning improves feed intake and immune response in weaned pigs. Fecal shedding of Salmonella in challenged pigs was altered by SD33 treatment such that shedding ceased sooner in SD-33 pigs. The mechanism of action of SD33 was shown to include effects on key pathways involved in feed intake and perception of stress/anxiety.

**Results**
These findings are promising and may represent a management tool to combat postweaning declines in pig health and well-being, thereby increasing the profitability and sustainability of livestock operations and ensuring an adequate and low cost meat product for consumers.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 301 | Reproductive Performance of Animals |
| 305 | Animal Physiological Processes |
| 306 | Environmental Stress in Animals |

**Outcome #7**

**1. Outcome Measures**

Forest Protection in Great Smoky Mountains (Lambdin and Wiggins)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Simultaneous releases of multiple predatory species of Hemlock Woolly Adelgid (HWA) at the same location may be more effective in reducing HWA populations than single species releases.

**What has been done**
Recovery of Ln and St on the same trees indicates that they can coexist and are compatible. This project demonstrates that by using tree cages, different species of predators of HWA can be established at the same location.

**Results**
The establishment of two predator species provides managers, property owners and government officials a means to control the exotic hemlock woolly adelgid to protect forest health and diminish any negative impact on the tourist industry that contributes over 14 million dollars to the local economy annually.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |
| 215 | Biological Control of Pests Affecting Plants |
| 216 | Integrated Pest Management Systems |

**Outcome #8**

**1. Outcome Measures**

Corn production (Newman)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
New fungicides are needed to lower application costs and provide choices to producers.

**What has been done**
Corn producers now have more than two new fungicides (Quadris and Headline) to apply to corn for gray leaf spot. Headline AMP, Quilt Xcel , Stratego YLD and the newest fungicide Avito have been added to the list of effective fungicides for gray leaf spot.

**Results**
As a result, prices paid by producers have decreased significantly. Crop rotation, use of tolerant hybrids and spraying of foliar fungicides have saved as much as 20-30 bushels per acre from diseases. This could mean an increase of 7-10 million bushels across the state.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 204 | Plant Product Quality and Utility (Preharvest) |
| 205 | Plant Management Systems |
| 212 | Pathogens and Nematodes Affecting Plants |

**Outcome #9**

**1. Outcome Measures**

Genetic improvement of soybean yields (Pantalone)

**2. Associated Institution Types**

- 1862 Research

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
There is an ongoing need for better soybean varieties.

**What has been done**
Varieties and germplasm lines developed by our program are well utilized by prominent soybean breeders in industry, USDA, and other universities; moreover, both conventional and Roundup Ready varieties that we developed were commercially produced in Tennessee.

**Results**
University of Tennessee soybean genetics is estimated to have contributed over $7 million to producer revenue. The yield advantage of the soybean varieties for which we were awarded a U.S. Plant Utility Patent in 2010 have added more than $1 million to producer revenues, compared with average commercial varieties.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 201 | Plant Genome, Genetics, and Genetic Mechanisms |
| 202 | Plant Genetic Resources |
| 203 | Plant Biological Efficiency and Abiotic Stresses Affecting Plants |
| 204 | Plant Product Quality and Utility (Preharvest) |

**Outcome #10**

**1. Outcome Measures**

Abandonment of Precision Agricultural Technology (Roberts)

**2. Associated Institution Types**

- 1862 Extension
- 1862 Research

**3a. Outcome Type:**

Change in Knowledge Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
Adoption of precision agriculture technology has received considerable attention, but abandonment has received little.

**What has been done**
The objective of this research was to identify factors motivating adoption and abandonment of grid soil sampling for cotton production.

**Results**
Results indicate that younger producers who farmed more cotton area, owned more of their cropland, planted larger amounts of non-cotton area, used a computer for farm management and used a Personal Digital Assistant (PDA) in the field were more likely to adopt grid soil sampling for cotton precision farming. Results also suggest that producers with more cotton area who owned livestock and adopted management zone soil sampling were more likely to abandon grid soil sampling, while those who used a PDA in the field, used grid soil sampling for more years and followed up grid soil sampling with variable-rate fertilizer application were less likely to abandon grid soil sampling for cotton production. For some farmers, grid soil sampling was abandoned for management zone soil sampling in the context of replacement discontinuance.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

**Outcome #11**

**1. Outcome Measures**

Wheat: Number of acres utlized precision agriculture technologies for variable rate application of plant growth regulators, defoliants or pesticides.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 5872 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

**Outcome #12**

**1. Outcome Measures**

Wheat: Number of producers adopted UT recommended resistance management strategies to control pests (weeds, insects, diseases).

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 679 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

**Outcome #13**

**1. Outcome Measures**

Soybeans: Number of acres of soybeans scouted by a producer or independent crop consultant to help make crop management decisions.

**2. Associated Institution Types**

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 413618 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

## Outcome #14

### 1. Outcome Measures

Soybeans: Number of producers who adopted UT recommended resistance management strategies to control pests (weeds, insects and diseases).

### 2. Associated Institution Types

- 1862 Extension

### 3a. Outcome Type:

Change in Action Outcome Measure

### 3b. Quantitative Outcome

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 2436 |

### 3c. Qualitative Outcome or Impact Statement

**Issue (Who cares and Why)**

**What has been done**

**Results**

### 4. Associated Knowledge Areas

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |
| 211 | Insects, Mites, and Other Arthropods Affecting Plants |
| 213 | Weeds Affecting Plants |

## Outcome #15

### 1. Outcome Measures

Corn: Number of producers who reported harvesting higher corn yields and/or better quality crops using university trial results.

### 2. Associated Institution Types

- 1862 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 727 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

**Outcome #16**

**1. Outcome Measures**

Corn: Percentage increase in corn yield by using recommended crop management strategies for insects, weeds or plant diseases (outcome expressed as a percentage increase).

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Action Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 10 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**

**What has been done**

**Results**

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

**Outcome #17**

**1. Outcome Measures**

Extension Producers $48.9 Million Economic Impact through Corn, Soybean, and Wheat Production Programs

**2. Associated Institution Types**

- 1862 Extension
- 1890 Extension

**3a. Outcome Type:**

Change in Condition Outcome Measure

**3b. Quantitative Outcome**

| Year | Quantitative Target | Actual |
|---|---|---|
| 2010 | {No Data Entered} | 0 |

**3c. Qualitative Outcome or Impact Statement**

**Issue (Who cares and Why)**
The two major issues for Tennessee corn, soybeans and whaet producers have been controlling costs of pests and selecting high-performing varieties.

**What has been done**
Extension agents and specialists conducted over 600 group meetings reaching more than 10,000 farmer contacts to teach best practices for crop production. Extensive variety testing programs were coordinated by Extension on-farm research trials.

**Results**
The total estimated economic impact of Extension's variety selection and pest management programs for corn, soybeans and wheat was $48.9 million in FY 2010.

**4. Associated Knowledge Areas**

| KA Code | Knowledge Area |
|---|---|
| 205 | Plant Management Systems |

## V(H). Planned Program (External Factors)

### External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges

### Brief Explanation

In May, 2010, Tennessee was faced with massive flooding, including a 100-year flood of the Cumberland River. A total of 42 Tennessee Counties were declared Federal Disaster Areas by the Federal Emergency Management Agency of the United States Department of Homeland Security (FEMA, 2010). This event greatly affected all corn, soybean and wheat production in the state. Despite this hardship, nearly all of the outcome targets established for FY 2010 were met or exceeded.

## V(I). Planned Program (Evaluation Studies and Data Collection)

### Evaluation Results

{No Data Entered}

### Key Items of Evaluation

{No Data Entered}