2012 University of Tennessee Research and Extension and Tennessee State University Extension Combined Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

This report consists of the FY 2012 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 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.

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 2012, 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 was $484 million for FY 2012. It was estimated that for every $1 in public funds invested in Extension, $9.88 was returned to the people of Tennessee in increased revenue, increased savings and one time capital purchases.

The recurring economic impacts were estimated at over $270 million. These recurring economic values include increased revenue, increased savings and one time capital purchases associated with four Extension programs: crop variety trials/pest control, forage systems, 4-H camping, and optimizing beef production. Using the United States Department of Defense formula, an estimated 5,416 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 $214 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 4.6 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). In 2012, this reporting system was demonstrated to the administrators of three state Extension organizations who regarded it as a national model for Extension accountability.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	450.0	43.0	300.0	0.0
Actual	450.0	57.0	318.3	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 implemented four years ago. At that time, the external university panel review was completed with program planning and evaluation experts 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. The Plan of Work planned programs have only had minor changes since that time, therefore, an out-of-state review panel was not conducted in FY 2012.

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 2012, UT and TSU Extension made 8,816 contacts for needs assessment purposes, with these methods highlighted:

- 354 advisory committee meetings
- 113 focus groups
- 1076 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, 25% were young people under 18 years of age.

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 2012, Extension conducted 113 different focus groups and 1076 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 identified in various ways such as asking Advisory Committee members and community leaders to suggest names.

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 2012, stakeholder input was used to identify volunteer leaders, identify new audiences, and identify and secure locations for Extension programs. In FY 2012, stakeholder input was used to modify four programs:

- Our **Row Crops Education Programs** were modified to place greater emphasis on irrigation. In FY 2012, Tennessee farmers increased the number of irrigated acres used for corn, cotton, and soybean production by 42,000 acres. Based on UT research, average yield increases from irrigation resulted in an additional $12.3 million in farm income.
- The Center for Profitable Agriculture conducted two surveys of **Agritourism** operators to gather information about interests and needs for educational programs and materials. One survey targeted "beginning agritourism operators" and the second targeted "advanced agritourism operators." Operators were asked to rate a list of 33 potential conferences titles on a scale of "1=Not Interested/Don't Need" to "5=Extremely Interested/Very Much Needed". Results of these ratings and other suggestions made on the surveys were used to choose session topics for the Tennessee Agritourism Conference and are still being used for agritourism programs.
- UT Extension entered the fourth 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 Tennessee), Tennessee Department of Agriculture, The Land Trust for Tennessee, and USDA Natural Resources Conservation Service. In FY 2012, UT Extension continued its emphaiss on involving women in agriculture and estate planning.
- UT Extension Department of Family and Consumer Sciences initiated the **Living Well with Chronic Conditions** program based on stakeholder feedback about the health status of Tennessee citizens. Living Well with Chronic Conditions is a 6-week, evidence-based program that teaches people practical skills to live with anxiety, asthma, chronic bronchitis, heart disease, hypertension, multiple sclerosis, and other chronic conditions.

Brief Explanation of what you learned from your Stakeholders

We continued to implement our 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. 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 in FY 2012:

- Major issues of concern to **row crop producers** were pest control, variety selection, and irrigation. In FY 2012, Tennessee farmers increased the number of irrigated acres used for corn, cotton, and soybean production by 42,000 acres. Based on UT research, average yield increases from irrigation resulted in an additional $12.3 million in farm income.
- Surveys of Tennessee **agritourism operators** to gather information about interests and needs for educational programs and materials. Major nees identified were: offering innovative

attractions, effectively marketing their business, farm family communication, and transferring the farm to the next generation.

- UT Extension entered the fourth year as a partner in the Tennessee Farmland Legacy Partnership. **Individuals representing government agencies, farmer organizations, and community groups** citied the need to continue programs for estate planning and programs targeting women involved in agriculture.
- The Living Well with Chronic Conditions program was initiated based on stakeholder feedback from **citizens, health councils, and advisory groups** that Tennesseans with chronic conditions needed education, support, and practical skills to engage in normal, everyday activities.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
8593699	2801842	5956247	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	9836477	2773818	7108222	0
Actual Matching	35385408	2773818	35296164	0
Actual All Other	7579856	0	11974413	0
Total Actual Expended	52801741	5547636	54378799	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	1303536	0	474266	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

☑ Reporting on this Program

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	20%	20%	0%	
806	Youth Development	80%	80%	0%	
	Total	100%	100%	0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	138.0	13.0	0.0	0.0
Actual Paid Professional	135.0	17.0	0.0	0.0
Actual Volunteer	46.0	6.0	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
2950973	840552	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
10407475	840552	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
100000	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• **Clubs/Project Groups -** At least 65 Tennessee counties organized over 2,500 4-H clubs where workforce preparation was the major emphasis in FY 2012. Project work was emphasized, and the experiential learning model was used to highlight jobs and careers aligned with 4-H projects. Activity sheets were developed to emphasize practical skills aligned with jobs and careers.

• **School Enrichment -** Various school enrichment programs in at least 50 Tennessee counties focused on science, engineering and technology. Youth were exposed to jobs and careers associated with science fields.

• **Mass media** - Mass media was used to inform parents, participants and stakeholders about program opportunities and achievements.

• **Youth from Under-Served and Limited Resource Families:** In FY 2012, UT and TSU Extension 4-H Youth Development programs placed special emphasis on 4-H Science programs in clubs, afterschool settings and other venues to reach youth. The ultimate goal was to increase science literacy among the state's young people. TSU Extension devoted resources to reach underserved and limited resource youth.

2. Brief description of the target audience

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

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communites of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Positive Youth Development Planned Program was enhanced through the service of seven Tennesseee Extension personnel on the "For Youth, For Life" and "Military Families" CoP. Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	280963	845671	1299903	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	4	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of volunteers utilized in delivering this program.

Year	Actual
2012	8295

Output #2

Output Measure

- Number of exhibits produced.

Year	Actual
2012	413

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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	Actual
2012	10874

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	Actual
2012	7193

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	Actual
2012	8741

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	Actual
2012	23084

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	Actual
2012	15148

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	Actual
2012	15345

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	Actual
2012	38368

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	Actual
2012	46597

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	Actual
2012	38149

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	Actual
2012	30758

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

SET: Number of youth who can design a scientific procedure to answer a question.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	11173

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Building Science Literacy

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The National Science Foundation's (NSF) Science and Engineering Indicators concluded that most Tennessee 4th and 8th graders do not demonstrate proficiency in the knowledge and skills taught at their grade level in science and mathematics.

What has been done
UT and TSU Extension made 109,277 direct educational contacts to help youth gain new knowledge, acquire new skills and increase aspirations regarding science, engineering, and technology. Programs were delivered through 3,375 group meetings including organized clubs, camps, project groups and school enrichment by Extension 4-H Agents and volunteers.

Results
1,117 youth were involved in evaluated programs that focused on long-term skills related to science, engineering, and technology. Completed questionnaires were obtained from 233 youth (21% of total participants). The following outcome indicator data was obtained:
*77% report they can communicate a scientific procedure to others.
*89% report they can create a display to communicate scientific data and observations.

*91% report they can use data to create a graph for presentation to others.
*84% report they can use models to explain scientific results.
*69% report they can use science terms to share scientific results.
*87% report they can use the results of their investigation to answer the question they had asked.

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Improving STEM Skills of Tennessee Youth

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Science, technology, engineering and mathematics (STEM) education is a priority at local, state and national levels. Tennessee has historically performed at or below the national average in science and mathematics. One of the key initiatives of the recent Race to the Top education reform program adopted in the State of Tennessee is increasing STEM education in grades K-12.

What has been done
Specialists in the Biosystems Engineering and Soil Science department utilized a variety of educational efforts to promote STEM education in Tennessee. These efforts included partnering with Tennessee?s electric power distributors and TVA to hold the 2012 4-H Electric Camp; partnering with Tennessee Geographic Information Council (TNGIC) to host 3 workshops teaching GPS and GIS to 4-H agents, volunteers and youth; coordinating a National 4-H Youth Science Day event; and presentations at various summer camps and Earth Science Day events. Educational resources and materials including 1 peer reviewed journal article, 7 curriculum modules and several factsheets were developed to support these educational programs.

Results
*105 middle school females increased their knowledge and skills in soil science and molecular biology as a result of attending Gadget Girls and SHADES (Sharing Adventures in Science & Engineering) programs.
*91 middle school youth increased their knowledge and skills in soil chemistry and biology by attending Garden and Forensics Camps.
*48 youth increased their knowledge and skills of GPS navigation, geospatial data collection and GIS mapping by attending workshops at TNGIC regional conferences.
*307 6th and 7th grade 4-H members increased their knowledge of energy, electricity, energy conservation, electrical safety and other basic sciences in fun-filled, hands-on" learning activities by attending 4-H Electric Camp.
*900 elementary school youth increased their knowledge of electricity, chemistry, energy and other basic sciences as a result of attending in-school STEM education programs.

4. Associated Knowledge Areas

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

Outcome #14

1. Outcome Measures

ASPIRE: Developing 4-H Leaders in Limited Resource Communities across Tennessee

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Effective community leadership is critical for the developing and sustaining healthy communities. It helps develop important networks, establish communication and provides community direction. Researchers have found evidence that leadership programs can financially benefit communities beyond the participants who formally participate in the leadership training program. A recent study found that for every $1 invested in a community leadership program, there is a net return of

almost $3 to the same community.

What has been done

Agents in 20 counties in reported 33,292 contacts through school clubs, after-school care programs, workshops and summer day camps. Instruction focused on leadership, healthy self-esteem, positive risk-taking, achieving goals, ethical decision making, public speaking and responsible citizenship. Extension made 80,404 contacts to lead, train, recruit and coordinate 4-H volunteers.

Results

TSU Extension surveyed various groups of youth to determine the impact of the different aspects of the ASPIRE Youth Leadership program. Some of the highlights include:
*105 4-H clubs were led by volunteers.
*90% of youth reported that they learned more about leadership.
*2,538 students were able to select a topic and speak loudly enough to give a speech.
*181 youth reported that they know how to set goals and they use that ability when leading a group.
*182 youth reported that they can now cooperate and work in a group.
*1464 youth reported that they could explain their ideas to others.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Competing Public priorities

Brief Explanation

In FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a $2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Tennessee 4-H Youth Development Leadership Skills

Youth Development and Leadership are important components of workforce development programs according to research from the National Collaborative on Workforce and Disability. In 2012, 108,467 Tennessee youth and adults were involved in 4-H leadership programs. Of those persons, 11.8% were of a minority population.

- Specifically, 59,681 contacts were made through meetings and demonstrations.
- Direct and e-mail, as well as personal telephone calls, also indicates that 20,555 persons were contacted directly.
- On-site visits to the farm, home or workplace and client office visits (9,538) also indicated that our programs are directly reaching youth.

In 2012, 57 Tennessee counties reported program activities in leadership. Completed survey questionnaires focused on short-term skill development in the area of leadership were obtained from 1,165 of the 3,866 participants (30.1%) in this program area. The following beginning outcome indicator data were obtained.

Because of their 4-H experiences:

- 75% (876) reported that as a member of a committee, they take their job seriously.
- 87% (1,016) reported that they help to ensure that everyone gets an opportunity to say what they think.
- 92% (1,075) believed that they could cooperate and work in a group.
- 89% (1,042) believed that when in charge of a group, they treat everyone fairly and equally.
- 82% (953) indicated that they know how to set goals and use them when leading a group.

Completed survey questionnaires focused on intermediate skill development in the area of leadership were obtained from 903 of the 2,296 participants (39.3%) in this program area. The following intermediate outcome indicator data were obtained.

Because of their 4-H experiences:

- 93% (840) noted that they like to work with others and help them reach their goals.
- 79% (712) reported using enthusiasm to get a group working.
- 89% (783) indicated that they felt comfortable being a group leader.
- 82% (741) reported that they could run a meeting.
- 81% (731) said that they give clear directions.

Completed survey questionnaires focused on long-term skill development in the area of leadership were obtained from 424 of the 2,196 participants (19.3%) in this program area. The following long-term leadership outcome indicator data were obtained.

Because of their 4-H experiences:

- 80% (338) reported that they seek out other people who can help them become a better leader.
- 61% (259) said that they are able to break tough problems down into smaller, simpler task.
- 53% (223) indicated that they felt comfortable being responsible for a group.
- 72% (304) indicated that they were sensitive to the feelings of others when discussing and solving problems.
- 81% (342) reported that they are able to resolve problems without losing control of their emotions.

Key Items of Evaluation

Completed survey questionnaires focused on long-term skill development in the area of leadership were obtained from 424 of the 2,196 participants (19.3%) in this program area. The following long-term leadership outcome indicator data were obtained.

Because of their 4-H experiences:

- 80% (338) reported that they seek out other people who can help them become a better leader.
- 61% (259) said that they are able to break tough problems down into smaller, simpler task.
- 53% (223) indicated that they felt comfortable being responsible for a group.
- 72% (304) indicated that they were sensitive to the feelings of others when discussing and solving problems.
- 81% (342) reported that they are able to resolve problems without losing control of their emotions.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Agronomic Crop Systems

☑ Reporting on this Program

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%	9%	
112	Watershed Protection and Management	0%	0%	2%	
132	Weather and Climate	0%	0%	2%	
133	Pollution Prevention and Mitigation	0%	0%	2%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	6%	
202	Plant Genetic Resources	0%	0%	6%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	8%	
204	Plant Product Quality and Utility (Preharvest)	0%	0%	1%	
205	Plant Management Systems	50%	50%	15%	
206	Basic Plant Biology	0%	0%	5%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%	5%	14%	
212	Pathogens and Nematodes Affecting Plants	5%	5%	19%	
213	Weeds Affecting Plants	0%	0%	6%	
215	Biological Control of Pests Affecting Plants	0%	0%	2%	
216	Integrated Pest Management Systems	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 FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	86.0	8.0	0.0	0.0

Actual Paid Professional	4.0	1.0	46.1	0.0
Actual Volunteer	2.0	0.2	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**
98365	28018	721802	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
346915	28018	6857918	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
100000	0	1044819	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Extension portion of this report includes cotton, irrigation, entomology, plant pathology and row crops management and marketing issues. This report is 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 FY 2012: conservation-tillage; planting insect-tolerant crops; planting herbicide-tolerant crops; spaying crops with foliar fungicide to manage disease; using recommended varieties (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 was also used to highlight 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 delivered detailed instruction to producers.

Implementation: On-farm demonstrations were conducted, particularly in the 31 West Tennessee counties, to highlight research-based practices. To the extent possible, integrated research and extension was conducted such as result demonstrations and test plots in all 31 West Tennessee counties.

Confirmation: Farm visits and telephone calls were made to assist producers in the continued use of the practices, respond to environmental factors, and realize greater profits.

This program seeks to increase yield for Tennessee's (and the world's) corn, soybeans, wheat, and commercial vegetable production, as well as food-animal livestock production.

We will continue to develop varieties and genetic lines that provide high-yielding, disease-resistant options for producers, and compare these to commercial standards. This will result in unbiased, research-based information to improve the ability of producers to make sound selections for optimum performance and yields. Optimum production systems will be determined through research which will provide producers with best management practices.

Because growth rates and pest and disease resistance and control are critical to the success of farmers, insect and disease control technologies are continually being created by sources within the University system and outside it. We will continue to develop and utilize new Integrated Pest Management technology for control of existing, invasive, new and re-emerging insect and disease pests of cropping systems.

In many cases, agricultural production research develops new technologies and practices to increase yields while ignoring economic tradeoffs. We will seek to use a multidisciplinary approach to evaluate crop systems for economically optimal production of the agricultural commodities produced in Tennessee.

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.

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communites of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Agronomic Crop Systems Planned Program was enhanced through the service of three Tennessee Extension personnel and one stakeholder on the "Cotton" CoP and one Extension personnel and one stakeholder on the "Pesticide Environmental Stewardship" CoP. Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	20485	110849	146	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	15	51	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.
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of research-based publications distributed as part of this program.
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Number of newspaper articles published as part of this program.

Year	Actual
2012	72

Output #4

Output Measure

- Developed and/or improved existing recommendations related to irrigation, nitrogen, and foliar potassium application to cotton, and choosing the best maturity group and row spacing to maximize yield in soybeans. (Verbree)

Year	Actual
2012	1

Output #5

Output Measure

- Our preliminary evaluation of transgenic soybean has shown promise for drought tolerance. (Cheng)

Year	Actual
2012	1

Output #6

Output Measure

- Wheat line TN1102 produced 6 bushels/acre more than the average of 42 varieties in the Tennessee Wheat Variety trial in 2011 and 2012. (West)

Year	Actual
2012	1

Output #7

Output Measure

- We have identified a protein that is involved in activating gut stem cells to proliferate during gut healing. This identification of a growth factor will allow us to develop new pesticides targeting the specific gene. (Jurat-Fuentes)

Year	Actual
2012	1

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	Irrigation: Extension Program Produces $50 Million Impact
5	Soybean Production: Extension Program Improves Profitability
6	Target-Specific Planter Fluid Delivery (Wilkerson)
7	Adoption and Abandonment of Precision Farming (Roberts)

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1258

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	Actual
2012	556

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Pesticide Section within the Tennessee Department of Agriculture (TDA) is Tennessee?s pesticide regulatory agency and it works with commercial and private applicators, structural pest control operators, farmers, landscapers and others to ensure Federal and state regulations are followed for public safety. The section also registers pesticides and certifies applicators. The University of Tennessee, Pesticide Safety Education Program (PSEP) provides training and training materials for individuals who want to become certified.

What has been done
Online materials were developed to provide individuals information concerning the PSEP program as well as current pest related issues. Pesticide Safety and Education Training sessions were taught at 17 separate meetings. Publications were maintained, updated and placed online for Extension personnel and the general public?s usage.

Results
*452 commercial applicators were training in various pesticide categories.
*104 private applicators received initial certification via online training.
*Well-educated pesticide applicators are better equipped to control pest problems safer and more effectively.
?Pesticide safety education helps reduce the incidence of pesticide misuse, spills and undesirable damage to non-target organisms.

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

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	549

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

Irrigation: Extension Program Produces $50 Million Impact

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Tennessee row crop producers expressed a need to adopt and use irrigation for various crops.

What has been done
In 2012, 1,330 row crop producers attended Extension field days, workshops and county meetings focused on management practices that promote irrigation water use efficiency.

Results
*Tennessee row crop producers increased the number of irrigated acres used for corn, cotton and soybean production in 2012 by 42,000 acres. *Based on UT research, average yield increases from irrigation resulted in an additional $12.3 million dollars of farm income for Tennessee?s row crop producers.
*Based on an average cost of $900 per acre, Tennessee row crop producers in 2012 invested more than $38 million in their local economy by purchasing center pivot irrigation equipment.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Soybean Production: Extension Program Improves Profitability

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Challenges facing the row crops industry include understanding and adopting changes in technology, integrated pest management, sustainable agronomic practices and profitability. Soybeans were planted and harvested on more than 1.2 million acres in Tennessee in 2012.

What has been done

Extension agents and area Extension specialists conducted educational programs reaching over 20,900 direct and 24 million indirect contacts during 2012. Best production practices were taught at more than 300 group meetings and over 530 on-farm visits. Newspaper articles (40), publications (7) and radio programs (69) supported the direct contacts. 4805 soybean producers used data provided by UT publications or UT Internet resources and made changes in their production practices.

Results

*Producers increased yield by 117,043 bushels by selecting top yielding varieties on 1,832,558 acres of soybeans, earning an extra $819,301.
*436,058 acres of soybeans scouted by a producer or independent crop consultant to help make crop management decisions.
*102,020 acres of soybeans scouted by a UT-trained scout to help make crop management decisions.
*1208 soybean producers adopted UT recommended resistance management strategies to control pests (weeds, insects and diseases).
*775 soybean producers increased their knowledge of recommended agronomic practices and understanding of their benefits and use.
*392 soybean producers report a $247,549 reduction in pest control costs by following recommended control strategies for insects, weeds or plant diseases.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Target-Specific Planter Fluid Delivery (Wilkerson)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Agricultural fertilizers and pesticides are expensive and potent, so they must be accurately applied. This technology has both economic and environmental benefit.

What has been done
The intellectual property for two US patents were commercially licensed.

Results
Our technology will be integrated into a 'target specific' fluid delivery system that is expected to be commercially available on row planters within the next two years.

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
204	Plant Product Quality and Utility (Preharvest)
601	Economics of Agricultural Production and Farm Management

Outcome #7

1. Outcome Measures

Adoption and Abandonment of Precision Farming (Roberts)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Not only do some farm and farmer demographic characteristics influence cotton farmers? use of precision farming, but certain of those characteristics affect the timing of adoption.

What has been done
The objective of this research was to identify factors motivating adoption of grid soil sampling for cotton production.

Results

Preliminary results indicate that cotton farmers with larger cotton enterprises and more education, who rent more of the land they farm, use computers for farm management and use laptop computers in the field, were more likely to adopt remote sensing, yield monitoring, grid soil sampling and management zone soil sampling earlier than other cotton farmers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Cotton is an indeterminate crop grown as an annual and requires a unique level of management. Cotton is grown on a multitude a soil types and under many different environments in Tennessee. Rolling hills, creek bottoms and alluvial flood plains make Tennessee cotton production a challenge. Since Tennessee is on the Northern edge of the Cotton Belt, growers show a particular interest in earliness management. Cotton is produced in 23 counties statewide with the majority grown in the western part of the state.

Soybeans were planted and harvested on more than 1.2 million acres in Tennessee in 2012. Moderate to above normal late season moisture created good to excellent yields in most counties across the state and there was a final state average yield of 38 bushels/acre (Jan 2013, USDA crops report). Soybean prices were strong and most producers received more than $14.00 per bushel for their crop. Projected cash receipts for soybeans in 2012 are more than $660 million.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Our evaluation results of the Extension cotton program in 31 West Tennessee counties found the following:

• Producers increased yield by 1354 pounds by selecting top yielding varieties on 308402 acres of cotton.

- 375,672 acres of cotton were scouted by a producer or independent crop consultant to help make crop management decisions.
- 44,080 acres of cotton were scouted by a UT-trained scout to help make crop management decisions.
- 667 cotton producers adopted UT recommended resistance management strategies to control pests (weeds, insects and diseases).
- 620 cotton producers increased their knowledge of recommended agronomic practices and understanding of their benefits and use.
- 266 cotton producers report a $484,947 reduction in pest control costs by following recommended control strategies for insects, weeds or plant diseases.
- 686 cotton producers used data provided by UT publications or UT Internet resources and made changes in their production practices.

Key Items of Evaluation

- 266 cotton producers report a $484,947 reduction in pest control costs by following recommended control strategies for insects, weeds or plant diseases.
- 686 cotton producers used data provided by UT publications or UT Internet resources and made changes in their production practices.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Animal Systems

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	15%	15%	20%	
302	Nutrient Utilization in Animals	0%	0%	7%	
303	Genetic Improvement of Animals	10%	10%	0%	
304	Animal Genome	0%	0%	6%	
305	Animal Physiological Processes	0%	0%	7%	
306	Environmental Stress in Animals	0%	0%	8%	
307	Animal Management Systems	60%	60%	10%	
311	Animal Diseases	15%	15%	31%	
315	Animal Welfare/Well-Being and Protection	0%	0%	2%	
402	Engineering Systems and Equipment	0%	0%	4%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%	0%	2%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%	0%	3%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	37.0	3.5	0.0	0.0
Actual Paid Professional	41.0	5.0	21.3	0.0
Actual Volunteer	2.0	0.2	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**
885291	252165	540562	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3122242	252165	4051511	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
200000	0	316661	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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 with an interest in the state's cattle industry. Master Beef Producer programs were 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. The Master Beef Producer Program:

- Included a series of 12 educational sessions that focueds on cow-calf production and issues facing the beef industry. These were conducted at various off-campus locations accessible to Tennessee beef producers. These sessions included hands-on demonstrations, mini-lectures, discussions, question and answer sessions, etc.
- Enhanced the profitability and competitiveness of cow-calf operations by providing essential, technical information.
- Provided participants with a beef production reference manual.
- Allowed producers to interact with trained facilitators and encourage sharing of ideas with other producers.

Goats are an environmentally adaptive species of livestock, extremely opportunistic and afford the small limited resource landowner(s) an alternative enterprise. The goat provides food security, high quality protein (for human nutrition), 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. Meat goat numbers have been significantly increasing within the United States 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. There is no longer an export value for goat meat; the import value has tripled.

The Tennessee Browsing Academy was established in 2007 as an extensive four day hands-on training for producers, educators/government agency personnel interested in the biological and environmentally sound practices of vegetative management with small ruminants (specifically goats). This class is taught through lecture and applied practices as the participants learn new techniques.

The most outstanding example of successful outcomes encompassing the work of extension specialists, county extension agents, and clients is the Master Meat Goat Producer Program. The Small Ruminant College has become an annual two-day event covering a different major production theme each

year. Along with the two days of both inside lectures and outside hands-on demonstrations, the attendees receive proceedings to complement the topics covered. Work will continue in working with small ruminant farmers as well as with professionals through Heifer International. Presentations and demonstrations in the state are designed for extension agents, government agencies, meat goat organizations, farmer forum initiatives, and 4-H groups.

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

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.

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Animal Systems Planned Program was enhanced through the service of:

- 13 Tennessee Extension personnel on the "Beef Cattle" CoP,
- two Tennessee Extension personnel on the "Goat Industry" CoP, and
- two Tennessee Extension personnel on the HorseQuest CoP.

Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	260646	9405879	83328	0

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

Patent Applications Submitted

Year: 2012

Actual: 1

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	4	30	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
2012	1689

Output #2

Output Measure

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

Year	Actual
2012	428460

Output #3

Output Measure

- The new ELISA test was shown to be effective in diagnosis of bovine tuberculosis. (Eda)

Year	Actual
2012	0

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	Educational assistance was provided to beef producers resulting in increased Tennessee Department of Agriculture cost-share assistance for improved facilities, equipment and genetics.
4	Beef Production and Marketing: Number of beef producers who improved marketing methods.
5	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.
6	Beef Production and Marketing: The number of calves managed according to Beef Quality Assurance (BQA) guidelines.
7	Goat Production: Number of goat producers who have implemented practices related to genetic improvement, nutrition, health, reproduction and other information as a result of the Master Goat Program.
8	Improved Test and Device for Johne's Disease (Eda)
9	Non-Antibiotic Strategy for Dairy Cattle Mastitis (Almeida)

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
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	40

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Challenges facing the beef cattle industry in Tennessee range from the adoption of very basic management practices to complicated global market drivers that affect input costs. Nutritional, reproductive, genetic and health management are the general areas that impact profitability most.

What has been done
Extension agents and specialists taught best management practices in beef cattle production at 4,869 group meetings, 2,808 on-site visits and 3,326 walk-in consultations in the local county office. These direct methods were reinforced by 22,850 newspaper articles, 62 radio programs and 15 television programs.

Results
*12095 beef producers sold 294,492 calves managed according to BQA guidelines to increase returns by $2,355,936.
*8085 beef producers stored 1127721 large, round bales under some type of cover to increase returns by $6,766,326.
*6891 beef producers utilized bulls with greater genetic potential to produce 179,914 head of calves to increase returns by $4,857,678.
*9509 beef producers utilized hay feeding rings to feed 923,626 bales and improved feeding methods to reduce wastage/spoilage, saving $4,618,130.
*6218 beef producers utilized improved marketing methods to market 225,923 head of calves to increase returns by $1,129,615.

4. Associated Knowledge Areas

KA Code	Knowledge Area

303	Genetic Improvement of Animals
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	Actual
2012	6891

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

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

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	6218

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 #5

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
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	6514

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 #6

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
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	294492

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 #7

1. Outcome Measures

Goat Production: Number of goat producers who have implemented practices related to genetic improvement, nutrition, health, reproduction and other information as a result of the Master Goat Program.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	590

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases

Outcome #8

1. Outcome Measures

Improved Test and Device for Johne's Disease (Eda)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Despite the significant economic impact and high prevalence of Johne?s disease in cattle, there is no practical vaccine or chemotherapeutics for control and/or ultimate eradication of the disease.

What has been done
We developed a new diagnostic test, named EVELISA test, which showed much higher sensitivity (approximately 90%) compared to that of current ELISA tests. Further, we are developing on-site (in-field, bed-side) diagnostic device for Johne's disease and other diseases.

Results
Our new tests are likely to have positive impacts on control of infectious diseases in animals and humans.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases
722	Zoonotic Diseases and Parasites Affecting Humans

Outcome #9

1. Outcome Measures

Non-Antibiotic Strategy for Dairy Cattle Mastitis (Almeida)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The goal of this research is to develop technology to prevent or reduce the severity and economic impact of mastitis which will help increase production and profitability of dairy farms and ensure an ample supply of safe and nutritious dairy products for consumers throughout the world.

What has been done
The research was directed to the identification of virulence factors utilized by S. uberis to infect bovine mammary epithelial cells. Such virulence factors often are excellent candidates for elaboration of vaccines.

Results
Results from these studies will prove the efficacy of SUAM vaccine and novel data on the bovine mammary immune system that will fuel future research projects and grant applications.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
311	Animal Diseases

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

In FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a $2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Better Beef Marketing in Tennessee

In FY 2012, UT Extension entered the seventh year of its evaluation of Tennessee feeder cattle marketing. Feeder cattle buyers prefer to purchase truckload lots of cattle that are similar in age, size, weight, and color, and they are willing to pay premiums to producers who participate in cooperative marketing ventures to assemble cattle to meet their needs. Extension agents and specialists helped beef cattle producers to market feeder cattle through cooperative marketing arrangements, including alliances, graded feeder calf sales, and age and source verification programs. Experts estimate farmers earned an average of $8 per head more by managing cattle according to Extension's beef quality assurance program and $25 per head by selecting bulls based on genetic potential. As a result of these FY 2012 programs, farmers realized $7.2 million in additional sales revenue.

Key Items of Evaluation

Better Beef Marketing in Tennessee

In FY 2012, UT Extension entered the seventh year of its evaluation of Tennessee feeder cattle marketing. Feeder cattle buyers prefer to purchase truckload lots of cattle that are similar in age, size, weight, and color, and they are willing to pay premiums to producers who participate in cooperative marketing ventures to assemble cattle to meet their needs. Extension agents and specialists helped beef cattle producers to market feeder cattle through cooperative marketing arrangements, including alliances, graded feeder calf sales, and age and source verification programs. Experts estimate farmers earned an average of $8 per head more by managing cattle according to Extension's beef quality assurance program and $25 per head by selecting bulls based on genetic potential. As a result of these FY 2012 programs, farmers realized $7.2 million in additional sales revenue.

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Childhood Obesity

☑ Reporting on this Program

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%	25%	
701	Nutrient Composition of Food	5%	5%	15%	
702	Requirements and Function of Nutrients and Other Food Components	0%	0%	10%	
703	Nutrition Education and Behavior	95%	95%	50%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	97.0	9.0	4.0	0.0
Actual Paid Professional	77.0	9.0	11.5	0.0
Actual Volunteer	26.0	3.2	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**
1672218	476313	386700	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
5897569	476313	701537	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
5978528	0	426016	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

UT and TSU 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. Extension obesity prevention programs emphasized the following:

- how to use choosemyplate.gov, follow Dietary Guidelines, and 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.

2. Brief description of the target audience

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

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Childhood Obesity Planned Program was enhanced through the service of:

- 12 Tennessee Extension personnel on the "Families, Food and Fitness" CoP, and the leader of this CoP is the Associate Dean of Family and Consumer Sciences for UT Extension.
- two Tennessee Extension personnel on the "A,B,C's of Omega 3's" CoP.

Tennessee Extension personnel shared emerging research, implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	333857	18369856	549901	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	12	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2012	2451

Output #2

Output Measure

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

Year	Actual
2012	878271

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	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	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.
3	Tennessee Shapes Up: Number of participants who increased consumption of dairy foods.
4	Tennessee Shapes Up: Number of participants who increased consumption of fruits.
5	Tennessee Shapes Up: Number of participants who increased consumption of vegetables.
6	Tennessee Shapes Up: Number of participants increased consumption of whole grains.
7	Tennessee Shapes Up: Number of participants who improved their blood sugar.
8	Tennessee Shapes Up: Number of participants who improved their cholesterol levels.
9	Healthy Steps: Extension Targets Pre-Schoolers for Obesity Prevention

Outcome #1

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	Actual
2012	6443

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 #2

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	Actual
2012	6443

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 #3

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #4

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	Actual
2012	7518

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 increased consumption of vegetables.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	7518

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 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	Actual
2012	7518

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 improved their blood sugar.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	426

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 improved their cholesterol levels.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	395

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

Healthy Steps: Extension Targets Pre-Schoolers for Obesity Prevention

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	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 28 Tennessee counties in 2012. 4,677 direct contacts were made in Voluntary Pre-K, Head Start and center-based classrooms; 575,328 indirect contacts were made through exhibits, newspaper articles, publications and television. In addition 17,855 contacts were made by volunteers.

Results
Surveys were completed by teachers at the end of the program to document program outcomes. *521 of 531 teachers reported preschool children in their classes were more actively engaged in

physical activity.
*509 of 536 teachers reported preschool children in their classes were more willing to taste fruit.
*486 of 536 teachers reported preschool children in their classes were more willing to taste vegetables.
*479 of 516 teachers reported preschool children in their classes were more willing to taste whole-grain foods.
*275 of 311 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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

In FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a $2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Nutrition Education

Nutrition education studies have found cost/benefit ratio of $1.00/$10.64. This translates to a return of over $144 million for the investment in UT Extension's nutrition education programs for the state of Tennessee.

Key Items of Evaluation

Nutrition Education

Nutrition education studies have found cost/benefit ratio of $1.00/$10.64. This translates to a return of over $144 million for the investment in UT Extension's nutrition education programs for the state of Tennessee.

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Economic Infrastructure and Commerce

☑ Reporting on this Program

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%	5%	
202	Plant Genetic Resources	0%	0%	3%	
315	Animal Welfare/Well-Being and Protection	0%	0%	9%	
601	Economics of Agricultural Production and Farm Management	30%	30%	20%	
602	Business Management, Finance, and Taxation	5%	5%	0%	
603	Market Economics	5%	5%	5%	
604	Marketing and Distribution Practices	30%	30%	5%	
605	Natural Resource and Environmental Economics	0%	0%	12%	
606	International Trade and Development	5%	5%	2%	
607	Consumer Economics	10%	10%	0%	
608	Community Resource Planning and Development	15%	15%	28%	
610	Domestic Policy Analysis	0%	0%	2%	
901	Program and Project Design, and Statistics	0%	0%	9%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	26.0	2.5	28.0	0.0
Actual Paid Professional	58.0	7.0	28.2	0.0
Actual Volunteer	20.0	2.2	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**
1278755	364239	732224	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
4509905	364239	3123449	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
77000	0	135952	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 helps families analyze their total farming business so they can make informed decisions regarding their future. Extension staff trained in farm and financial management help 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 is will offer hundreds of workshops to help farmers improve their financial situation. For example, workshops will be offered in improved marketing, goal-setting, and strategic planning.

Although the MANAGE program will not remove uncertainty of the future, it will provide farm families with a clear understanding of their current financial situation and help them evaluate their alternatives for the future. Making informed decisions today may be the best way to prepare for tomorrow's opportunities. The educational program is offered at no cost to participating farm families in all 95 Tennessee counties.

Land is a great source of wealth in the African-American community. In addition to providing economic stability, land ownership is highly correlated to one's social and economic well-being. Many urban residents who desire to return to the land of their origin find themselves confronted by various obstacles in terms of retaining rightful land ownership. In addition to problems they face of landownership retention are efforts to engage in profitable land use development, and operate viable farming enterprises.

Production inputs have changed over the past two decades. As a result of this, there was a reduction in the number of crops produced. In-service training on "Small Farm Outlook" will continue to be conducted to make landowners aware of resources that are available to them for land retention and crop production. The training will provide information on ways to keep land through estate planning, lessening

their property, and legal issues for seniors (the aging population).

Effective community leadership is critical for the developing and sustaining healthy communities. It helps develop important networks, establish communication and provides community direction. Researchers have found evidence that leadership programs can financially benefit communities beyond the participants who formally participate in the leadership training program. A recent study found that for every $1 invested in a community leadership program, there is a net return of almost $3 to the same community.

2. Brief description of the target audience

- Limited-resource and small farmers
- Farmers transitioning from tobacco to other crops
- Policy-makers at the state, federal, and municipal level
- Businesses looking to expand or relocate to Tennessee

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension. This Economic Infrastructure and Commerce Planned Program was enhanced through the service of:

- 10 Tennessee Extension personnel on the "Entrepreneurs and Their Communities" CoP, and
- four Tennessee Extension personnel on the "Network Literacy" CoP.

Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	147270	5103528	10835	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total

Actual	5	33	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2012	14489

Output #2

Output Measure

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

Year	Actual
2012	1915

Output #3

Output Measure

- Organized an economic policy center that has developed working relationships with other policy centers, USDA, DOE, EPA, ORNL, TVA, EPRI, the Howard G. Buffett Foundation, the Pew Initiatives, other US universities, and academics and farm leaders internationally. (Ray)

Year	Actual
2012	0

Output #4

Output Measure

- In a simulation study using a statistical model, long-run employment growth of rural counties with highways funded by the Appalachian Regional Commission appears to be higher than peer counties that do not have access to this system. (Lambert)

Year	Actual
2012	0

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 between 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 and evaluating equitable leasing arrangements)
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	Tennessee Extension Leadership Development: Small businesses or non-profits developed by limited resource leaders.
8	Soil, Climate, and Tillage Effects on Yields (Larson)
9	Setting a Realistic Path to a Bioenergy Economy (De La Torre Ugarte)

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	Actual
2012	204

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	Actual
2012	62

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 between generations.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	26

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 and evaluating equitable leasing arrangements)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1460

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	Actual
2012	672

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	Actual
2012	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
601	Economics of Agricultural Production and Farm Management

Outcome #7

1. Outcome Measures

Tennessee Extension Leadership Development: Small businesses or non-profits developed by limited resource leaders.

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Soil, Climate, and Tillage Effects on Yields (Larson)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Soils and climate may be important factors influencing risk and expected return and the adoption of no-till by farmers.

What has been done
Our research found that whether no-tillage results in higher yields than tillage depend on soil texture, crop grown, rainfall, and geographic region.

Results
No-tillage performs better than tillage in the warmer and more humid climate of the southeastern United States; using no-tillage in the southeast also reduced the risk of having decreased yields. A sandy soil generally resulted in lower no-tillage yields. Larger precipitation was found to increase the risk of having lower no-tillage yields compared to tillage.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Setting a Realistic Path to a Bioenergy Economy (De La Torre Ugarte)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
DOE and USDA need data and analysis of feedstock production.

What has been done
In collaboration with the Energy Information Administration, the integration of POLYSYS into the National Energy Modeling System was completed.

Results
This integration will provide the outlook estimates for the agricultural and biomass sectors of Annual Energy Outlook.

4. Associated Knowledge Areas

KA Code	Knowledge Area
601	Economics of Agricultural Production and Farm Management
603	Market Economics
605	Natural Resource and Environmental Economics
610	Domestic Policy Analysis

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 FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a $2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

6th National Small Farm conference
Investigators: Bullock, F. D.
Performing Department: College of Agriculture, Human and Natural Sciences -- 3517
Start Date: 09/01/2011 **Termination Date:** 08/31/2012
Reporting period: 09/01/2011 to 08/31/2012

Outputs:
6th NATIONAL SMALL FARM CONFERENCE REPORT The 6th National Small Farm Conference was held September 18th - 20th, 2012, in Memphis, Tennessee. Dr. Sonny Ramaswamy, Director of the USDA's National Institute of Food and Agriculture (NIFA), gave the keynote address on creating and sustaining small farms. USDA Administrative officials, academia and non profit brought remarks at the opening general session. This conference's theme, "Promoting Successes for Small Farmers and Ranchers," brought together 725 participants representing small farmers, land-grant universities, community-based organizations, agricultural foundations, and other public and private sector organizations. A diverse panel of farmers discussed the opportunities and challenges facing small farmers, and scientists and educators shared research, extension, and education ideas to enhance small farm enterprises as well as improve the quality of life in farming communities. The preconference short courses included workshops on Food Safety for Small Farmers, Using New and Emerging Technologies, Evaluation Strategies, Whole Farm Planning and Grant Writing. Approximately 60 posters, 44 exhibits and 20 success stories were featured at the conference. With over 200 oral presentations and 65 break-out sessions, this train-the-trainer conference aims to strengthen partnerships and build capacity in the following areas: marketing opportunities, outreach for underserved communities, research and extension priorities, program planning and implementation, and alternative and traditional enterprises. Five educational tours were conducted covering Biodemensions/Solar farming systems, Organic Farms, Wineries, Farmers Markets and varied farming systems that were featured at the Ames Plantation. The overall goal of this conference is to promote the successes of small farmers and ranchers with a long term projection of ensuring that small farmers and ranchers enhance their capacity to earn higher income and improve the quality of life within their local communities. Additional conference details are provided at the conference website at www.tnstate.edu/smallfarmconference. The conference was co-hosted by NIFA, Tennessee State University, and the University of Tennessee. Conference proceedings will be posted on the conference website in the near future. Please direct any questions pertaining to this conference to Dr. Fitzroy Bullock, State Specialist, Integrated Pest Management and Small Farms, Cooperative Extension Program, Tennessee State University at fbullock@tnstate.edu or 615-963-5449.

Publications:
(None)

Outcomes/Impacts:
ANTICIPATED OUTCOMES OUTPUTS: These include sharing of practices learned at the conference; improve the already established national network system with peers from land grant universities with similar clientele needs and challenges; acquaint participants from across the nation with the numerous types of agricultural pursuits practiced in the area where farm tours will be held during the conference; Outcomes: Increased understanding of stakeholder participation; collaboration with stakeholders in developing tools which can be utilized to increase knowledge; conduct training that will allow for easy adoption and use of new methods and improved technology; developing strategies that will enable small farmers to compete in the marketplace. ANTICIPATED IMPACTS: Improved quality of life;

enhanced farm income and productivity; increased market opportunities; sustained productivity and success in replacing the growing number of retiring farmers and ranchers; increased number of new and beginning farmers; increased farm management skills; increased production and labor efficiency

Participants:

ATTENDence: Agricultural professionals, including Extension, small farm advisers, USDA agencies to include NIFA,NRCS,FSR,Rural Development,ARS, land grant university state specialists, county educators, community-based organizations, researchers, state agency personnel fron TFBF, TDA, farmers, limited resource farmers, socially disadvantaged farmers and ranchers, beginning farmers, under represented farmers, unserved farmers, students and others with vested interests in small farm programs The 6th National Small Farm Conference -"Promoting the Successes of Small Farmers and Ranchers"--was held September 18-20, 2012, at the Memphis Convention Center in Memphis, Tennessee. Successes in small farm activities will be shared as well as innovative ideas in research, extension and outreach to strengthen collaboration and partnership among state specialists who work to ensure that small farmers and ranchers not only survive, but thrive in today's economy. This Conference will also serve as a forum to discuss the results of research geared towards addressing challenges facing small farmers and ranchers. Strengthening partnerships created at the five previous National Small Farm Conferences will continue to be a priority for the Memphis meeting. This conference will consist of short courses, oral presentations, exhibits, poster paper presentations and educational tours within Tennessee and Arkansas. PROJECT JUSTIFICATION - CRITICAL NEEDS: Small farmers face many challenges such as facing an agricultural economy where success is dependent on excelling in all areas of management. For many producers, marketing is the most challenging management area that needs to be addressed. Market planning and training programs will be developed that can be delivered nationally as a means of producing alternative enterprises, improving marketability such as developing and establishing cooperatives for niche crops with the ultimate goal of enhancing profitability.

Target Audiences:

According to USDA statistics, nearly 40% of the value of farm products in the US is still generated by small farms. The share may be declining, but we still depend upon small farms for a significant portion of our food. The loss of farms-and farm families-has had an impact on the fabric of rural and small-town life throughout the region. School populations have declined, forcing many rural communities to close or consolidate their schools, resulting in long and costly bus rides for the remaining students. Businesses in small towns suffer many pressures, but declining agricultural populations have accelerated their decline, and today many rural towns have more boarded-up windows than functioning stores. Our agricultural system is producing enough food for now, but at what cost? Current production relies heavily on unsustainable consumption of fossil fuels and water from aquifers built up over thousands of years. Pesticides and nutrients wind up in drinking water supplies and contribute to ecological and economic problems close to home and thousands of miles away. Small and moderate-sized farms tend to be more diversified than large farms, and in particular, they are more likely to integrate crop and livestock production, allowing for better nutrient cycling than highly specialized farms. They are better abl rely on ecological management rather than primarily on chemical inputs to manage fertility, pests, and diseases. They are less likely to engage in exploitative labor practices than large farms. And they tend to be innovators in sustainable food and fiber production. Not all small farms are diverse, sustainable, innovative, and good employers. Some large farms are all of those things. But it is often easier and more likely for small farms to have those attributes. In part, it is a question of time. On small farms, there is more likely to be enough time to visit and observe each field. In part it is a question of complexity. The challenge of managing

many fields and employees and a lot of area leaves less time and energy for the challenge of managing many different crops and experimenting with new techniques. In part it is also a question of capital. When you have invested in the specialized equipment needed to work a large farm it is financially inefficient to let it stand idle. As a result of these and other issues and concerns, agencies, universities and organizations have developed programs and activities to support small farms. The 6th National Small Farm Conference will provide an opportunity for educators, agency personnel, researchers, non-profits and farmers to share examples of unique and innovative programs that will help them to better understand and act on these challenging issues as well as promote successes of small farmers and ranchers.

Project Modifications:

Additional conference details are provided at the conference website at www.tnstate.edu/smallfarmconference. The conference was co-hosted by NIFA, Tennessee State University, and the University of Tennessee. Conference proceedings will be posted on the conference website in the near future. Please direct any questions pertaining to this conference to Dr. Fitzroy Bullock, State Specialist, Integrated Pest Management and Small Farms, Cooperative Extension Program, Tennessee State University at fbullock@tnstate.edu or 615-963-5449.

Key Items of Evaluation

6th NATIONAL SMALL FARM CONFERENCE REPORT:

The 6th National Small Farm Conference was held September 18th - 20th, 2012, in Memphis, Tennessee. Dr. Sonny Ramaswamy, Director of the USDA's National Institute of Food and Agriculture (NIFA), gave the keynote address on creating and sustaining small farms. USDA Administrative officials, academia and non profit brought remarks at the opening general session. This conference's theme, "Promoting Successes for Small Farmers and Ranchers," brought together 725 participants representing small farmers, land-grant universities, community-based organizations, agricultural foundations, and other public and private sector organizations. A diverse panel of farmers discussed the opportunities and challenges facing small farmers, and scientists and educators shared research, extension, and education ideas to enhance small farm enterprises as well as improve the quality of life in farming communities. The preconference short courses included workshops on Food Safety for Small Farmers, Using New and Emerging Technologies, Evaluation Strategies, Whole Farm Planning and Grant Writing. Approximately 60 posters, 44 exhibits and 20 success stories were featured at the conference. With over 200 oral presentations and 65 break-out sessions, this train-the-trainer conference aims to strengthen partnerships and build capacity in the following areas: marketing opportunities, outreach for underserved communities, research and extension priorities, program planning and implementation, and alternative and traditional enterprises. Five educational tours were conducted covering Biodemensions/Solar farming systems, Organic Farms, Wineries, Farmers Markets and varied farming systems that were featured at the Ames Plantation. The overall goal of this conference is to promote the successes of small farmers and ranchers with a long term projection of ensuring that small farmers and ranchers enhance their capacity to earn higher income and improve the quality of life within their local communities. Additional conference details are provided at the conference website at www.tnstate.edu/smallfarmconference. The conference was co-hosted by NIFA, Tennessee State University, and the University of Tennessee. Conference proceedings will be posted on the conference website in the near future. Please direct any questions pertaining to this conference to Dr. Fitzroy Bullock, State Specialist, Integrated Pest Management and Small Farms, Cooperative Extension Program, Tennessee State University at fbullock@tnstate.edu

or 615-963-5449.

COMMUNITY LEADERSHIP REPORT:

WHAT HAS BEEN DONE: Agents in 91 counties in reported 35,071 contacts through group meetings. 16,740 contacts were made through direct mail, telephone and email. Agents also made 4,285 contacts through client office visits and on-site visits.

IMPACT: The economic impact of Extension leadership programs was $1,312,257 in increased revenue, one-time capital improvements and secured resources across the state of Tennessee. 2,468 of 2,663 participants reported increased involvement in community activities. 5,382 of 5,446 participants increased their awareness of economic, social, and environmental issues that impact their local communities. 3,811 out of 3,904 participants said that their knowledge of community assets, development opportunities and/or programs in their community increased.

V(A). Planned Program (Summary)

Program # 6

1. Name of the Planned Program

Environmental and Water Quality Impacts

☑ Reporting on this Program

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	20%	20%	26%	
112	Watershed Protection and Management	80%	80%	15%	
133	Pollution Prevention and Mitigation	0%	0%	15%	
135	Aquatic and Terrestrial Wildlife	0%	0%	10%	
136	Conservation of Biological Diversity	0%	0%	3%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	3%	
212	Pathogens and Nematodes Affecting Plants	0%	0%	7%	
213	Weeds Affecting Plants	0%	0%	3%	
215	Biological Control of Pests Affecting Plants	0%	0%	3%	
402	Engineering Systems and Equipment	0%	0%	5%	
404	Instrumentation and Control Systems	0%	0%	6%	
721	Insects and Other Pests Affecting Humans	0%	0%	4%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	25.0	0.0
Actual Paid Professional	4.0	1.0	34.9	0.0
Actual Volunteer	2.0	0.2	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**
98271	28018	836846	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
346915	28018	3504353	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
50000	0	860608	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

The vast majority of this program is currently research, so the target audience is weighted toward basic/applied research clients. Clients targeted by Extension efforts included landwoners, construction workers, engineers, and regulators.

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	24178	315811	4421	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	19	45	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Field validation/demonstration of remotely-controlled acoustic monitoring system for monitoring grassland birds on no-entry zones in military installations (Buehler).
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Validate our vehicle terrain model for the U.S. Army. (Ayers)

Year	Actual
2012	1

Output #3

Output Measure

- The modified snorkelcam snorkel mounted underwater video-mapping system has been applied to salamander mapping within the US Forest Service. (Ayers)

Year	Actual
2012	0

Output #4

Output Measure

- Based on our C sequestration research program, a project has been funded to assist in developing the first large scale thermochemical process to generate liquid fuels and biochars for soil amendment from lignocellulosic biomass in Tennessee. (Labbe)

Year	Actual
2012	0

Output #5

Output Measure

- There has been a reduction in both the number of hours below freezing, and chilling units, at all locations in Tennessee over the past 30 years. Varieties of crops such as peach trees will have to be changed to adapt to these warmer conditions. In addition, threats from pests are likely to increase due to warmer winters. (Logan)

Year	Actual
2012	0

Output #6

Output Measure

- Our research concerning the retention of antimony by common soil minerals indicates that this toxin is strongly retained, particularly by iron minerals and in acidic environments. These findings suggest that antimony in acidic soils may have low bioaccessibility. The findings also indicate that antimony-contaminated acidic soils may be stabilized through the addition of ferric iron. (Essington)

Year	Actual
2012	0

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 2010 report).
2	Greenhouse and nursery crop use of bioactive natural products in place of conventional pesticide on tomato, percent of operators adopting (Gwinn).
3	Sustainability in Tennessee: Improving the Environment, Economy and Society
4	Native Grasslands as Wintering Habitat (Buehler)
5	Using GIS to Improve GPS Machine Control (Freeland)

Outcome #1

1. Outcome Measures

Percent of Tennessee major row-crop acreage under some form of no-till or conservation tillage (Tennessee Agriculture 2010 report).

Not Reporting on this Outcome Measure

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).

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Sustainability in Tennessee: Improving the Environment, Economy and Society

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Increasing sustainability will enable the world to meet present needs while continuously improving future generation?s ability to meet their own needs. This can be done not only by lessening our environmental impacts, improving human health, and improving the economic and social well-being of Tennessee?s communities, but also by increasing productivity to meet current as well as future food, fuel, and fiber demands. Water quality and quantity are issues that demand attention as excess nutrients and sediment are polluting surface and groundwater resources and aquifers are being depleted.

What has been done
An integrated, multi-disciplinary research, education, and outreach program has been established to develop and disseminate information pertaining to water quality and quantity issues in Tennessee. Presentations at one hundred and thirty-two field days, county and/or multi-county meetings, on-farm demonstrations, 19 newly-developed publications, developed the UT Extension Solar Energy website, mass media articles, and 8,790 personal contacts were used to promote the adoption of profitable and environmentally-conscious practices.

Results
*Landowners reduced the amount of sediment and other nonpoint source pollutants entering Tennessee?s surface water resources by stabilizing streambanks, establishing buffer strips and/or fencing cattle access on 47 miles of rivers and streams.
*Tennessee landowners planted native grasses on 2,400 acres to provide enhanced wildlife habitat, protect against soil erosion and stabilize the edges of fields.
*150 landowners attending field days, workshops and county meetings increased their knowledge and skills on ecologically friendly landscaping techniques.
*956 construction workers, contractors, engineers and regulators attending erosion prevention and sediment control workshops increased their knowledge on construction site stormwater best management practices that promote improved water quality in Tennessee?s urban and suburban areas.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management

Outcome #4

1. Outcome Measures

Native Grasslands as Wintering Habitat (Buehler)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Birds are considered good indicators of environmental health, and are useful for evaluation of contemporary environmental issues, such as climate change. Effective monitoring tools are needed to be able to use birds as environmental indicators.

What has been done
We have developed a monitoring protocol for tracking grassland bird populations through our research in the Central Hardwoods Bird Conservation Region covering seven states.

Results
Through analysis of data collected based on our protocol, we have shown the linkage between USDA Farm Bill conservation practices and grassland bird populations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
404	Instrumentation and Control Systems

Outcome #5

1. Outcome Measures

Using GIS to Improve GPS Machine Control (Freeland)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Critical to obtaining the highest degree of accuracy and precision for reliable machine control are the initial acquiring of a solution (i.e., obtaining an RTK ?fix? solution), the continuously maintaining of this fix, and if it is lost, rapidly reestablishing the fix.

What has been done
A Geographic Information System (GIS) solution for mapping a model of sky-blockages surrounding agricultural fields across entire regions was developed. It employs spatial landform feature layers, such as terrain elevations (levies, ridges, side slopes), forecast satellite availability from Mission Planning software (MPS), and terrain coverage maps.

Results
Using the GIS tool, a spatial risk illustration for targeted fields is provided for farmers that shows the impact of using additional multinational GNSS satellite constellations for improving auto-steer reliability, as opposed to using only the U.S. GPS satellite constellation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
404	Instrumentation and Control Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Public Policy changes
- Competing Public priorities

Brief Explanation

In FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a $2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The Biosystems Engineering and Soil Science department's educational efforts to promote sustainability were evaluated through interviews, observations, and expert estimations. Evaluation results included the following:

1. Increased adoption of nutrient management tools by Tennessee livestock and row crop producers resulted in 32 stream sections totaling over 293 miles being removed from the state's 303d list of impacted streams and rivers for one or more pollutants due to animal and row crop agriculture.
2. 1,798 livestock and row crop producers attending field days, workshops and county meetings increased their knowledge and skills on nutrient management practices that promote sustainable production systems.
3. More than 80 secondary fuel containment structures, holding 410,000 gallons of fuel and other oils regulated under the EPA's Oil Pollution Prevention, have been constructed,

most with direct design input from the University of Tennessee Extension, significantly reducing producer liability and potential environmental contamination in the event of an oil spill.

4. More than 290 CAFOs have received state or federal CAFO permits and are now conducting nutrient management with regulatory approval of their Nutrient Management Plans, improving profitability, reducing liability for manure applications, and ensuring compliance with state and federal CAFO regulations.

Key Items of Evaluation

The Biosystems Engineering and Soil Science department's educational efforts to promote sustainability were evaluated through interviews, observations, and expert estimations. Evaluation results included the following:

1. Increased adoption of nutrient management tools by Tennessee livestock and row crop producers resulted in 32 stream sections totaling over 293 miles being removed from the state's 303d list of impacted streams and rivers for one or more pollutants due to animal and row crop agriculture.
2. 1,798 livestock and row crop producers attending field days, workshops and county meetings increased their knowledge and skills on nutrient management practices that promote sustainable production systems.
3. More than 80 secondary fuel containment structures, holding 410,000 gallons of fuel and other oils regulated under the EPA's Oil Pollution Prevention, have been constructed, most with direct design input from the University of Tennessee Extension, significantly reducing producer liability and potential environmental contamination in the event of an oil spill.
4. More than 290 CAFOs have received state or federal CAFO permits and are now conducting nutrient management with regulatory approval of their Nutrient Management Plans, improving profitability, reducing liability for manure applications, and ensuring compliance with state and federal CAFO regulations.

V(A). Planned Program (Summary)

Program # 7

1. Name of the Planned Program

Family Economics

☑ Reporting on this Program

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 FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	20.0	2.0	0.0	0.0
Actual Paid Professional	14.0	2.0	0.0	0.0
Actual Volunteer	4.0	0.6	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
295097	84055	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1040747	84055	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
500000	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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 "Financial Security in Later Life" initiative and with the "America Saves" national organization and other national and state partners with the TN Jumpstart Coalition. Extension hosted training conferences to strengthen the capacity of educators to teach financial and savings education. Extension deployed its On My Own curriculum and youth TN Saves in over 100 financial education simulations annually throughout the state to reach 30,000 youth with savings and financial education. Additional classes, newsletters, 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.

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Family Economics Planned Program was enhanced through the service of 11 Tennessee Extension personnel on the "Financial Security for All" CoP. Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	53557	8631077	71103	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	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
2012	238

Output #2

Output Measure

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

Year	Actual
2012	41954

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 Financial Education Simulation: 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 reduced debt.
8	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
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1553

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
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1395

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
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1553

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 Financial Education Simulation: Number of participants who felt more strongly that they needed to get a good education.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	15827

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
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2119

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
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	5386

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 reduced debt.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1395

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: 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	Actual
2012	5

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

- Appropriations changes

Brief Explanation

In FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a $2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Tennessee Saves

The Family and Consumer Sciences Tennessee Saves program teaches personal savings and financial management. 50% of participants increased their savings or investment, generating an annual estimated savings/investment of $4.4 million. In addition, 33% reduced debt an average of $208 per month, for a total estimated debt reduction of more than $1.1 million annually.

Key Items of Evaluation

Tennessee Saves

The Family and Consumer Sciences Tennessee Saves program teaches personal savings and financial management. 50% of participants increased their savings or investment, generating an annual estimated savings/investment of $4.4 million. In addition, 33% reduced debt an average of $208 per month, for a total estimated debt reduction of more than $1.1 million annually.

V(A). Planned Program (Summary)

Program # 8

1. Name of the Planned Program

Food Safety

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
125	Agroforestry	0%	0%	3%	
308	Improved Animal Products (Before Harvest)	0%	0%	3%	
311	Animal Diseases	0%	0%	16%	
312	External Parasites and Pests of Animals	0%	0%	3%	
315	Animal Welfare/Well-Being and Protection	0%	0%	2%	
501	New and Improved Food Processing Technologies	0%	0%	15%	
502	New and Improved Food Products	0%	0%	6%	
702	Requirements and Function of Nutrients and Other Food Components	0%	0%	6%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	100%	100%	26%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%	0%	4%	
806	Youth Development	0%	0%	5%	
901	Program and Project Design, and Statistics	0%	0%	5%	
903	Communication, Education, and Information Delivery	0%	0%	6%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	9.0	1.0	26.0	0.0
Actual Paid Professional	4.0	1.0	27.2	0.0
Actual Volunteer	2.0	0.2	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**
98365	0	452330	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
346915	0	3207302	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
140321	0	898194	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

In the Safe Food for Tennessee initiative, UT and TSU Extension taught lessons in homes, schools, community centers, churches, and other accessible locations to consumers. The lessons in "Cook's Corner" and "Safe Food for You" were used 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 to reach youth. 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 safe food practices:

- 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.

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.

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.

2. Brief description of the target audience

- Consumers
- Employees of Child Care Centers
- SNAP and WIC clients

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Food Safety Planned Program was enhanced through the service of four Tennessee Extension personnel on the "Food Safety" CoP, including the CoP leader who serves as a specialist in the UT Extension Department of Family and Consumer Sciences. Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	16643	5845610	1423	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	2	48	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of exhibits displayed to promote safe food handling practices.

Year	Actual

2012	93

Output #2

Output Measure

- Number of research-based publications distributed by Extension to educate producers, processors, and consumers.

Year	Actual
2012	29028

Output #3

Output Measure

- Identified a novel bacteriophage protein that has broad spectrum anti-microbial activity against gram-negative plant and animal pathogens. (Ghosh)

Year	Actual
2012	0

Output #4

Output Measure

- Identified the impacts of quorum sensing mediated bacteriophage induction in food-borne pathogens leading to the development of USDA food safety grant. (Ghosh)

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Safe Food Handling for Consumers: Number of consumers who more often washed their hands with soap and warm running water before preparing food.
2	Safe Food Handling for Consumers: Number of consumers who now separate raw, cooked, and ready-to-eat foods while storing and preparing.
3	Safe Food Handling for Consumers: Number of consumers who now use a thermometer to check the internal temperature of food.
4	Safe Food Handling for Consumers: Number of consumers who canned vegetables following a tested recipe.
5	Adoption of a homogenization pasteurization process as an alternative to thermal processing by small or mid-sized juice processors (Davidson).
6	If petroleum prices continue to increase, we may identify several applications for chitosan to replace cellulose in the pharmaceutical or plastics industries (Zivanovic).
7	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).
8	Safe Food Handling by Consumers
9	Safe Manufacturing of Commercial Food Products and Commodities
10	New Approaches in Fruit, Vegetable Preservation (Zivanovic)

Outcome #1

1. Outcome Measures

Safe Food Handling for Consumers: Number of consumers 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	Actual
2012	14235

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 for Consumers: Number of consumers who now separate raw, cooked, and ready-to-eat foods while storing and preparing.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3787

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 for Consumers: Number of consumers who now use a thermometer to check the internal temperature of food.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2216

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

Safe Food Handling for Consumers: Number of consumers who canned vegetables following a tested recipe.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	1674

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 #5

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 #6

1. Outcome Measures

If petroleum prices continue to increase, we may identify several applications for chitosan to replace cellulose in the pharmaceutical or plastics industries (Zivanovic).

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results
Created and applied chitosan-gallic acid multifunctional packaging for reduction of oxidation and extension of shelf life of foods susceptible to rancidity.

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

Outcome #7

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).

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Safe Food Handling by Consumers

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Centers for Disease Control and Prevention (CDC) estimates that foodborne diseases cause approximately 76 million illnesses, 325,000 hospitalizations, and 5,000 deaths in the United States each year. The Economic Research Service has estimated the annual U.S. economic costs incurred for the five major bacterial pathogens alone to be $6.9 billion. The cost estimate includes medical costs, productivity losses from missed work, and an estimate of the value of premature death.

What has been done
A total of 244,885 direct contacts, which included food safety education, were made by SNAP-ED programs in Tennessee during 2012; 2.6 million contacts were made indirectly through exhibits, newspaper articles, publications, radio, television, and web sites.

Results
Research has demonstrated that unsafe consumer food handling behaviors increases the risk for foodborne illness. The following consumer food handling behavior changes were reported:

*85% (3510 of 4143 participants) refrigerate perishable foods within two hours.
*85% (2024 of 2392 participants) separate raw, cooked and ready-to-eat foods while storing and preparing.
*60% (1994 of 3291 participants) surveyed used a thermometer to check the internal temperature of food.
*72% (2184 of 3030 participants) surveyed used a thermometer to check the internal temperature of their refrigerator.
*86% (13666 of 15790 youth participants) now wash hands more often.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Safe Manufacturing of Commercial Food Products and Commodities

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Food safety challenges facing the commercial food industries include implementing best practices for safely manufacturing food, regulatory compliance pertinent to the safe manufacture of foods, and implementing food safety practices in the growing and harvesting of meat, poultry and produce.

What has been done
UT Extension programming in food safety resulted in over 7,500 direct contacts during 2012. Food safety best practices and regulatory compliance were taught at over 300 group meetings and on-site visits. Our science-based food safety message was also carried to nearly 30,000 stakeholders by exhibits, radio programs, TV stories, newspaper articles and other publications.

Results

Domestic Kitchen Workshop assists the cottage food industry with food safety best practices. This course provides an introduction to food microbiology, Good Manufacturing Practices (GMPs), cleaning and sanitation, Hazard Analysis and Critical Control Points (HACCP), food labeling, and allergen control for food manufacturers wishing to prepare non-potentially hazardous foods in their home kitchen, and it is the first step in meeting requirements outlined in TN Dept. of Ag. Regulations Chapter 0080-4-11. Over the past year, a web-based course was also developed and implemented to increase access to interested Tennesseans. Over 150 certified participants took part in this training in 2012. The course improved participant food safety knowledge by 21%, and all participants who evaluated the program found that they would be able to practically apply the course content to their domestic kitchen activities.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

New Approaches in Fruit, Vegetable Preservation (Zivanovic)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Advances are needed in nutritional quality and shelf-life of rations for the U.S. military.

What has been done
We evaluated a military database with over ten thousand MRE items with various quality deteriorations.

Results
Observations from the project are currently used to design a new database to collect data from regular MRE testing in all army storage facilities.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
502	New and Improved Food Products
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes

Brief Explanation

In FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a $2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

In 2012, the University of Tennessee Department of Family and Consumer Sciences conducted a statewide evaluation of its consumer food preservation program with these notable outcomes:

*811 dial-gauge lids were tested.
*719 of 1049 participants surveyed canned pickles following a tested recipe.
*805 of 992 participants surveyed canned tomatoes following a tested recipe.
*869 of 1072 participants surveyed canned vegetables following a tested recipe.
*693 of 986 participants surveyed processed pickles in a water-bath canner.
*758 of 961 participants surveyed processed tomatoes in a water-bath or pressure canner.
*821 of 1019 participants surveyed processed vegetables in a pressure canner.
*877 participants process high-acid foods in a water bath canner.

Key Items of Evaluation

In 2012, the University of Tennessee Department of Family and Consumer Sciences conducted a statewide evaluation of its consumer food preservation program with these notable outcomes:

*811 dial-gauge lids were tested.
*719 of 1049 participants surveyed canned pickles following a tested recipe.
*805 of 992 participants surveyed canned tomatoes following a tested recipe.
*869 of 1072 participants surveyed canned vegetables following a tested recipe.
*693 of 986 participants surveyed processed pickles in a water-bath canner.
*758 of 961 participants surveyed processed tomatoes in a water-bath or pressure canner.

*821 of 1019 participants surveyed processed vegetables in a pressure canner.

*877 participants process high-acid foods in a water bath canner.

V(A). Planned Program (Summary)

Program # 9

1. Name of the Planned Program

Forestry, Wildlife, and Fishery Systems

☑ Reporting on this Program

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%	4%	
123	Management and Sustainability of Forest Resources	75%	75%	28%	
124	Urban Forestry	0%	0%	3%	
125	Agroforestry	10%	10%	0%	
133	Pollution Prevention and Mitigation	0%	0%	5%	
135	Aquatic and Terrestrial Wildlife	10%	10%	21%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	4%	
206	Basic Plant Biology	0%	0%	3%	
213	Weeds Affecting Plants	0%	0%	2%	
301	Reproductive Performance of Animals	0%	0%	3%	
311	Animal Diseases	0%	0%	2%	
312	External Parasites and Pests of Animals	0%	0%	4%	
605	Natural Resource and Environmental Economics	5%	5%	8%	
721	Insects and Other Pests Affecting Humans	0%	0%	2%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%	0%	3%	
903	Communication, Education, and Information Delivery	0%	0%	8%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	8.0	1.0	24.0	0.0

Actual Paid Professional	14.0	2.0	37.9	0.0
Actual Volunteer	4.0	0.6	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**
295097	84055	767459	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1040747	84055	3265344	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
43040	0	2231129	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

UT and TSU Extension partnered with the Tennessee Forestry Association to plan and conduct group meetings to inform forest landowners of issues pertaining to forestry and wildlife. Topics included management and marketing. 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. Demonstrations were provided for landowners and forestry workers. Extension Agents and Specialists educated attendees at County Forestry Landowners Association. UT and TSU Extension worked closely with private consultants, Tennessee Wildlife Resources Agency employees, Tennessee Division of Forestry and others in forestry related industries to develop and deliver educational programs and activities for professionals and landowners.

UT and TSU Extension continued to make one-on-one contacts with landowners throughout the year and use 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 target 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.

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension. This Forestry, Wildlife, and Fisheries Planned Program was enhanced through the service of:

- one Tennessee Extension personnel on the "Climates, Forests and Woodlands" CoP,
- one Tennessee Extension personnel on the "Extension Wildfire Information Network" CoP,
- one Tennessee Extension personnel on the "Feral Hogs" CoP, and
- one Tennessee Extension personnel on the "Wildlife Damage Management" CoP.

Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	24820	809375	3232	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	10	36	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2012	345000

Output #2

Output Measure

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

Year	Actual
2012	59232

Output #3

Output Measure

- A significant risk of strength and value loss in railway tie processing was documented. A low-cost, environmentally-benign protective treatment was identified and will be evaluated in the coming months. (Taylor)

Year	Actual
2012	0

Output #4

Output Measure

- We identified high levels of a rarely-studied Lyme-like pathogen Borrelia miyamotoi among wild

turkeys in Tennessee. Subsequent research by medical labs in Russia and the US has confirmed that this pathogen can cause human disease, and may help explain 'Lyme like' symptoms among humans in Southeastern states. (Hickling)

Year	Actual
2012	0

Output #5

Output Measure

- The completion and approval by USDA APHIS of our Beneficial Insects Containment Laboratory will greatly enhance state, regional, and national biological control efforts directed against invasive pests through the careful evaluation and selection of beneficial insects. This Laboratory, which will foster and enhance cooperative efforts with USDA APHIS, as well as other scientists and agencies throughout the U.S., as well as globally, will expedite and improve our management of invasive species, such as hemlock woolly adelgid, emerald ash borer, marmorated stink bug, kudzu bug, and other pests. (Grant)

Year	Actual
2012	0

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	Golden-winged warbler conservation strategy for the Cumberland Mountains of Tennessee delivery to FWS. (Buehler)
5	Extension's Tennessee Master Logger Program
6	Biomass Feedstock Availability and Assessment (Hodges)
7	Thousand Cankers Disease on Black Walnut (Grant)

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	Actual
2012	365

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	Actual
2012	249

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

Golden-winged warbler conservation strategy for the Cumberland Mountains of Tennessee delivery to FWS. (Buehler)

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Extension's Tennessee Master Logger Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Training of loggers in Best Management Practices (BMPs) is necessary to protect water quality during forest harvesting operations. Log bucking is the process of cutting trees into the logs that are fed into sawmills. The bucking decisions greatly impact the value of the logs, lumber and finished products that come from the forest.

What has been done
In 2012, Extensioon conducted six logger workshops of five days each (basic training) for 92 participants and 19 continuing education logger workshops (8 hours each) for 405 participants.

Results
*92 loggers increased their knowledge on BMPs to protect water quality during harvesting operations. These loggers impact approximately 27,500 acres of forest land consisting of 69 million board feet of timber harvested with an estimated value of $10 million to landowners on an annual basis.
*The Tennessee Master Logger educational program has reached more than 2,600 loggers since 1983 or about 90% of the state logging workforce.
*405 loggers attended and increased their knowledge about BMPs in a 1-day continuing education course (various subjects).
*16 Log Bucking Optimization training classes have been held over the past three years where 294 Master Loggers have increased their knowledge of the importance of and techniques for improving log value through better bucking. As a result of this training, Tennessee loggers have increased their revenues by an estimated $1.5 million.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #6

1. Outcome Measures

Biomass Feedstock Availability and Assessment (Hodges)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Planners need to assess the quantity, quality, harvesting, and transportation costs of various biomass feedstocks.

What has been done
BioSAT allows users to assess the quantity and quality of multiple feedstocks, as well as assess the resource, harvesting, and transportation costs at multiple sites.

Results
Our bioenergy policy index is not only helpful for new business investors in making siting decisions, but also for state policy makers considering new woody biomass relevant legislation to spur the bioenergy industry. Similarly the state-level assessment of biomass supply provides an assessment of the potential supplies for bioenergy facilities in Tennessee at various production levels.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
125	Agroforestry
605	Natural Resource and Environmental Economics

Outcome #7

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	Actual
2012	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.

What has been done
We initiated studies on the invasive pest, walnut twig beetle, that is responsible for transmitting the thousand cankers disease, we have documented the life history of this pest with data providing information that could be used to manage pest populations on black walnut.

Results
Documented eight potential predators and two parasitoids of WTB, and the consumption rates of three clerid species in choice and no-choice tests. Determined use of imidacloprid has a negative impact on non-target walnut tissue and associated insects due to concentration levels in branch, leaf, core and walnut samples over a two-year period.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources
125	Agroforestry

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 FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a $2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The UT Department of Forestry, Wildife and Fisheries conducted a two-year evaluation project to determine if Master Loggers, trained through UT Extension, were implementing Best Management Practices (BMP) on their logging operations. Statewide, 205 logging sites were evaluated in 2011 and 2012 to determine BMP implementation rates and compliance for 43 different factors (n=8815). BMP categories evaluated included haul roads, skid roads, log landings, stream crossings and streamside management zones. The results included:

- A statewide BMP compliance rate of 90% was determined from the study.
- Significant water quality risks from harvesting operations were found on 5 of the 205 (2.5%) of the sampled logging sites. Loggers from four of these five sites were not trained Master Loggers.
- Those loggers who received Master Logger training were more inclined to implement BMPs correctly (94% overall) than those who had not received the training.

Key Items of Evaluation

The UT Department of Forestry, Wildife and Fisheries conducted a two-year evaluation project to determine if Master Loggers, trained through UT Extension, were implementing Best Management Practices (BMP) on their logging operations. Statewide, 205 logging sites were evaluated in 2011 and 2012 to determine BMP implementation rates and compliance for 43 different factors (n=8815). BMP categories evaluated included haul roads, skid roads, log landings, stream crossings and streamside management zones. The results included:

- A statewide BMP compliance rate of 90% was determined from the study.
- Significant water quality risks from harvesting operations were found on 5 of the 205 (2.5%) of the sampled logging sites. Loggers from four of these five sites were not trained Master Loggers.
- Those loggers who received Master Logger training were more inclined to implement BMPs correctly (94% overall) than those who had not received the training.

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Global Food Security and Hunger

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
205	Plant Management Systems	50%	50%	0%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%	5%	0%	
212	Pathogens and Nematodes Affecting Plants	5%	5%	0%	
601	Economics of Agricultural Production and Farm Management	40%	40%	0%	
	Total	100%	100%	0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	27.0	2.0	110.0	0.0
Actual Paid Professional	27.0	3.0	0.0	0.0
Actual Volunteer	4.0	0.6	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**
590194	168110	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2081495	168110	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
49992	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

In 2012, Extension agents and specialists taught row crops producers the following:

- conservation tillage;
- planting insect-tolerant crops;
- planting herbicide-tolerant crops;
- spraying with foliar fungicide to manage disease;
- using recommended varieties.

Producers of corn, soybeans, wheat, and commercial vegetables are challenged each year with high costs of production, relatively low profit margins, and a host of other issues such as plant diseases, weather, and competition from other countries in world markets. Because farmers often operate with a relatively low profit margin, economic feasibility as well as efficacy of new genetics or technology for pest and disease control is of paramount importance. Farmers need to be aware of the comparative performance of new technologies in order to make appropriate decisions on pest and disease management. Little information exists about the economics of those technologies and systems under differing production conditions. In addition, the economics of systems vary as the combination of system and production environment change, and as relative prices and costs change.

2. Brief description of the target audience

The program was targeted to all Tennessee corn, soybeans, wheat and commercial vegetable producers.

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension. This Global Food Security and Hunger Planned Program was enhanced through the service of

- four Tennessee Extension personnel on the "Bee Health" CoP, including the leader of the CoP.
- two Tennessee Extension personnel on the "Corn and Soybean" CoP.
- one Tennessee Extension personnel on the "eOrganic" CoP.
- three Tennessee Extension professionals on the "Grapes" CoP.

Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

We were funded as part of a 21 member national USDA/NIA/CAP team from 17 institutions to reverse managed bee decline. As lead institution we formed, certified and maintained the eXtension Bee Health CoP with 38 leaders and 120 members from 37 states who provided 298 pages of content and used the YouTube Bee Health channel to provide 31 videos for stakeholders. In 2012 use of "Bee Health": eXtension website increased 17.4% to 182,761 page views. YouTube channel subscribers increased 49.4% to 1444, and YouTube views increased 54% to 394,510.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	92605	28941247	5602	0

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

Patent Applications Submitted

Year: 2012

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	5	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of exhibits displayed to educate producers.

Year	Actual
2012	59

Output #2

Output Measure

- Number of research-based publications distributed to educate producers.

Year	Actual
2012	96912

Output #3

Output Measure

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

Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Release a new soybean variety tailored to Tennessee needs (Pantalone).
  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	Wheat: Number of acres utilized precision agriculture technologies for variable rate application of plant growth regulators, defoliants, or pesticides.
2	Wheat: Number of producers who adopted UT recommended resistance management strategies to control pests (weeds, insects, diseases).
3	Soybeans: Number of producers who learned soybean best management practices that can improve production potential (e.g., conservation tillage, winter covers, plant population, row spacing, planting dates, plant growth regulators, harvest, variety selection, irrigation, fertility).
4	Soybeans: Percentage increase in Tennessee soybean yield by using recommended crop management strategies for insects, weeds, or plant diseases.
5	Corn: Percentage increase in Tennessee corn yield by using recommended crop management strategies for insects, weeds, or plant diseases.
6	Corn: Number of producers who reported harvesting higher corn yields and/or better quality crops using university variety trials.
7	Additional income earned by Tennessee producers by using UT Extension crop variety research trial results (in millions of dollars).
8	Agronomic testing of corn, soybean, wheat, grain sorghum and oats, varieties tested. (Allen)
9	Target number of research laboratories using our reverse-genetic tool for Phytophthora gene function analysis (Lamour).
10	Production of a 'hand-held' diagnostic device for Johne's disease by merging our diagnostic method and microfluidic technology. (Eda)
11	Extension's Work Produces Significant Economic Impact for Corn, Soybeans, and Wheat Producers
12	Controlling Diseases of Fruit and Vegetable Crops in Tennessee

Outcome #1

1. Outcome Measures

Wheat: Number of acres utilized precision agriculture technologies for variable rate application of plant growth regulators, defoliants, or pesticides.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	350

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
212	Pathogens and Nematodes Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #2

1. Outcome Measures

Wheat: Number of producers who adopted UT recommended resistance management strategies to control pests (weeds, insects, diseases).

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	652

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
212	Pathogens and Nematodes Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #3

1. Outcome Measures

Soybeans: Number of producers who learned soybean best management practices that can improve production potential (e.g., conservation tillage, winter covers, plant population, row spacing, planting dates, plant growth regulators, harvest, variety selection, irrigation, fertility).

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	861

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
212	Pathogens and Nematodes Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #4

1. Outcome Measures

Soybeans: Percentage increase in Tennessee soybean yield by using recommended crop management strategies for insects, weeds, or plant diseases.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	8

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
212	Pathogens and Nematodes Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #5

1. Outcome Measures

Corn: Percentage increase in Tennessee corn yield by using recommended crop management strategies for insects, weeds, or plant diseases.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	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
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #6

1. Outcome Measures

Corn: Number of producers who reported harvesting higher corn yields and/or better quality crops using university variety trials.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	3825

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
212	Pathogens and Nematodes Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #7

1. Outcome Measures

Additional income earned by Tennessee producers by using UT Extension crop variety research trial results (in millions of dollars).

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	170

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
212	Pathogens and Nematodes Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #8

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #9

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 #10

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #11

1. Outcome Measures

Extension's Work Produces Significant Economic Impact for Corn, Soybeans, and Wheat Producers

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Tennessee farmers use UT Extension information to make decisions about variety selection and crop management.

What has been done
UT Extension crop variety testing data is used extensively by 80% of these farmers to select the seed that they use to plant their crops.

Results
Results from the variety testing program have helped farmers increase yields by identifying the varieties that will perform best in their farming operations. The higher yields have resulted in approximately $170 million in additional income annually to Tennessee farmers. Farmers reported $3.9 million in reduced pest control costs by following Extension recommendations for controlling insects, weeds, or plant diseases.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #12

1. Outcome Measures

Controlling Diseases of Fruit and Vegetable Crops in Tennessee

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Diseases rob Tennessee fruit and vegetable growers of 5 to 10 percent of their crops, with the potential for much greater losses in any given year. There is a need to avoid disastrous losses that can threaten survival of some farms, while reducing the losses to diseases that recur on a regular basis.

What has been done
In 2012, UT and TSU Extension conducted 460 group meetings to educate producers on crop rotations, resistant varieties, how to choose the most appropriate spray materials, and how to implement IPM programs. Growers were alerted to possible impending outbreaks of certain diseases and made aware of the importance of remaining prepared at all times.

Results
Observations and personal interviews were used to determine the outcomes of the educational activities:
*166 fruit and/or vegetable producers adopted an integrated pest management approach to insect, mite and disease control.
*446 fruit and/or vegetable producers learned to identify pest insects, mites and diseases.
*148 fruit and vegetable producers adopted organic and/or sustainable production practices on their farm.

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Appropriations changes

Brief Explanation

Challenges facing the row crops industry include understanding and adopting changes in technology, integrated pest management, sustainable agronomic practices and profitability. Corn was planted and harvested on more than 900,000 acres in Tennessee in 2012. Early season moisture deficits severely reduced yield potential in most counties across the state and there was a final state average yield of 85 bushels/acre (Jan 2013 USDA crops report). Corn prices were higher than normal with most producers receiving more than $7.00 per bushel for their crop. Projected cash receipts for corn grain in 2012 are more than $600 million.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The following results are from our statewide evlauation of Extension programs that support corn producers:

• Producers increased corn yield by 511,566 bushels/acre by selecting top yielding varieties on 1,113,006 acres of corn increasing their income by $1,534,698.
• 269,646 acres of corn scouted by a producer or independent crop consultant to help make crop management decisions.
• 87,594 acres of corn scouted by a UT-trained scout to help make crop management decisions.
• 3640 corn producers adopted UT recommended resistance management strategies to control pests (weeds, insects, diseases).
• 959 corn producers increased their knowledge of recommended agronomic practices and understanding of their benefits and use.
• 373 corn producers report a $381,586 reduction in pest control costs by following recommended control strategies for insects, weeds or plant diseases.
• 3879 corn producers used data provided by UT publications or UT Internet resources and made changes in their production practices.

Key Items of Evaluation

The following results are from our statewide evlauation of Extension programs that support corn producers:

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- 269,646 acres of corn scouted by a producer or independent crop consultant to help make crop management decisions.
- 87,594 acres of corn scouted by a UT-trained scout to help make crop management decisions.
- 3640 corn producers adopted UT recommended resistance management strategies to control pests (weeds, insects, diseases).
- 959 corn producers increased their knowledge of recommended agronomic practices and understanding of their benefits and use.
- 373 corn producers report a $381,586 reduction in pest control costs by following recommended control strategies for insects, weeds or plant diseases.
- 3879 corn producers used data provided by UT publications or UT Internet resources and made changes in their production practices.

V(A). Planned Program (Summary)

Program # 11

1. Name of the Planned Program

Health and Safety

☑ Reporting on this Program

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%	
724	Healthy Lifestyle	70%	70%	0%	
805	Community Institutions, Health, and Social Services	25%	25%	0%	
	Total	100%	100%	0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	15.0	2.0	0.0	0.0
Actual Paid Professional	18.0	1.0	0.0	0.0
Actual Volunteer	6.0	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
393463	112073	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1387663	112073	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
155975	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Dining with Diabeteswas a three-session course 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. 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 included:

- 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 also targeted arthritis sufferers. Extension offered this exercise instructional program to individuals throughout the state. Research indicates that this regimen builds strength and helps those with arthritis to reduce pain and increase mobility.

2. Brief description of the target audience

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

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Health and Safety Planned Program was enhanced through the service of

- two Tennessee Extension personnel on the "Drinking Water and Human Health" CoP, and
- seven Tennessee Extension personnel on the "Extension Disaster Education Network" CoP.

Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	13118	11591836	26509	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	0	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
2012	486

Output #2

Output Measure

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

Year	Actual
2012	395114

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	Living Well with Chronic Conditions in Tennessee

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
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	568

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
805	Community Institutions, Health, and Social Services

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
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	262

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
805	Community Institutions, Health, and Social Services

Outcome #3

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	98

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
805	Community Institutions, Health, and Social Services

Outcome #5

1. Outcome Measures

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

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

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

Not Reporting on this Outcome Measure

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
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	146

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
805	Community Institutions, Health, and Social Services

Outcome #8

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	341

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
805	Community Institutions, Health, and Social Services

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
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	341

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
805	Community Institutions, Health, and Social Services

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	Actual
2012	661

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	Actual
2012	568

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

Living Well with Chronic Conditions in Tennessee

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Chronic diseases, such as arthritis, asthma, cancer, depression, diabetes, heart disease, obesity and pulmonary disease, are among the most prevalent and costly health problems facing Tennessee. These illnesses account for 70% of deaths and 75% of health care costs in the United States. The consequences of chronic illness include a myriad of physical, mental, and social consequences that affect patients and their family members, friends and caregivers. In addition to the patient education provided by health care providers, people need the knowledge and skills necessary to self-manage their chronic condition. By becoming good self-managers, they can live the best possible quality of life and control personal health care costs.

What has been done
Recognizing that people with chronic conditions must make day-to-day decisions (self-management) about their illness, UT Extension has partnered with the Tennessee Department of Health and the Tennessee Commission on Aging and Disability to offer Living Well with Chronic Conditions Program, the Stanford Chronic Disease Self-Management Program. Extension educators in 63 counties were certified to conduct this program in partnership with clinics, health departments, hospitals and senior centers. 17,570 contacts were made, with 1,448 of the contacts attending the self-management education program. 2,659,939 indirect contacts received chronic disease self-management information through exhibits, newspaper articles, publications, and radio and TV programs.

Results
Six months after completing the program, 573 participants completed a follow-up survey and reported:
*71% (404 of 573) are applying healthy eating principles when making food decisions.
*67% (381 of 569) are better self-managers of their chronic condition.
*67% (329 of 491) are finding their chronic condition is interfering less with the things they like to do.
*66% (359 of 547) are physically active.
*69% (270 of 393) have fewer visits to the emergency room.
*58% (326 of 561) have less pain from their chronic condition.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
805	Community Institutions, Health, and Social Services

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Appropriations changes
- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

In FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a $2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Health Literacy Economic Impact

Increasing health literacy and adopting healthy habits such as increasing exercise and participating in health screenings have shown to improve health and reduce the risk of many chronic diseases, such as diabetes and high blood pressure. For every dollar spent on UT Family and Consumer Sciences health education programs, $25 is saved on direct medical costs and indirect expenditures, resulting in a $48.4 million benefit to Tennessee.

Key Items of Evaluation

Health Literacy Economic Impact

Increasing health literacy and adopting healthy habits such as increasing exercise and participating in health screenings have shown to improve health and reduce the risk of many chronic diseases, such as diabetes and high blood pressure. For every dollar spent on UT Family and Consumer Sciences health education programs, $25 is saved on direct medical costs and indirect expenditures, resulting in a $48.4 million benefit to Tennessee.

V(A). Planned Program (Summary)

Program # 12

1. Name of the Planned Program

Horticultural Systems

☑ Reporting on this Program

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%	5%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	4%	
202	Plant Genetic Resources	0%	0%	3%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	7%	
204	Plant Product Quality and Utility (Preharvest)	0%	0%	3%	
205	Plant Management Systems	60%	60%	8%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%	10%	4%	
212	Pathogens and Nematodes Affecting Plants	0%	0%	31%	
213	Weeds Affecting Plants	10%	10%	12%	
215	Biological Control of Pests Affecting Plants	0%	0%	5%	
216	Integrated Pest Management Systems	10%	10%	12%	
312	External Parasites and Pests of Animals	10%	10%	0%	
607	Consumer Economics	0%	0%	2%	
701	Nutrient Composition of Food	0%	0%	4%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	36.0	3.0	26.0	0.0
Actual Paid Professional	36.0	5.0	36.7	0.0
Actual Volunteer	12.0	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**
786926	224147	1098260	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2775326	224147	4453566	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	754001	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Variety evaluation of several different vegetable crops will be conducted to determine suitability to climate, soils and cultural practices for state producers. Yields, quality and market potential will be evaluated to assess potential production by growers seeking additional crops or alternative crops. Crops suitable for greenhouse production will be 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 just been made in construction and renovation of greenhouse facilities on campus and at certain Research and Education Centers. These will be 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 business.

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Horticultural Systems Planned Program was enhanced through the service of 14 Tennessee Extension personnel on the "Consumer Horticulture" CoP. Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	258233	10945368	8605	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	2	39	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Horticultural workshops and conferences.

Year	Actual
2012	0

Output #2

Output Measure

- Number of exhibits displayed to teach best practices in horticultural systems.

Year	Actual
2012	130

Output #3

Output Measure

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

Year	Actual
2012	33868

Output #4

Output Measure

- The impact of our work on two popular fungicide modes of action will allow turfgrass managers to appropriately use these products and better understand their abilities to manage abiotic stress in addition to the diseases they help manage. (Horvath)

Year	Actual
2012	0

Output #5

Output Measure

- Developed a high quality reference genome for the vegetable pathogen Phytophthora capsici that is freely available online. This provides a valuable resource for researchers worldwide. (Lamour)

Year	Actual
2012	0

Output #6

Output Measure

- We continue to improve trap designs and are successfully monitoring seasonal flights of the walnut twig beetle, which vectors Thousand Cankers Disease in walnut trees. (Klingeman)

Year	Actual
2012	0

Output #7

Output Measure

- Soil incorporation of mustard seed meal (biofumigation) or dried molasses (anaerobic soil disinfestation), followed by irrigation and covering with plastic can reduce some soilborne pathogens and improve strawberry yield compared to plant yields on untreated soil. (Deyton)

Year	Actual
2012	0

Output #8

Output Measure

- Discovered and implemented of several new molecular markers critically important for successful completion of insect phylogenetic studies. (Moulton)

Year	Actual
2012	0

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

Annual Tennessee economic contribution of Encore azaleas based on TAES research, dollars (M. Windham).

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Consumer Horticulture: Number of consumers who applied fewer fertilizers and pesticides due to a better understanding of landscape best management practices.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2749

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
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #4

1. Outcome Measures

Consumer Horticulture: Number of consumers who learned about plant selection and proper planting to save money and time in the landscape.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	8203

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
212	Pathogens and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #5

1. Outcome Measures

Controlling Insect and Mite Pests of Ornamental Landscape Plants and Commercial Ornamental Horticultural Crops

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Insect and mite pests cause millions of dollars of damage to turfgrass and ornamental plants in Tennessee each year. New insect or mite associated threats to ornamental plants include: rose rosette disease, thousand cankers disease, granulate ambrosia beetle, camphor shot borer, emerald ash borer, etc.

What has been done
Extension agents and area specialists in 36 counties conducted educational programs in consumer and commercial horticulture reaching over 177,000 direct contacts during 2012. Pest management practices were taught by Extension educators at over 700 group meetings and during 2,000 plus site visits.

Results
Educational activities across the state were evaluated to determine the following commercial and consumer horticulture impacts:
*1602 green industry personnel adopted an integrated pest management approach to insect, mite, and disease control in turfgrass and/or ornamental plants.
*876 green industry personnel increased business profitability and sustainability through improved insect, mite and disease control in turfgrass and/or ornamental plants.
*2686 green industry personnel learned to correctly identify pest insects, mites and diseases of turfgrass and/or ornamental plants.
*1094 Master Gardeners have used the knowledge and skills they learned in this program to assist 4983 people to identify pests and/or the damage they cause.
*1045 Master Gardeners have used the knowledge and skills they learned in this program to assist 5424 people to identify symptoms of plant 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
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #6

1. Outcome Measures

Extension Commercial Ornamental Horticulture Program in Tennessee

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	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 $ 663,385 in increased savings, increased income, and one-time capital purchases. Other impacts included:
*1209 professionals added additional services and/or marketing practices.

*502 professionals developed or made adjustment to their business plans.
*1298 professionals implemented recommended cultural practices: fertilization, soil sampling, propagation, irrigation, etc.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #7

1. Outcome Measures

TSU Extension's Sustainable Landscapes Program Promotes Natural Playgrounds

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Sustainable landscapes benefit the health and wellbeing of, and provide environmental educational opportunities for people who live in rural and urban communities across Tennessee. Urbanization (building on farmlands and natural areas) has economic and social benefits, but it also causes environmental degradation, habitat destruction, and loss of productive agricultural land. Issues include water pollution due to pesticide use by residential home owners and the landscape industry, and increased flooding due to removal of natural vegetation associated with waterways. These issues impact the health and welfare of farm operators and residents of rural and urban communities.

What has been done
The Sustainable Landscapes Extension Program was established to address issues of urbanization by providing environmental education opportunities to children and adults in Tennessee. During 2012 Sustainable Landscapes delivered 9 workshops on natural playgrounds to parents and early childhood educators in Nashville, Memphis, Chattanooga, Clarksville, and Knoxville.

Results

A total of 154 people were directly provided information on building and managing natural playgrounds through their participation in Natural Playgrounds Workshops. Of those, approximately 10% (17 people) reported being more prepared to develop a natural playground at their early childhood education location. All of these individuals indicated that they would appreciate further information on designing, construction, and management natural playgrounds.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #8

1. Outcome Measures

Beauveria bassiana Against Insect, Plant Pathogens (Gwinn)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Beauveria bassiana, a fungus known for its ability to parasitize various crop insect pests, can also reduce losses due to fungal pathogens that attack plant roots.

What has been done
Colonization of plants by B. bassiana was only slightly reduced by planting in monarda herbage. There was no effect on seed germination for four of the five herbages tested.

Results
Both seed application of Beauveria bassiana and soil amendment with bioactive monarda herbages are sustainable approaches that can play a role in suppressing damping-off of tomato seedlings. Combining or 'stacking' these treatments is a promising strategy for protecting tomato seedlings from disease and insects damage.

4. Associated Knowledge Areas

KA Code	Knowledge Area

204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
212	Pathogens and Nematodes Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

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)

Evaluation Results

The total economic impact of Extension's 2012 commercial ornamental and landscape horticulture programming was estimated at $1.1 million in increased savings, increased income, and one-time capital purchases.

Key Items of Evaluation

The total economic impact of Extension's 2012 commercial ornamental and landscape horticulture programming was estimated at $1.1 million in increased savings, increased income, and one-time capital purchases.

V(A). Planned Program (Summary)

Program # 13

1. Name of the Planned Program

Human Development

☑ Reporting on this Program

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 FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	23.0	2.0	0.0	0.0
Actual Paid Professional	14.0	2.0	0.0	0.0
Actual Volunteer	4.0	0.6	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
295097	84055	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1040747	84055	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
185000	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-ordered 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 created and 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 utilizes lecture, class discussion, videos, and handouts to inform parents about the potential effects of divorce on their children and provided them with strategies for minimizing those effects.

TSU Extension provided leadership for a "Caring for the Caregiver" Education Conference. This is a multi-state effort involving seven other Southern states. The goal was to help caregivers survive the multiple challenges they face.

TSU Extension Family and Community Health programs placed special emphasis on "Healthy Aging" for the mind, body and spirit. The ultimate goal was to increase knowledge and education relating to healthy aging. Tennessee is getting older. Various assessments have shown that the percentage of Tennessee's population over the age of 65 will grow to 20% by 2025 (up from about 12% at the beginning of the 21st Century). TSU Extension produced and distributed resource materials and educational programs on a variety of topics for interested individuals, caregivers, and professionals. Various methods were employed, including inter-generational connections.

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 are directed by the courts to a four-hour co-parenting class. In many communities in the state, Extension is the only provider of this instruction.

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Human Development Planned Program was enhanced through the service of five Tennessee Extension personnel on the "Family Caregiving" CoP. Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	82128	9048784	10694	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	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
2012	139

Output #2

Output Measure

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

Year	Actual
2012	144299

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 violate 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	Caregiving Education: Number of caregivers who report the Extension program helped them to minimize stress.

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.

Not Reporting on this Outcome Measure

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.

Not Reporting on this Outcome Measure

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	Actual
2012	406

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 violate the law.

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Child Care/Parenting: Number of parents and child care providers who report putting down or blaming their child less.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	716

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 #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	Actual
2012	418

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	Actual
2012	3083

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	Actual
2012	1444

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

Caregiving Education: Number of caregivers who report the Extension program helped them to minimize stress.

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	2450

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Government Regulations

Brief Explanation

In FY 2012, state appropriations in Tennessee were reduced across the board for all public agencies. For UT Extension, this was a $2.5 million reduction from FY 2011 to FY 2012 in operating expenditures. Both UT and TSU Extension made programmatic changes to accommodate reductions. These changes included limiting postage, travel and printing.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Five counties were involved in the evaluation of Extension afterschool programs. The results showed that:

- 146 of 229 students increased their attendance since the beginning of the school year.
- 150 of 201 students increased their overall GPA since the beginning of the school year.
- 208 of 216 youth/children are able to communicate their understanding of science/math concepts through their involvement with activities.
- 217 of 229 youth/children have increased their knowledge base in the areas of technology, science, reading, health and relationships.
- 180 of 180 youth/children read books or other print at least three times per week in their afterschool or home setting.
- 184 of 216 youth/children report feeling better and eating better than before.

Key Items of Evaluation

Five counties were involved in the evaluation of Extension afterschool programs. The results showed that:

- 146 of 229 students increased their attendance since the beginning of the school year.
- 150 of 201 students increased their overall GPA since the beginning of the school year.
- 208 of 216 youth/children are able to communicate their understanding of science/math concepts through their involvement with activities.
- 217 of 229 youth/children have increased their knowledge base in the areas of technology, science, reading, health and relationships.
- 180 of 180 youth/children read books or other print at least three times per week in their afterschool or home setting.
- 184 of 216 youth/children report feeling better and eating better than before.

V(A). Planned Program (Summary)

Program # 14

1. Name of the Planned Program

Sustainable Energy

☑ Reporting on this Program

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%	5%	
102	Soil, Plant, Water, Nutrient Relationships	0%	0%	7%	
131	Alternative Uses of Land	0%	0%	3%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	10%	
202	Plant Genetic Resources	0%	0%	3%	
205	Plant Management Systems	0%	0%	12%	
206	Basic Plant Biology	0%	0%	7%	
212	Pathogens and Nematodes Affecting Plants	0%	0%	3%	
215	Biological Control of Pests Affecting Plants	0%	0%	2%	
402	Engineering Systems and Equipment	0%	0%	3%	
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%	28%	
512	Quality Maintenance in Storing and Marketing Non-Food Products	80%	80%	2%	
601	Economics of Agricultural Production and Farm Management	0%	0%	2%	
603	Market Economics	10%	10%	0%	
605	Natural Resource and Environmental Economics	10%	10%	0%	
610	Domestic Policy Analysis	0%	0%	3%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Extension	Research

Year: 2012	1862	1890	1862	1890
Plan	9.0	1.0	57.0	0.0
Actual Paid Professional	4.0	1.0	74.5	0.0
Actual Volunteer	2.0	0.2	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**
98365	28018	1572039	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1040747	28018	6131184	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	5307033	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Our economic research is developing national ethanol, biodiesel, electric, and bioproduct demand quantities and incorporating them into an existing dynamic agricultural sector econometric simulation model (POLYSYS). Regional feedstock supply curves necessary to meet national bioenergy and bioproduct demand quantities are being estimated by modifying POLYSYS to include cellulosic feedstock in addition to existing agricultural grain and oilseed crops. Regional bioenergy and bioproduct supply curves are being developed using regional feedstock supply curves, representative transportation costs, and representative costs for each feedstock-technology-product combination considered. A national expansion curve for the bioenergy and bioproduct industry is being estimated. Key indicators of agricultural sector performance including net farm income, agricultural prices, and government cost in meeting national bioenergy and bioproduct demand quantities are being evaluated.

As part of our engineering research, we are documenting drying rates and methods for corn stover, and quantifying the distribution and quality of the above ground biomass. For existing biomass densification systems, we areidentifying relations between particle size, biomass type, final density, compression pressures and energy, and other engineering factors. We are determining optimum particle sizes based on a balance between expended energy, final density, and integrity of compressed pellet or wafer. We are using these optimum particle sizes to identify or invent technologies to achieve the size based on theoretical cutting lengths due to feed speed, cutter speed, and other engineering factors. We are applying the developed technologies in laboratory-scale granulation tests to verify sizes using laser, image analyzer, sieve, and manual methods. We are comparing the developed methods in particle size reduction to existing technologies.

In terms of downstream processing, we are conducting fundamental studies on the fractionation of various free fatty acid (FFA) mixtures to test whether the mathematical modeling approach used by us for

rapeseed oil is more widely applicable.Additionally, the food safety of the purified FFA products is being assessed. We will then complete the cost analysis of this fractionation process using results predicted by the mathematical model using chemical plant design software. A bench-scale continuous reactor is being assembled and we will attempt to maintain the same productivity (moles of product per time per mass of enzyme) as achieved for batch-mode experiments from previous experiments.We are also attempting the further development of microemulsion-based protein extraction as a rapid low-cost and scalable means of selectively isolating and purifying proteins of interest from aqueous media.

2. Brief description of the target audience

This planned program is targeted to Tennessee farmers. Secondary audiences include consumers of both basic and applied research and the general public.

3. How was eXtension used?

Tennessee is represented by 108 eXtension members in 42 of the 59 approved Communities of Practice (CoP). Tennessee Extension personnel have addressed over 800 Frequently Asked Questions through eXtension.

This Sustainable Energy Planned Program was enhanced through the service of five Tennessee Extension personnel on the "Sustainable Ag Energy" CoP. Tennessee Extension personnel shared implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues

V(E). Planned Program (Outputs)

1. Standard output measures

2012	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	2870	1048849	46	0

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

Patent Applications Submitted

Year:	2012
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	1	69	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Peer-reviewed technical resource pages in online BioWeb resource (Rials).
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Number of research-based publications distributed as part of Extension biofuels programs.

Year	Actual
2012	33

Output #3

Output Measure

- Identify the prevalent foliar and root diseases of switchgrass in Tennessee and the major fungal pathogens associated with seed (Ownley).
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- We have demonstrated that high value cellulose nanocrystals (CNCs) can be produced by sulfuric acid hydrolysis from switchgrass. Those findings will help other researchers to better design cellulose nanocomposites. (Wang)

Year	Actual
2012	0

Output #5

Output Measure

- Lignin has been optimized through a series of organic fractionations and an organosolv pulping process. This results in a lignin with a thermal and viscoelastic properties to facilitate the production of lignin based fibers from a melt spinning process. This will allow the production of carbon fibers at a fraction of the cost of other carbon fibers. (Harper)

Year	Actual
2012	0

Output #6

Output Measure

- High-tonnage switchgrass-supply research showed advantages of integrating 1st-stage size-reduction processing with harvest logistics to enable economies of automated bulk-format handling. Low moisture switchgrass chopped at improved uniform particle lengths exhibited

increased handling and flow behaviors than wide particle size distributions created from tub ground bales. (Womac)

Year	Actual
2012	0

Output #7

Output Measure

- Switchgrass becomes more competitive with traditional enterprises on the less productive soil, but the risk-preferred contract terms differ based on risk behavior of different producers. Less productive soils are more suited to cow-calf production and switchgrass production than to row-crop production. Subsidies and risk-deferring contract terms could make switchgrass production on less productive soils a more profitable enterprise than traditional enterprises and entice producers to grow switchgrass. (English)

Year	Actual
2012	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Majority of first-pass biomass size reduction done with knife grids or other techology more efficient than rotary (Womac).
2	In-field size reduction and/or compacting done on majority of cellulosic biomass harvested in Tennessee (Womac).
3	Number of growers producing switchgrass as an energy crop. (Jackson)
4	Number of acres of switchgrass grown in Tennessee as an energy crop. (Jackson)
5	Farmer-owned biomass cooperative to help capture economic advantage of bioenergy production (Tiller).
6	Be evaluating precision-farming / variable-rate technology for switchgrass and other bioenergy crops (Tyler).
7	Mills using integrated process to produce bioenergy plus enhanced-strength OSB (Wang).
8	Process Analytics of Bio-Based Products (Young)
9	Switchgrass Storage (English)

Outcome #1

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #6

1. **Outcome Measures**

Be evaluating precision-farming / variable-rate technology for switchgrass and other bioenergy crops (Tyler).

Not Reporting on this Outcome Measure

Outcome #7

1. **Outcome Measures**

Mills using integrated process to produce bioenergy plus enhanced-strength OSB (Wang).

Not Reporting on this Outcome Measure

Outcome #8

1. **Outcome Measures**

Process Analytics of Bio-Based Products (Young)

2. **Associated Institution Types**

- 1862 Research

3a. **Outcome Type:**

Change in Condition Outcome Measure

3b. **Quantitative Outcome**

Year	Actual
2012	0

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

Issue (Who cares and Why)
Wood product producers need to minimize costs and improve quality.

What has been done
The commercial-ready statistical software system that predicts real-time strength properties of manufactured materials has improved performance at forest products and biobased manufacturers in the southeastern U.S.

Results

The potential of a larger impact to North American and global industries is feasible. The new and emerging biofuels industry could directly benefit from optimization of throughput and improved quality of bioenergy and biofuels from use the system.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
404	Instrumentation and Control Systems
511	New and Improved Non-Food Products and Processes

Outcome #9

1. Outcome Measures

Switchgrass Storage (English)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2012	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The impact of storage dry matter losses on the profitability of producing switchgrass is poorly understood.

What has been done
Initiated a bale storage study examining switchgrass storage methods and bale decomposition.

Results
A cost savings of 12 to 18 cents per gallon of ethanol could be realized depending on whether the alternative was square or round bales. Densification could create additional savings. Feedstock costs are close to those needed as indicated by Industry to make biofuels economically competitive.

4. Associated Knowledge Areas

KA Code	Knowledge Area

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

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
- Other (International conflict)

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Our research programs are evaluated by acceptance of publications in peer-reviewed, archival journals, grant proposals that receive funding from government, industry, and foundation sources, and our ability to attract promising graduate and post-doctoral students.

Key Items of Evaluation

Our research programs are evaluated by acceptance of publications in peer-reviewed, archival journals, grant proposals that receive funding from government, industry, and foundation sources, and our ability to attract promising graduate and post-doctoral students.

V(A). Planned Program (Summary)

Program # 15

1. Name of the Planned Program

Climate Change

☐ Reporting on this Program

Reason for not reporting

Projects have been reassigned to other planned programs.

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
132	Weather and Climate	0%	0%	100%	
	Total	0%	0%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2012	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	0.0	0.0
Actual Paid Professional	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
Actual Volunteer	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}	{NO DATA ENTERED}

V(D). Planned Program (Activity)

1. Brief description of the Activity

No active program.

2. Brief description of the target audience

No active program.

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2012	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: 2012

Actual: {No Data Entered}

Patents listed

{No Data Entered}

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2012	Extension	Research	Total
Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Not reporting

  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	not applicable

Outcome #1

1. **Outcome Measures**

not applicable

Not Reporting on this Outcome Measure

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
- Other ()

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}