2014 University of Tennessee Research and Extension and Tennessee State University Extension Combined Annual Report of Accomplishments and Results

Status: Accepted

Date Accepted: 05/29/2015

I. Report Overview

1. Executive Summary

The Tennessee Agricultural Research and Extension System serves the needs of Tennesseans with research and outreach in the food, agricultural, natural resources, and human sciences. The University of Tennessee (UT) Extension and the Tennessee Agricultural Experiment Station (UT AgResearch) comprise the 1862 institution and the Tennessee State University (TSU) Cooperative Extension Program and the TSU Institute for Agricultural Research comprise the 1890 institution. This report represents the combined efforts of UT Extension, UT AgResearch, and TSU Cooperative Extension Program.

UT and TSU Extension extend the knowledge and expertise of the state's two land grant institutions to the 6.4 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 2014, 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 community economic development produce substantial returns for Tennessee. Using research, questionnaires, observations and sales records, an estimated impact was $493 million for FY 2014. It was estimated that for every $1 in public funds invested in Extension, $8.13 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 $341 million. These recurring economic values include increased revenue, increased savings and one time capital purchases associated with Extension programs in crop variety trials/pest control, forage systems, 4-H camping, pesticide safety education, integrated pest management, turfgrass weed management, apiculture, and optimizing beef production. Using the United States Department of Defense formula, an estimated 5,930 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 $196 million from Extension programs in nutrition education, health literacy, Tennessee Saves, and volunteerism.

Extension's Excellence in Outreach: UT and TSU Extension professionals and the volunteers they recruited, trained and managed made more than 5.3 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). For the past nine years (2006-2014), this reporting system has been demonstrated to the administrators of 20 state Extension organizations who regarded it as a national model for Extension accountability.

UT AgResearch efforts included steady advances in biomass production and processing to reduce dependence on foreign oil, varietal support for the state's nursery industry, extensive testing and development of agronomic crop varieties to meet consumer and farmer needs, and improvements in the reproductive health of various livestock populations. Our research strengthened and improved the state's critical hardwood lumber processing industry. We continued to provide nationwide leadership in soil erosion modeling and no till agriculture. We used beneficial insects to protect ecosystems in the Great Smoky Mountains, and helped lead the national public policy conversation through our agricultural and natural policy research centers. We also promoted technologies to minimize wastewater impact, and helped safeguard the public with important food safety research.
UT AgResearch data were derived from the detailed annual online reports of approximately 140 Ph.D. faculty and specialized staff. This information is collected for each calendar year, and then aggregated to reflect collaborative efforts between faculty, and across academic departments and specialty centers. Once aggregated, the information is keyed to program areas, and separated into current impacts (for the annual report) and program directions (for the plan of work).

Total Actual Amount of professional FTEs/SYs for this State

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	450.0	57.0	360.0	0.0
Actual	450.0	90.0	311.1	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 six 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 2014.
The Merit Review Process at Tennessee State University consisted primarily of a review done by an Internal University Panel which reviewed and approved the annual plans of work and annual reports submitted by extension personnel. Many of the plans were reviewed by experts at TSU and UT at the faculty and administrator level as well.
UT AgResearch underwent a formal week-long unit review in February 2014. The five reviewers were deans and directors of various peer agricultural research units and affiliated organizations. The reviewers absorbed a 200+ page self-study, responded to detailed strategic questions, and met separately with university administration, unit leaders, remote research center directors, department heads, faculty, and staff. The review produced a written report, whose recommendations were shared in various AgResearch personnel meetings, and have already influenced efforts to increase our research productivity

by various means, including adjustments to our field research funding model.
UT AgResearch's merit review was strengthened by the continued use of our online workplan submission process. Workplans are the core of many planned research programs -- the details of how the project actually gets done on the ground. Our evolving online system allows rapid interactive review and revision of workplans between PI, department head, research center director, Deans, and compliance officers. With a central document repository, all those involved can literally be "on the same page," no matter where they are located.

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 2014, UT and TSU Extension made more than 29,000 contacts for needs assessment purposes, with these methods highlighted:

- 320 advisory committee meetings
- 121 focus groups
- 987 interviews 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, 6,121 (21%) were young people under 18 years of age. Both TSU and UT Extension administrators meet with the State Extension Advisory Council at least twice a year to help determine the needs and direct educational programs. Input from non-traditional stakeholder individuals is seen as particularly valuable to the institutions. At the county level, extension agents meet with local advisory councils and various stakeholders to determine programming needs.
One of UT AgResearch's highest priorities is to be continuously engaged with the clientele who rely on our programs. In pursuit of this, the Institute of Agriculture formed three Regional Advisory Councils (RACs) to help guide its programs and priorities. The RACs are organized geographically based upon the Extension regions and the state's grand divisions. The AgResearch Regional Advisory Councils provide a forum to discuss trends and issues in Tennessee with a broadly representative group of our clientele.
Each UT AgResearch department has an advisory group, while most research and education centers have advocacy groups. These groups meet once or more each year (typically at least twice). Current research activities and plans for future activities are reviewed at each meeting. Reactions and suggestions from the groups are received and factored into the research agenda setting process. Membership in each group is by invitation of the department head or center director, and typically consists of industry and regional representatives, local leaders, scientific peers, commodity group members, and other relevant stakeholders.

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
- Needs Assessments
- Use Surveys

Brief explanation.

All Tennessee 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. Surveys are also given to traditional and non-traditional stakeholders as well.
Several years ago, UT AgResearch retained a PR firm to reinforce our understanding of a number of critical stakeholders: largely oblivious Tennessee public; federal, state, and local legislators; and opinion leaders, industry and academic research partners, and the residents around our 10 regional research centers (the regional field laboratories).

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

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

Brief explanation.

The System for University Planning, Evaluation and Reporting (SUPER) tracks Extension's needs assessment efforts across Tennessee. In FY 2014, Extension conducted 121 different focus groups and 987 interviews with key informants. Regarding interviews with key informants, 28% 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. TSU Extension continued to use stakeholder input to expand its outreach to small and limited resource farmers and producers through its annual Small Farm Expo and Small and Limited Resource Producer Outreach Conference. Stakeholder input was also used to target and expand leadership development training for extension agents in each of the three regions of the state.
In addition to the various UT AgResearch regional, research center, and departmental advisory groups, some of the ways we collect stakeholder input include:

• "UT Day on the Hill", an annual meeting with producers and farmers, industry groups, legislators, and affiliated organizations.

- Direct contacts through our AgResearch and ten regional center websites.
- Participation in various commodity and agricultural interest groups and associations.
- Individual interactions at more than a dozen field days throughout the state.
- Feedback from Extension colleagues, or, in the case of joint appointments, individual knowledge from Extension activities.

UT AgResearch holds monthly meetings of academic department heads and research center directors, and annual meetings with selected principal investigators. These sessions are very helpful in refining our focus as we share different perspectives on the expressed needs of various constituents.

3. A statement of how the input will be considered

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

Brief explanation.

The State Action Agendas (state plans of work) delineated programs, curricula, partners and resources for addressing stakeholder concerns. Individual plans were created and implemented by Extension Agents and Specialists based on the results of the needs assessment. The plans were monitored and adjusted by Regional Program Leaders and Department Heads. In FY 2014, stakeholder input was used to identify volunteer leaders, identify new audiences, and identify and secure locations for Extension programs. In FY 2014, stakeholder input was used to modify these programs:

- Our **Childhood Obesity** program was slightly redirected to family-based approaches to combat obesity, diabetes, heart disease, and stroke in four West Tennessee counties (Lake, Lauderdale, Haywood, and Humphreys Counties) identified by the Centers for Disease Control and Prevention as four of the unhealthiest counties in the United States. Based on stakeholder feedback, UT and TSU Extension are in partnership to pursue this new approach which had 48 letters of support from community and state-level organizations and agencies.
- The **4-H Positive Youth Development** program was modified based on stakeholder feedback to expand 4-H Science programming. New emphasis will be placed on equipping volunteers to serve as leaders for energy, science, engineering, and technology programs that serve young people.
- The **Animal Systems** planned program was redirected to two ways. First, the new **UT Beef and Forage Center** was established to provide an integrated approach to research and Extension programming. In FY 2014, the Center placed emphasis on forage analysis and a new integrated beef calendar to help producers improve herd health and management. Second, the **Advanced Master Beef Producer** education program was launched to continue the impact of the original Tennessee Master Beef Producer series (in which 12,000 producers participated). The goal of the new program is to provide the education and outreach needed for an even more productive Tennessee beef industry by improving a producers' profitability, position in the industry, and to be competitive with other states.
- TSU Extension continued to use stakeholder input to improve programming and identify staffing needs across the state. Youth programming in the STEM areas, leadership development, financial

planning, beginning farmer training, obesity/health and nursery crop were all identified as needs and issues that should be prioritized by TSU Extension.

One perhaps overlooked means of stakeholder input that affects UT AgResearch programs is the publication feedback loop, where the acceptance for publication, reviewer comments, and the ultimate traction of a particular publication (in citations) provide an impetus, particularly for pre-tenure faculty, to work on research that is timely and compelling.

In research, partly due to the previous PR firm's recommendations and brainstorming sessions, we made changes in our "branding" to "UT AgResearch", updated our website layout, and increased the quantity of available research content. A public-facing new hire is now in place, to address a lack of stakeholder connection in the west Tennessee area.

Brief Explanation of what you learned from your Stakeholders

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- TSU Extension continued to use stakeholder input to improve programming and identify staffing needs across the state. Youth programming in the STEM areas, leadership development, financial planning, beginning farmer training, obesity/health and nursery crop were all identified as needs and issues that should be prioritized by TSU Extension.

UT AgResearch regularly modifies research directions, drops obsolete or dead-end programs, and adds directions that are emerging. Examples of some programs in flux include urban forestry, bioinformatics, genomics, biomass (sources, processing, end uses), urban storm water, native grasses, and emerging agronomic and forestry pests. Research feedback shows a strong continuing interest in the entire biofuels/bioenergy spectrum - even with declining fuel prices, particularly to provide new income streams for farmers and new state job opportunities. Food safety also continues to be very much "on the table" -- recent news stories and large-scale public health and economic impacts seem to be on the public's mind.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
8883852	2904030	6119958	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	8886193	2904030	6169692	0
Actual Matching	37920186	3904030	34189174	0
Actual All Other	7244477	150000	12687798	0
Total Actual Expended	54050856	6958060	53046664	0

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

V. Planned Program Table of Content

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

4-H Positive Youth Development

☑ 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	25%	25%	0%	
806	Youth Development	75%	75%	0%	
	Total	100%	100%	0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	135.0	17.0	0.0	0.0
Actual Paid	158.0	32.0	0.0	0.0
Actual Volunteer	45.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
3122660	1028026	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
13325369	1382026	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
100000	150000	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

• **Clubs/Project Groups -** In FY2014, 65 Tennessee counties organized over 2,500 4-H clubs where workforce preparation was the major emphasis. Project work was emphasized, and the experiential learning model was used to highlight jobs and careers aligned with 4-H projects. Activity sheets emphasized practical skills which aligned with jobs and careers.

• **School Enrichment -** Various school enrichment programs in 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 employed to inform parents, participants and stakeholders about program opportunities and achievements.

• **Youth from Under-Served and Limited Resource Families:** TSU Extension 4-H Youth Development programs placed special emphasis on SET 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 reached under-served and limited resource youth.

2. Brief description of the target audience

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

3. How was eXtension used?

This 4-H Positive Youth Development Planned Program was enhanced through the service of seven Tennessee Extension personnel on the "For Youth, For Life" and "Military families" Community of Practice (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

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	57828	3555673	352079	3555673

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total

Actual	4	0	4

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of volunteers utilized in delivering this program.

Year	Actual
2014	754

Output #2

Output Measure

- Number of exhibits produced.

Year	Actual
2014	5070

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

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

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
2014	7249

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
2014	8722

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
2014	4947

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
2014	10500

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
2014	8140

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
2014	8643

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
2014	14493

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
2014	17718

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
2014	15179

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
2014	10712

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
2014	7035

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The number of bachelor?s degrees in science and engineering conferred per 1,000 individuals 18-24 years old in Tennessee in 2009 was 13.2 (4th quartile nationally). The need for science and

engineering graduates in Tennessee and nationwide will continue to grow.

What has been done

UT and TSU Extension made 126,316 direct educational contacts to help youth gain new knowledge, acquire new skills and increase aspirations regarding 4-H Science. Programs were delivered through 6,086 group meetings including organized clubs, camps, project groups and school enrichment by Extension 4-H Agents and volunteers. Educational programs were reinforced by 29 exhibits, 69 news articles, 5 radio programs and 3 television programs.

Results

7035 youth were involved in programs that measured science literacy skills as measured by the Science Process Skills Inventory. 100% of youth (n=7035) achieved these skills:
?Analyzing the results of a scientific investigation.
?Asking a question that can be answered by collecting data.
?Designing a scientific procedure to answer a question.
?Communicating a scientific procedure to others.

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

Leadership Skills for Life

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Leadership and youth development programs provide many of the developmental pieces needed for youth to succeed in becoming ideal employees, as well as ideal citizens. Research from the Appalachian Regional Commission indicates a growing need for leadership training to ensure young people are prepared to participate in political and civic life.

What has been done

UT and TSU Extension taught leadership and provided leadership development opportunities to 87,335 Tennesseans from 67 counties including 65,853 youth and 21,482 adult residents in 2014. Of those persons, 11% represented racial or ethnic minority groups. The majority of contacts (73,709) were made through meetings and demonstrations.

Results

Of the 67 counties participating, 32% conducted a formal evaluation of randomly-selected participants. Because of their 4-H experiences:
?1,200 reported that as a member of a committee, they take their job seriously.
?1,429 said that they help to ensure that everyone gets an opportunity to say what they think.
?1,525 believed that they could cooperate and work in a group.
?1,314 noted that when in charge of a group, they treat everyone fairly and equally.
?1,362 indicated that they know how to set goals and use them when leading a group.

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Public priorities

Brief Explanation

The vast majority of this program was planned for in-school 4-H programs that take place in Tennessee public school classrooms. The standardized testing schedule can be a challenge in scheduling and conducting 4-H in-school programs. In some cases, programs had to move to after-school settings or community-based delivery based on changing priorities of the public schools.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

To measure youth science literacy, the Science Process Skills Inventory, developed at Oregon State University and validated at Oregon State and the University of Tennessee was used (Arnold & Bourdeau, 2009). It was administered as a post-test only to evaluate the degree to which youth learn science process skills, such as conducting an experiment, in their 4-H programs. 7035 youth were involved in programs that measured science literacy skills. **100% of youth (n=7035) achieved these skills:**

- Analyzing the results of a scientific investigation.
- Asking a question that can be answered by collecting data.

- Designing a scientific procedure to answer a question.
- Communicating a scientific procedure to others.

Key Items of Evaluation

To measure youth science literacy, the Science Process Skills Inventory, developed at Oregon State University and validated at Oregon State and the University of Tennessee was used (Arnold & Bourdeau, 2009). It was administered as a post-test only to evaluate the degree to which youth learn science process skills, such as conducting an experiment, in their 4-H programs. 7035 youth were involved in programs that measured science literacy skills. **100% of youth (n=7035) achieved these skills:**

- Analyzing the results of a scientific investigation.
- Asking a question that can be answered by collecting data.
- Designing a scientific procedure to answer a question.
- Communicating a scientific procedure to others.

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%	10%	
104	Protect Soil from Harmful Effects of Natural Elements	0%	0%	2%	
111	Conservation and Efficient Use of Water	0%	0%	2%	
112	Watershed Protection and Management	0%	0%	2%	
132	Weather and Climate	0%	0%	1%	
133	Pollution Prevention and Mitigation	0%	0%	1%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	13%	
202	Plant Genetic Resources	0%	0%	17%	
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%	12%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%	5%	5%	
212	Diseases and Nematodes Affecting Plants	5%	5%	10%	
213	Weeds Affecting Plants	0%	0%	5%	
402	Engineering Systems and Equipment	0%	0%	5%	
405	Drainage and Irrigation Systems and Facilities	0%	0%	1%	
511	New and Improved Non-Food Products and Processes	0%	0%	3%	
601	Economics of Agricultural Production and Farm Management	40%	40%	0%	
611	Foreign Policy and Programs	0%	0%	2%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	1.0	46.0	0.0
Actual Paid	43.0	9.0	62.0	0.0
Actual Volunteer	12.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
856501	278787	1334384	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3654958	374787	9255289	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
100000	0	1961320	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Extension portion of this report includes cotton, corn, soybeans, wheat, irrigation, entomology, plant pathology and row crops management and marketing issues. The increase in FTEs assigned to Agronomic Crop Systems reflects the previous Global Food Security planned program which has been fully incorporated into this Agronomic Crop Systems planned program.

Based on needs assessments conducted by Extension Specialists, the following practices were targeted: 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). The Innovation-Decision Process (Rogers, 1995) provides a masterful way to organize the agronomic crop systems planned program.

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 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 will provided 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 programs were conducted such as result demonstrations and test plots in all 31 West Tennessee counties.

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

UT AgResearch helps agronomic producers in a variety of areas. 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 primary audience for this program was Tennessee row crop producers, and the secondary audience were the professionals, business owners/cooperatives, and government officials who serve row crop producers.

3. How was eXtension used?

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 professional 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

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	56204	13260414	1390	0

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

Patent Applications Submitted

Year:	2014
Actual:	6

Patents listed

Computational discovery of soybean promoter cis-regulatory elements for the construction of soybean cyst nematode inducible synthetic promoters. Stewart, Jr., C. N., M. Mazarei, and W. Liu.

Glyphosate inducible plant promoter to confer glyphosate resistance and useful for sensing glyphosate. Stewart, Jr., C. N., Y.i Peng.

Methods of plant transformation using transformable cell suspension cultures and uses thereof. Willis, J., N. Stewart, J. Burris and M. Mazarei.

Resistance genes to soybean cyst nematode based on epigenetics. Hewezi, T., A. Rambani, C.N. Stewart, M. Mazarei and V. Pantalone.

Increasing soybean defense against pathogens. Stewart, Jr., C. N., J. Lin, M. Mazarei, and F. Chen.

Application of light-emitting diodes at specific angles and light quality for the growth and maintenance of turfgrass in low-light environments. Kopsell, D.A., J.C. Sorochan, and C.E. Sams.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	15	85	100

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2014	31

Output #2

Output Measure

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

Year	Actual
2014	38448

Output #3

Output Measure

- Research on new micro nutrient fertilizer products (Micro Essentials and Zn-core technology) may provide new methods to improve crop productivity and food mineral nutrition. (Yin)

Year	Actual
2014	2

Output #4

Output Measure

- UT researchers hope to reduce the incidence of soybean and snap bean seedling diseases and maximize grower farm receipts by increasing the calcium content of very young soybean and snap bean seedlings. (Canaday)
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Determined break-even irrigated corn field sizes (Larson)

Year	Actual
2014	0

Output #6

Output Measure

- Examined factors associated with African household participation in maize markets as a vendor or buyer, and the subsequent quantity of maize transacted (Lambert)

Year	Actual
2014	0

Output #7

Output Measure

- Found that cover crop mixtures were no more effective in supplying ground cover and did not enhance yields over single species cover (Tyler).

Year	Actual
2014	0

Output #8

Output Measure

- Developed cross-sterile corn lines to prevent cross pollination, increasing profitability and reducing risk to corn production (West).

Year	Actual
2014	0

Output #9

Output Measure

- Demonstrated the ability to successfully improve specialty crop nutritional values through simple changes in cultural management activities -- most notably narrow-band light from LED's (Kopsell).

Year	Actual
2014	0

Output #10

Output Measure

- Published horseweed genome paper, representing the first draft genome elucidated for an agronomic weed, which has important implications for identifying non-target resistance genes (Stewart).

Year	Actual
2014	0

Output #11

Output Measure

- Identified a number of natural product-producing genes with a function in plant defense. (Chen)

Year	Actual
2014	0

Output #12

Output Measure

- Characterized the mode of action of novel insecticidal proteins and compared them to currently available proteins produced by transgenic crops (Oppert).

Year	Actual
2014	0

Output #13

Output Measure

- Determined that differential susceptibility to Bt in rice is associated to differences in the concentration of binding sites for Bt toxins in different insects (Jurat-Fuentes).

Year	Actual
2014	0

Output #14

Output Measure

- Identified a herbicide program which adequately suppresses knotroot foxtail, resulting in clean hay (Rhodes).

Year	Actual
2014	0

Output #15

Output Measure

- Identified wheat varieties that are genetically susceptibility to metribuzin (West).

Year	Actual
2014	0

Output #16

Output Measure

- Demonstrated a positive nutritional impact of bioactive compounds and common pesticides (herbicides, fungicides, and insecticides) currently labeled for use on specialty crops (Kopsell, Armel).

Year	Actual
2014	0

Output #17

Output Measure

- Developed germplasm and conventional soybean lines optimized for yield and pathogen resistance (Pantalone).

Year	Actual
2014	0

Output #18

Output Measure

- Pipelining soybean lines targeted for high oleic acid, which would eliminate the need for the oil to be hydrogenated, and would provide exceptional oxidative stability in food and industrial applications (Pantalone).

Year	Actual
2014	0

Output #19

Output Measure

- Helped assemble a transcriptome for the tobacco budworm. This significant and much needed genomic resource opens new avenues of research using this insect as model (Jurat-Fuentes).

Year	Actual
2014	0

Output #20

Output Measure

- Developed soybean mosaic virus (SMV)/resistant soybean genotypes as a model system to understand how this virus overcomes resistance (Hajimorad).

Year	Actual
2014	0

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	We hope continuous evaluation of transgenic soybean can lead to development of drought tolerant soybeans. (Cheng)
5	Economic Impact of Extension Row Crop Programs Estimated at $141.3 million for 2014
6	Rollover Protection Systems (Ayers)
7	Genetically improve soybean yields (Pantalone)
8	Assays to diagnose soybean viruses (Hajimorad)

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
2014	2075

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
2014	6473

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Commercial and private applicators, structural pest control operators, farmers, landscapers and others need training in pesticide safety to ensure Federal and state regulations are followed for public safety.

What has been done
Online materials were developed to provide individuals information concerning the Pesticide Safety Education Program as well as current pest related issues. Pesticide Safety and Education Training sessions were taught at 17 separate meetings.

Results
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.
*The Pesticide Safety Education Program had 1041 certifications and 5459 re-certifications.
*Research has estimated annual benefits of $38 million for the Pesticide Safety Education Program.

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
2014	1061

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

We hope continuous evaluation of transgenic soybean can lead to development of drought tolerant soybeans. (Cheng)

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Economic Impact of Extension Row Crop Programs Estimated at $141.3 million for 2014

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	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. Row crop producers in Tennessee need unbiased information on which to base their management decisions including variety performance data, irrigation,forward pricing, and no-till production.

What has been done
Extension programs reached more than 57,000 contacts with row crops producers through group meetings, demonstrations,farm visits, and visits to the Extension Office. Replicated variety tests were conducted on corn, soybeans, wheat, and some specialty crops at seven of UT?s Research & Education Centers located in the different regions of Tennessee. Furthermore, County Standardized Variety Trails were conducted on corn (71 hybrids), soybeans (79 varieties) and wheat(20 varieties) in large strip-trials on producer?s farms in approximately 28 counties throughout the state as well as five Kentucky counties.

Results
The combined economic impact of Extension row crop programs were estimated at $141.3 million in 2014:

*UT Extension crop variety testing data is used extensively by 80% of Tennessee farmers to select the seed that they use to plant their oilseed, grain and cotton crops. Results from the variety testing program have helped farmers increase yields by identifying the varieties that will perform best in their farming operations. In 2014, the higher yields resulted in approximately $102.4 million in additional income to Tennessee farmers.
*Again this year, farmers increased the number of irrigated acres used for corn, cotton, and soybean production. Based on UT research, average yield increases from irrigation resulted in an additional $18.3 million in farm income.
*Based on an average cost of $900 per acre, Tennessee row crop producers invested more than $59 million in their local economy by purchasing center pivot irrigation equipment.
*Row crop producers increased returns by $2.6 million on 94,100 acres by using forward pricing market opportunities as compared to selling at harvest.
*By using no-till production as a best management practice, it is estimated that production costs were reduced by more than $18 million.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
213	Weeds Affecting Plants
601	Economics of Agricultural Production and Farm Management

Outcome #6

1. Outcome Measures

Rollover Protection Systems (Ayers)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The RollOver Protective Structure (ROPS) design standard includes modeling for compliance without actual field testing, however mower deck influence is ignored.

What has been done
A new computer-based ROPS Design program was developed and verified to assist in the ROPS design process.

Results
Rollover Protection Systems (ROPS) software passed test and was distributed to manufacturers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
402	Engineering Systems and Equipment
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management

Outcome #7

1. Outcome Measures

Genetically improve soybean yields (Pantalone)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
More than half of all gains in USA agricultural production have been through genetic improvement. Genetic improvement of soybeans is vital to sustaining the economic livelihood of farmers in Tennessee and the Mid-South region.

What has been done
Developed and released the new conventional soybean variety Ellis.

Results
Ellis performed exceptionally: It was the top yielding entry in many trials including: the 2014 Arkansas State Variety Test, the 2014 UniSouth Genetics Test, the 2013 Tennessee Elite Yield Test, and previous years Tennessee State Variety Test, and USDA Southern Uniform Test.

4. Associated Knowledge Areas

KA Code	Knowledge Area
202	Plant Genetic Resources
204	Plant Product Quality and Utility (Preharvest)

Outcome #8

1. Outcome Measures

Assays to diagnose soybean viruses (Hajimorad)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
These materials are essential for studies of these viruses and are currently being shared by other soybean virologists nationally.

What has been done
Developed assays for diagnosis of viruses of soybean including antibody-based assays for rapid and reliable detection of alfalfa mosaic virus and soybean vein necrosis-associated virus.

Results
Our developed antibody against SVNaV represents the only immunological tool for the detection of this virus worldwide.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
212	Diseases and Nematodes Affecting Plants

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Corn was harvested on more than 840,000 acres in Tennessee in 2014. The 2014 growing season was optimal in both temperature and rainfall for high corn yields and many growers reported some of the best yields ever in non-irrigated fields. The final state average yield was a record 168 bushels/acre (Jan 2015 USDA crops report). Corn prices were lower than in recent years due to the large U.S. crop with producers receiving less than $4.00 per bushel for their crop on average. Soybeans were harvested on more than 1.5 million acres in Tennessee in 2014. Moderate temperatures and above normal rainfall created good to excellent yields in most counties across the state and there was a final state average yield of 46 bushels/acre (Jan 2015 USDA crops report). Soybean prices were lower than previous years and most producers received less than $11.00 per bushel for their crop.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The combined economic impact of Extension row crop programs were estimated at $141.3 million in 2014:
*UT Extension crop variety testing data is used extensively by 80% of Tennessee farmers to select the seed that they use to plant their oilseed, grain and cotton crops. Results from the variety testing program have helped farmers increase yields by identifying the varieties that will perform best in their farming operations. In 2014, the higher yields resulted in approximately $102.4 million in additional income to Tennessee farmers.
*Again this year, farmers increased the number of irrigated acres used for corn, cotton, and soybean production. Based on UT research, average yield increases from irrigation resulted in an additional $18.3 million in farm income.
*Based on an average cost of $900 per acre, Tennessee row crop producers invested more than $59 million in their local economy by purchasing center pivot irrigation equipment.
*Row crop producers increased returns by $2.6 million on 94,100 acres by using forward pricing market opportunities as compared to selling at harvest.
*By using no-till production as a best management practice, it is estimated that production costs were reduced by more than $18 million.

Key Items of Evaluation

The combined economic impact of Extension row crop programs were estimated at $141.3 million in 2014:
*UT Extension crop variety testing data is used extensively by 80% of Tennessee farmers to select the seed that they use to plant their oilseed, grain and cotton crops. Results from the variety testing program have helped farmers increase yields by identifying the varieties that will perform best in their farming operations. In 2014, the higher yields resulted in approximately $102.4 million in additional income to Tennessee farmers.
*Again this year, farmers increased the number of irrigated acres used for corn, cotton, and soybean production. Based on UT research, average yield increases from irrigation resulted in an additional $18.3 million in farm income.
*Based on an average cost of $900 per acre, Tennessee row crop producers invested more than $59 million in their local economy by purchasing center pivot irrigation equipment.
*Row crop producers increased returns by $2.6 million on 94,100 acres by using forward pricing market opportunities as compared to selling at harvest.
*By using no-till production as a best management practice, it is estimated that production costs were reduced by more than $18 million.

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
102	Soil, Plant, Water, Nutrient Relationships	0%	0%	8%	
205	Plant Management Systems	0%	0%	8%	
301	Reproductive Performance of Animals	15%	15%	8%	
302	Nutrient Utilization in Animals	0%	0%	13%	
303	Genetic Improvement of Animals	10%	10%	0%	
304	Animal Genome	0%	0%	5%	
305	Animal Physiological Processes	0%	0%	13%	
306	Environmental Stress in Animals	0%	0%	6%	
307	Animal Management Systems	60%	60%	5%	
311	Animal Diseases	15%	15%	14%	
312	External Parasites and Pests of Animals	0%	0%	5%	
315	Animal Welfare/Well-Being and Protection	0%	0%	9%	
402	Engineering Systems and Equipment	0%	0%	3%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	0%	0%	3%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	41.0	5.0	21.0	0.0
Actual Paid	41.0	8.0	21.7	0.0
Actual Volunteer	12.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
802969	261363	482889	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3426523	351363	4793004	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
200000	0	85558	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Master Beef Producer Program was led by a team of UT Extension specialists and agents, with the support and involvement of representatives of state agencies, businesses and organizations that have an interest in the state's cattle industry. The Master Beef Producer Program:

1. Included a series of 12 educational sessions that focused 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.

2. Enhanced the profitability and competitiveness of cow-calf operations by providing essential, technical information.

3. Provided participants with a beef production reference manual that covers in detail the educational information presented in the sessions.

4. Allowed producers to interact with trained facilitators and encourage sharing of ideas with other producers.

The **Animal Systems** planned program was redirected in two ways. First, the new **UT Beef and Forage Center** provided an integrated approach to research and Extension programming. In FY 2014, the Center placed emphasis on forage analysis and a new integrated beef calendar to help producers improve herd health and management. Second, the **Advanced Master Beef Producer** education program was launched to continue the impact of the original Tennessee Master Beef Producer series (in which 12,000 producers participated). The goal of the new program is to provide the education and outreach needed for an even more productive Tennessee beef industry by improving a producers' profitability, position in the industry, and to be competitive with other states.

Goats are an environmentally adaptive specie 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. The total number of meat goats in Tennessee on January 1, 2009 was 133,000 head, up 9,000 head from 2008. Milk goats totaled 5,800 head, unchanged

from the previous year (TN Farm Facts, February 4, 2009). 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 May 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.
UT AgResearch conducts 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 by UT AgResearch 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 were targeted for this planned program. Tennessee cattle producers are primarily cow-calf operators. All of the state's cow-calf operators composed the target audience for this planned program.

3. How was eXtension used?

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 professionals shared program implementation strategies, outcome measurement, and evaluation protocols with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	490797	5098892	73477	0

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

Patent Applications Submitted

Year:	2014
Actual:	1

Patents listed

Antibody for skewing sex ratio and methods of use thereof. Edwards, J.L. L.A. Rispoli and F.N. Schrick.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	4	57	61

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
2014	81

Output #2

Output Measure

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

Year	Actual
2014	185495

Output #3

Output Measure

- Tall fescue toxicosis can reduce weight gain, and fertility on beef cattle. The ability to identify

genetically resistant cattle could have great impact on the profitability of the beef industry in the Southeastern United States. (Kojima)
Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of Tennessee beef producers taught by Extension agents and specialists through farm visits.

Year	Actual
2014	8827

Output #5

Output Measure

- Excitable cattle exhibit behavioral and physiological alterations that can adversely affect health and performance as well as endanger producers. We developed novel methods of measuring these alterations in performance tested bulls (Kattesh).

Year	Actual
2014	0

Output #6

Output Measure

- Gauged voluntary afforestation and prescribed grazing to reduce cattle GHG emissions (Clark, Jensen, Lambert, Yu).

Year	Actual
2014	0

Output #7

Output Measure

- Solidified the concept that fatty acid oxidation in adipose tissue can be manipulated in poultry by modifying the diet (Voy).

Year	Actual
2014	0

Output #8

Output Measure

- Identified and characterized novel sperm biomarkers for reproductive efficiency in cattle (Rispoli).

Year	Actual
2014	0

Output #9

Output Measure

- Evaluated consumer willingness to pay a premium for beef products that are USDA Angus certified, locally produced, DNA traceable, produced with lower carbon emissions, and from humanely-raised cattle (Clark, Jensen, Lambert).

Year	Actual
2014	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	My efforts are also focusing on providing farmers with the opportunity to detect the onset of mastitis using behavioral changes. (Krawczel)
9	Alternative Broiler House Heating Systems

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	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
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
2014	4068

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.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	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
307	Animal Management Systems

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
2014	3018

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.

What has been done
Extension agents and specialists taught best management practices in beef cattle production at 2,026 group meetings, 2,498 on-site visits and 5,935 walk-in consultations in the local county office during 2014.

Results
Surveys, sales records, and interviews demonstrated these impacts:
*3018 beef producers utilized improved marketing methods to market 109,783 head of calves to increase returns by $548,915.

*3,292 beef producers sold 94,811 calves managed according to BQA guidelines to increase returns by $758,488.

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
2014	5715

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
2014	5715

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
2014	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
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

My efforts are also focusing on providing farmers with the opportunity to detect the onset of mastitis using behavioral changes. (Krawczel)

Not Reporting on this Outcome Measure

Outcome #9

1. Outcome Measures

Alternative Broiler House Heating Systems

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
We seek to reduce production, and hence retail, cost and improve farm profitability.

What has been done
The University of Tennessee has in the past three years become a leader in the applied research effort to establish the cost effectiveness and environmental and production impacts of alternative heating systems for broiler production houses.

Results
Large, national, scope, applied research projects have been placed on two Tennessee broiler farms.

4. Associated Knowledge Areas

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

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

The financial impact of Extension beef programing fluctuates form year-to-year depending on several factors including commodity prices, input costs, and land value. However, these programs continue to enhance the lives and livelihood of Tennessee beef cattle producers.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

- Extension agents emphasized quality assurance, reproductive management, nutrition, and marketing with Tennessee beef producers 2014, increasing returns by $10 million. Program impact highlights included:
  - 2,499 beef producers stored 400,836 large, round bales under some type of cover to increase returns by $2,405,016.
  - 2,559 beef producers utilized hay feeding rings to feed 182,088 bales and improved feeding methods to reduce wastage/spoilage, saving $910,440.
- Tennessee horse owners depend on Extension's research-based programs for horse health and nutrition. Extension taught rotational grazing to increase forage production, vaccinations, dental care, and correct deworming practices. These practices helped 205 horse owners, owning more than 1,000 horses, to save a combined $1.3 million.

Key Items of Evaluation

- Extension agents emphasized quality assurance, reproductive management, nutrition, and marketing with Tennessee beef producers 2014, increasing returns by $10 million. Program impact highlights included:
  - 2,499 beef producers stored 400,836 large, round bales under some type of cover to increase returns by $2,405,016.
  - 2,559 beef producers utilized hay feeding rings to feed 182,088 bales and improved feeding methods to reduce wastage/spoilage, saving $910,440.
- Tennessee horse owners depend on Extension's research-based programs for horse health and nutrition. Extension taught rotational grazing to increase forage production, vaccinations, dental care, and correct deworming practices. These practices helped 205 horse owners, owning more than 1,000 horses, to save a combined $1.3 million.

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
701	Nutrient Composition of Food	5%	5%	0%	
703	Nutrition Education and Behavior	95%	95%	0%	
	Total	100%	100%	0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	77.0	9.0	0.0	0.0
Actual Paid	63.0	13.0	0.0	0.0
Actual Volunteer	18.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
1249064	406564	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
5330147	546564	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
5986105	0	0	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 MyPyramid.gov and following Dietary Guidelines.
- how to use the Healthy Plate Method.
- decreasing consumption of high-fat foods like fried foods, bologna, hot dogs, etc.
- increasing consumption of fruits, vegetables and whole-grains.

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 Tennessee Nutrition and Consumer Education Program (TNCEP) and the TSU Food Nutrition Education Program targeted eligible food stamp recipients. The Expanded Food Nutrition Education Program (EFNEP) programs targeted the state's limited resource population.

3. How was eXtension used?

This Childhood Obesity planned program was enhanced through the service of:

- 12 Tennessee Extension personnel on the "Families, Food, and Fitness" CoP.
- two Tennessee Extension personnel on the "A,B,Cs of Omega 3's" CoP.
- The "Families, Food, and Fitness" CoP continues to make extensive use of social media in Tennessee to promote educational programs and resources related to improving dietary quality and increasing physical activity.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	215454	12809763	234279	0

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2014	2731

Output #2

Output Measure

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

Year	Actual
2014	293815

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 fruits.
4	Tennessee Shapes Up: Number of participants who increased consumption of vegetables.
5	Tennessee Shapes Up: Number of participants increased consumption of whole grains.
6	Healthy Steps: Healthy Food and Physical Activity for Tennessee Preschoolers
7	Culinary Arts for Everyday Cooks
8	Power U: Helping Youth Make Healthy Choices and Increase Physical Activity

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
2014	3788

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
2014	3788

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 fruits.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	3788

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #4

1. Outcome Measures

Tennessee Shapes Up: Number of participants who 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
2014	3788

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 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
2014	3788

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

Healthy Steps: Healthy Food and Physical Activity for Tennessee Preschoolers

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Tennessee was one of three states that showed increases in the numbers of obese low-income preschool children in 2008-2011. Overweight or obese preschoolers are five times as likely to become overweight or obese adults, compared with their normal weight peers. Obesity is associated with high cholesterol, high blood sugar, asthma, and mental health problems. The medical costs for people who are obese are higher than those of normal weight, particularly if these conditions occur at younger ages.

What has been done
Agents use curricula and resources called ?Healthy Steps? developed by University of Tennessee Extension to deliver nutrition and physical activity education to preschoolers. In 2014, agents conducted 176 group meetings with teachers and students and made over 3,000 contacts. An additional 5,500 direct contacts were made by teachers with students using a train-the-trainer model. Approximately 25,000 more teacher and student contacts were made indirectly through exhibits, publications and other methods.

Results
Agents surveyed teachers about behaviors they observed in the classroom following implementation of Healthy Steps with the following results: 1) 39 of 39 teachers reported preschool children in their classes were more actively engaged in physical activity, 2) 39 of 39 teachers reported preschool children in their classes were more willing to taste fruit, 3) 38 of 39 teachers reported preschool children in their classes were more willing to taste vegetables, 4) 34 of 37 teachers reported preschool children in their classes were more willing to taste whole-grain foods, and 5) 34 of 39 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

Outcome #7

1. Outcome Measures

Culinary Arts for Everyday Cooks

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Lack of basic cooking skills contributes to the obesity epidemic because it limits the ability of the family to have healthy meals prepared at home.

What has been done
Culinary Arts for the Everyday Cook was implemented in 34 counties in 2014. There were 4554 direct contacts that included 123 group meeting and cooking schools. In addition there were 391,322 indirect contacts made through exhibits, newspaper articles, publication, radio and TV programs. There were 344 volunteer hours were reported that reached an additional 28,416 contacts.

Results
*121 participants reported choosing fast-food or take-out less often.
*529 participants reported learning culinary skills.
*146 participants reported using healthy food preparation techniques.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #8

1. Outcome Measures

Power U: Helping Youth Make Healthy Choices and Increase Physical Activity

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The number for Tennessee youth who are overweight or obese is higher than the national average but this is due to actual measures. Nationally, obesity and overweight data are extrapolated from samples. Tennessee has available actual measure of schoolchildren through the Coordinated School Health Program. More than 40 percent of Tennessee Children are overweight or obese.

What has been done
Extension implements programs that target youth across the age ranges. Power U is implemented in 368 schools. It is an interactive curriculum developmentally appropriate for 4th and 5th graders that engage the student in the learning activities. It has been reviewed and complies with the Common Core Standards adopted by the Tennessee Department of Education. Through tasting parties, students are exposed to a variety of new fruits and vegetables. The foods are presented in ways that are pleasing to 4th and 5th graders.

Results
Impact data was collected using a behavior checklist survey and through teacher and parent comments:
*52% (n= 1212) reported decreased intake of high-fat foods
*56% (n=1212) reported decrease intake of high-fat foods
*72% (n= 1212) reported increase intake of fruit
*58% (n= 1212) reported increase intake of vegetables
*64% (n= 1212) reported increase intake of dairy foods
*71% (n= 1212) reported increase in physical activity

Increasing intake of dairy foods and decreasing intake of high-sugar foods increases their

likelihood of the food?s adoption and is important for healthy prevention of obesity. Increasing physical activity and decreasing intake of sugar helps maintain caloric balance essential for healthy weight.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Extension implements programs that target youth across the age ranges. Power U is implemented in 368 schools. It is an interactive curriculum developmentally appropriate for 4th and 5th graders that engage the student in the learning activities. It has been reviewed and complies with the Common Core Standards adopted by the Tennessee Department of Education. Through tasting parties, students are exposed to a variety of new fruits and vegetables. The foods are presented in ways that are pleasing to 4th and 5th graders. Impact data was collected using a behavior checklist survey and through teacher and parent comments:
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*64% (n= 1212) reported increase intake of dairy foods
*71% (n= 1212) reported increase in physical activity
Increasing intake of dairy foods and decreasing intake of high-sugar foods increases their likelihood of the food's adoption and is important for healthy prevention of obesity. Increasing physical activity and decreasing intake of sugar helps maintain caloric balance essential for healthy weight. These program results demonstrate the strength of the UT-TSU Extension partnership in the state of Tennessee.

Key Items of Evaluation

Extension implements programs that target youth across the age ranges. Power U is implemented in 368 schools. It is an interactive curriculum developmentally appropriate for 4th and 5th graders that engage the student in the learning activities. It has been reviewed and complies with the Common Core Standards adopted by the Tennessee Department of

Education. Through tasting parties, students are exposed to a variety of new fruits and vegetables. The foods are presented in ways that are pleasing to 4th and 5th graders. Impact data was collected using a behavior checklist survey and through teacher and parent comments:

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*71% (n= 1212) reported increase in physical activity

Increasing intake of dairy foods and decreasing intake of high-sugar foods increases their likelihood of the food's adoption and is important for healthy prevention of obesity. Increasing physical activity and decreasing intake of sugar helps maintain caloric balance essential for healthy weight. These program results demonstrate the strength of the UT-TSU Extension partnership in 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
315	Animal Welfare/Well-Being and Protection	0%	0%	12%	
601	Economics of Agricultural Production and Farm Management	30%	30%	19%	
602	Business Management, Finance, and Taxation	5%	5%	0%	
603	Market Economics	5%	5%	6%	
604	Marketing and Distribution Practices	30%	30%	5%	
605	Natural Resource and Environmental Economics	0%	0%	16%	
606	International Trade and Development Economics	5%	5%	5%	
607	Consumer Economics	10%	10%	0%	
608	Community Resource Planning and Development	15%	15%	15%	
610	Domestic Policy Analysis	0%	0%	10%	
901	Program and Project Design, and Statistics	0%	0%	12%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	58.0	7.0	28.0	0.0
Actual Paid	18.0	4.0	31.9	0.0
Actual Volunteer	5.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
356875	116161	983263	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1522899	156161	3051510	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
77000	0	624174	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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).

UT AgResearch 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.

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?

This Economic Infrastructure and Commerce Planned Program was enhanced thorugh the service of:

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

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	880937	8392470	0	0

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	5	32	37

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2014	15265

Output #2

Output Measure

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

Year	Actual
2014	1572

Output #3

Output Measure

- Connecting young people in Senegal with traditional methods of building and helping them to make a very positive impact on their community by repairing compound walls, renovating existing buildings to provide a community center, and redeveloping the Genetic Resource Center (Schaffer).

Year	Actual
2014	0

Output #4

Output Measure

- Completed Knoxville foodshed assessment, and recommended changes to city of Knoxville (Hellwinckel)

Year	Actual
2014	0

Output #5

Output Measure

- Correlated several firm characteristics, including size, years in business, business type, and location factors with plans for expansion (Jensen).

Year	Actual
2014	0

Output #6

Output Measure

- Estimated direct economic impact for the region from the International Paper mill closure in Courtland, AL (Jensen).

Year	Actual
2014	0

Output #7

Output Measure

- Quantified beef consumers willingness to purchase Tennessee steak and ground beef (Jensen).

Year	Actual
2014	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	Eliminating confusion between marketing programs (Velandia)

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
2014	32

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
While displacement from the land poses a threat to small farmers, land loss has occurred most severe among African-American farmers. The decline of African-American owned rural land continues to be a major concern. Economic, social and technological changes over the past 100 years have contributed to a decrease in total farm numbers. Factors such as age, marital status, location, racial differences, employment, and migration to the North, education, and young African-American are not entering the field to replace the increasingly elderly population of existing black farmers.
WHAT HAS BEEN DONE: An educational program has been established to develop and disseminate information to landowners about estate planning, the importance of having a will, heir property, financial and technical assistance available, and risk management. Workshops, county meeting s , on-farm demonstrations, news articles, publications, fact sheets, TSU on Capitol Hill, and the Small Farm Expo were used to promote the landownership program.

What has been done
An educational program has been established to develop and disseminate information to landowners about estate planning, the importance of having a will, heir property, financial and technical assistance available, and risk management. Workshops, county meeting s , on-farm demonstrations, news articles, publications, fact sheets, TSU on Capitol Hill, and the Small Farm Expo were used to promote the landownership program.

Results
Participants increased their knowledge of how a will provides directions to heirs about your property and how planning in advance can save your family time and money. Fifty-one community leaders and landowners attended the training on estate planning.

Ten landowners increased knowledge and awareness of cost-share programs that could make their farm operation run more efficiently, and more profitable.
The issue of alternative sources of energy has come to the forefront in recent years as a result of rising energy costs. Forty-seven farmers in five Tennessee counties increased their knowledge on Bioenergy ?Federal Assistance Programs for Biodiesel Production.
Sixteen youth from the TSU Summer Apprenticeship Program in Agriculture visited a minority land owner?s farm in Montgomery County. They participated in collecting three DNA sample from calves. At the end of the summer program they reported on how much they increased their knowledge on DNA sampling.

4. Associated Knowledge Areas

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

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
2014	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
601	Economics of Agricultural Production and Farm Management
608	Community Resource Planning and Development

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.

Not Reporting on this Outcome Measure

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
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	191

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
2014	236

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
2014	81

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

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

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	120

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
608	Community Resource Planning and Development

Outcome #8

1. Outcome Measures

Eliminating confusion between marketing programs (Velandia)

2. Associated Institution Types

- 1890 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Tennessee has two state sponsored marketing programs promoting local products (Pick Tennessee Products and Tennessee Farm Fresh).

What has been done
Our study suggested an overlap between these two programs.

Results
Farm Bureau announced that Tennessee Farm Fresh was going to be folded into the Pick Tennessee Products program. They suggested that the move was to eliminate confusion between the two programs while continuing to serve producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices
607	Consumer Economics

901 Program and Project Design, and Statistics

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Extension professionals and its volunteers in the State of Tennessee made a significant impact by making 153,152 direct contacts in the area of community leadership development. Tennessee agritourism operators look to Extension for education regarding budgeting, safety, customer service, technical assistance, and more. A recent survey of 200 agritourism operators showed that as a result of Extension programs, sales increased by a combined $7.5 million. Other Extension community economic development programs produced an estimated $1.3 million in increased revenue and capital purchases; examples included assisting local charities to obtain grant funds and providing assistance to small businesses.

- 2,394 of 2,498 participants surveyed increased personal involvement in community activities.
- 2,746 of 2,945 participants surveyed increased their awareness of economic, social and environmental issues impacting their communities.
- 2,742 of 2,914 participants surveyed increased their knowledge of community assets, development opportunities and/or programs available to their community.

Agents in 14 counties and TSU extension specialists reported 4,389 direct contacts for the purpose of leadership development with minority youth and limited resource communities. 571 contacts were made through direct mail, telephone and email. Agents also made 3,856 contacts through group meetings or demonstrations, client office visits and on-site visits. TSU Extension made 2,194 contacts with minorities across the state. A new leadership development workshop series was developed for extension agents in each of the three regions of Tennessee that focused on strengths-based leadership for individuals and teams.

The economic impact of Extension leadership programs was $25,000 in increased revenue, one-time capital improvements and secured resources across the state of Tennessee in the two counties reporting outcomes. 158 of 250 of surveyed participants reported increased

involvement in community activities. 173 of 265 participants increased their awareness of economic, social, and environmental issues that impact their local communities. 173 out of 265 participants surveyed said that their knowledge of community assets, development opportunities and/or programs in their community increased. 4 counties reported the following outcomes with youth:

- 303 youth reported that they know how to set goals and they use that ability when leading a group.
- 422 youth reported that they can now cooperate and work in a group.
- 323 youth reported that they make sure everyone gets an opportunity to say what they think.
- 311 youth report they take their jobs seriously as members of a committee.

Key Items of Evaluation

Tennessee agritourism operators look to Extension for education regarding budgeting, safety, customer service, technical assistance, and more. A recent survey of 200 agritourism operators showed that as a result of Extension programs, sales increased by a combined $7.5 million. Other Extension community economic development programs produced an estimated $1.3 million in increased revenue and capital purchases; examples included assisting local charities to obtain grant funds and providing assistance to small businesses.

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%	24%	
112	Watershed Protection and Management	80%	80%	11%	
133	Pollution Prevention and Mitigation	0%	0%	12%	
135	Aquatic and Terrestrial Wildlife	0%	0%	13%	
136	Conservation of Biological Diversity	0%	0%	4%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	2%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	3%	
212	Diseases and Nematodes Affecting Plants	0%	0%	5%	
215	Biological Control of Pests Affecting Plants	0%	0%	3%	
216	Integrated Pest Management Systems	0%	0%	2%	
402	Engineering Systems and Equipment	0%	0%	7%	
403	Waste Disposal, Recycling, and Reuse	0%	0%	2%	
404	Instrumentation and Control Systems	0%	0%	8%	
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: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	1.0	35.0	0.0
Actual Paid	9.0	2.0	31.5	0.0
Actual Volunteer	3.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
178437	58081	976798	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
761449	78081	3476808	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
50000	0	590277	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

UT AgResearch is 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 UT AgResearch's 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, UT AgResearch provides research-based evaluation of appropriate technologies for Tennessee. Background information on the water quality is collected in various watershed areas, including one where baseline environmental data is being used to evaluate the impact of a dairy production unit on the area.

2. Brief description of the target audience

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

3. How was eXtension used?

eXtension was not used in this program.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	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: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	0	45	45

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Validate our vehicle terrain model for the U.S. Army. (Ayers)
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Apply the Soil and Water Assessment Tool to a rural Tennessee watershed dominated by animal agriculture. (Hawkins)
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Improve the SWAT model subroutine for pathogen transport in agricultural watersheds. (Hawkins)
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Elucidate signals that regulate phage reproduction of temperate bacteriophage will provide

targets for controlling plant, animal, and human pathogen, biofilms, nitrogen fixation in symbiotic nitrogen-fixing bacteria, and regulation of toxin production in food-borne pathogens. (Radosevich)
Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Optimize non-chemical methods of soil disinfestation for Tennessee vegetable and small fruit producers, supported by a grant from USDA-NIFA with collaborators in Tennessee, Florida, and California. This is an important issue for growers considering the impending loss of methyl bromide as a soil fumigant. (Butler)
  Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Develop practical systems for organic forage production in Tennessee, both for organic ruminant livestock production and for integration into sod-based crop rotations. These systems have potential to increase economic viability of family farms and decrease negative environmental impacts of agriculture. (Butler)
  Not reporting on this Output for this Annual Report

Output #7

Output Measure

- Research will help U.S. municipalities evaluate (1) alternative property tax structures that encourage more efficient land development, (2) priority areas for forest landscape restoration to protect ridgelines and hillsides, and (3) rezoning processes that help sustainable development. (Cho)
  Not reporting on this Output for this Annual Report

Output #8

Output Measure

- A pilot-scale stormwater runoff simulator was constructed. This device is being used to research various coagulants and flocculants that might have some effect on the sediment load being carried by stormwater being discharged from construction sites. (Yoder?)
  Not reporting on this Output for this Annual Report

Output #9

Output Measure

- Developed spreadsheet to simulate the watering habits of homeowners that resulted in a more realistic cost-benefit analysis for rain barrels (Logan).

Year	Actual
2014	0

Output #10

Output Measure

- Found that younger, more educated cattle producers with higher income levels are more willing

to adopt water-quality BMPs (Clark, Lambert, Walker).

Year	Actual
2014	0

Output #11

Output Measure

- We demonstrated that after a PAH contamination event, soil microbial communities remain significantly altered long after the original contaminants are degraded (Hayes, Schaeffer, DeBruyn).

Year	Actual
2014	0

Output #12

Output Measure

- Found that the retention of animal antibiotic tylosin (primarily used in swine production) by soil minerals indicates that this compound is exchangeable, but not competitive with common soil cations for the soil exchange phase (Essington).

Year	Actual
2014	0

Output #13

Output Measure

- Conducted modeling of the thermal impact of a paper mill on the Pigeon River; a requirement for the mill to stay in business (Tyner).

Year	Actual
2014	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	See nursery and nursery crop use of bioactive natural products in place of conventional pesticide on tomato, percent of operators adopting (Gwinn).
2	Chemical 'foot-printing' of stream sediment sources (Essington)
3	GPS-based underwater video mapping (Ayers).
4	Streambank erosion and Total Maximum Daily Load (Ayers)
5	Using GIS to improve GPS machine control (Freeland)

Outcome #1

1. Outcome Measures

See nursery 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 #2

1. Outcome Measures

Chemical 'foot-printing' of stream sediment sources (Essington)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Sediment is a common pollutant in east Tennessee streams. Methods to remediate affected streams requires knowledge of sediment sources.

What has been done
Potential sediment sources in an east Tennessee watershed were sampled to investigate the feasibility of using a chemical fingerprint technique for determining the sources of sediment, and the proportional contributions of the various sources, in an affected stream.

Results
Initial results indicate that the chemical composition of potential source materials (e.g., stream banks, cattle paths, forested areas, construction sites, forage fields) do not vary greatly, potentially limiting the viability of the technique.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife

Outcome #3

1. Outcome Measures

GPS-based underwater video mapping (Ayers).

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
It is difficult to acquire landscape-scale data on river systems.

What has been done
A GPS-based streambank video mapping has been successfully developed and applied to the Driftwood River and Upatoi Creek. A new project on the East Fork Poplar Creek was developed and implemented with ORNL.

Results
Two consulting firms have adopted this protocol and are implementing with local agencies.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
135	Aquatic and Terrestrial Wildlife
136	Conservation of Biological Diversity
402	Engineering Systems and Equipment
404	Instrumentation and Control Systems

Outcome #4

1. Outcome Measures

Streambank erosion and Total Maximum Daily Load (Ayers)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
TMDL development for sediment from streambank erosion is lacking.

What has been done
A novel technique to develop TMDL and total streambank erosion rates was developed.

Results
This approach is being implemented in state (TSMP) and national (USEPA) applications.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Using GIS to improve GPS machine control (Freeland)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Effective Real Time Kinematic (RTK) mobile machine control requires a sufficient number of positioning satellites that are both fully visible and ideally situated. Producer options are often limited by noted RTK equipment manufacturers taking strict proprietary and protectionist stances within their agricultural product lines.

What has been done
A GIS toolset was developed.

Results
This will aid extension specialists in advising producers as to their options, or lack thereof, for their specific field locales.

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

V(I). Planned Program (Evaluation Studies)

Evaluation Results

As this is a research-only program, there are no program-wide evaluation studies.

Key Items of Evaluation

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: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	14.0	2.0	0.0	0.0
Actual Paid	15.0	3.0	0.0	0.0
Actual Volunteer	4.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
303344	98737	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1294464	132737	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

Extension educated at least 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 deployed its On My Own curriculum and youth TN Saves in over 100 financial education simulations 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 remains a national leader for 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?

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

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	80818	3521174	48114	252236

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2014	224

Output #2

Output Measure

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

Year	Actual
2014	827

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
2014	115

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
2014	950

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
2014	3892

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
2014	10095

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
2014	285

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
2014	231

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
2014	950

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
2014	26

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Because they spend too much and save too little, many Tennesseans will not have enough money to live securely throughout life. Over the next 20 years, the percentage of retirement-age Tennesseans is expected to almost double; however, currently 52 percent of the U.S. workforce has no private pension coverage and 31 percent has no savings set aside specifically for retirement. Tennessee?s, unemployment rate fell from 7.6 percent at the end of 2013 to 6.6 percent in December or 2014. The South-Region CPI for all items?which had risen slightly at the beginning of 2014 and ended the year with a sharp decline because of decreasing energy prices?saw an overall .6 percent increase for the year.

What has been done
Tennessee Saves programming continued its focus on (1) training citizens in sound basic financial practices, (2) encouraging Tennesseans to save to build assets over their working lives, and (3) encouraging individuals and households to reduce dependence on credit and discharge debt.

Extension made 134,567 total direct educational contacts with Tennesseans in 2014. Direct contacts by agents included 55,334 contacts via group meetings and financial education

programs. An additional 3.8 million Tennesseans were reached with the message of the importance of savings and financial responsibility through agent and volunteer media and exhibits.

Results

The increase in employment and fall in the CPI resulted in an increase in disposable spending for Tennesseans. Indications are that Tennessee households used that increase for catching up with consumption as opposed to savings and discharging debt. Although approximately the same number of Extension clientele reported saving as in 2013 (34.4% in 2013 and 36.9% in 2014), the savings per month reported was smaller. The number of clientele reporting debt reduction rose also (35.2% in 2014 compared to 28.9% in 2013), but per-month reduction amounts were down. Savings among youth remained strong with both On My Own and Tennessee Saves Youth participants reporting more savings in three-month follow-up surveys. The estimated economic impact of clientele?s saving totaled $19,049,516 in 2014, with debt reduction estimates totaling $7,155,021. The total estimated impact of Extension Tennessee Saves adult and youth programs as well as youth financial simulations on Tennesseans? saving increase and debt reduction was $26,204,537.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

Tennessee's unemployment rate fell from 7.6 percent at the end of 2013 to 6.6 percent in December or 2014. The South-Region CPI for all items--which had risen slightly at the beginning of 2014 and ended the year with a sharp decline because of decreasing energy prices--saw an overall .6 percent increase for the year. The increase in employment and fall in the CPI resulted in an increase in disposable spending for Tennesseans. Indications are that Tennessee households used that increase for catching up with consumption as opposed to savings and discharging debt.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The increase in employment and fall in the CPI resulted in an increase in disposable spending for Tennesseans. Indications are that Tennessee households used that increase for catching up with consumption as opposed to savings and discharging debt. The increase in employment and fall in the CPI resulted in an increase in disposable spending for Tennesseans. Indications are that Tennessee households used that increase for catching up with consumption as opposed to savings and discharging debt. Although approximately the same number of Extension clientele reported saving as in 2013 (34.4 in 2013 and 36.9

in 2014), the savings per month reported was smaller. The number of clientele reporting debt reduction rose also (35.2 percent in 2014 compared to 28.9 percent in 2013), but per-month reduction amounts were down. Savings among youth remained strong with both On My Own and Tennessee Saves Youth participants reporting more savings in three-month follow-up surveys. The estimated economic impact of clientele's saving totaled $19,049,516 in 2014, with debt reduction estimates totaling $7,155,021. The total estimated impact of Extension Tennessee Saves adult and youth programs as well as youth financial simulations on Tennesseans' saving increase and debt reduction was $26,204,537.

Key Items of Evaluation

The increase in employment and fall in the CPI resulted in an increase in disposable spending for Tennesseans. Indications are that Tennessee households used that increase for catching up with consumption as opposed to savings and discharging debt. The increase in employment and fall in the CPI resulted in an increase in disposable spending for Tennesseans. Indications are that Tennessee households used that increase for catching up with consumption as opposed to savings and discharging debt. Although approximately the same number of Extension clientele reported saving as in 2013 (34.4 in 2013 and 36.9 in 2014), the savings per month reported was smaller. The number of clientele reporting debt reduction rose also (35.2 percent in 2014 compared to 28.9 percent in 2013), but per-month reduction amounts were down. Savings among youth remained strong with both On My Own and Tennessee Saves Youth participants reporting more savings in three-month follow-up surveys. The estimated economic impact of clientele's saving totaled $19,049,516 in 2014, with debt reduction estimates totaling $7,155,021. The total estimated impact of Extension Tennessee Saves adult and youth programs as well as youth financial simulations on Tennesseans' saving increase and debt reduction was $26,204,537.

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%	
311	Animal Diseases	0%	0%	15%	
403	Waste Disposal, Recycling, and Reuse	0%	0%	2%	
501	New and Improved Food Processing Technologies	0%	0%	11%	
502	New and Improved Food Products	0%	0%	7%	
503	Quality Maintenance in Storing and Marketing Food Products	10%	10%	0%	
504	Home and Commercial Food Service	10%	10%	0%	
702	Requirements and Function of Nutrients and Other Food Components	0%	0%	10%	
703	Nutrition Education and Behavior	0%	0%	2%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	80%	0%	30%	
722	Zoonotic Diseases and Parasites Affecting Humans	0%	0%	7%	
901	Program and Project Design, and Statistics	0%	0%	3%	
903	Communication, Education, and Information Delivery	0%	80%	10%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	1.0	27.0	0.0
Actual Paid	9.0	2.0	37.9	0.0
Actual Volunteer	3.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
178437	58081	562060	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
761449	78081	2673668	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
140397	0	1225542	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

Youth participants will receive 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) will emphasize 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.

UT AgResearch 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.
UT AgResearch 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?

This Food Safety planned prorgam was enhanced through the service of four Tennessee Extension personnel on the "Food Safety" CoP, including the leader who serves as a specialists 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

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	79739	3995815	0	0

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	2	41	43

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2014	187

Output #2

Output Measure

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

Year	Actual
2014	3689

Output #3

Output Measure

- A. acidoterrestris is a bacterium which has been found in pasteurized fruit juices. High pressure homogenization and dimethyl dicarbonate show promise for aiding in control of growth of vegetative cells of A. acidoterrestris. (Golden)
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Found that despite providing health benefits of kale, consumers still may not purchase the kale-enhanced food products (Hollis).

Year	Actual
2014	0

Output #5

Output Measure

- Demonstrated that immobilized lipases can be used to prepare sugar esters, important biobased surfactants having numerous applications in foods, cosmetics, and pharmaceuticals, at high yield in the complete absence of organic solvents (Hayes).

Year	Actual
2014	0

Output #6

Output Measure

- Related intestinal microbiota to performance related factors including weight gain and feed conversion. Based on our data, the sponsor is interested in developing protocols and assays to quantify specific gut bacteria that impact weight gain and feed conversion (Hanning).

Year	Actual
2014	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	If petroleum prices continue to increase, we may identify several applications for chitosan to replace cellulose in the pharmaceutical or plastics industries (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
2014	1257

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
504	Home and Commercial Food Service
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.

Not Reporting on this Outcome Measure

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
2014	3168

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done
3,168 direct contacts were made to teach safe food handing practices for consumers. 886,406 indirect contacts were also made using various forms of media and publications.

Results
60 out of 80 participants reported using a food thermometer to check the internal temperature of food.

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service

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
2014	916

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
503	Quality Maintenance in Storing and Marketing Food Products
504	Home and Commercial Food Service
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins

Outcome #5

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).

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

X

Key Items of Evaluation

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%	3%	
123	Management and Sustainability of Forest Resources	75%	75%	21%	
124	Urban Forestry	0%	0%	1%	
125	Agroforestry	10%	10%	0%	
133	Pollution Prevention and Mitigation	0%	0%	11%	
135	Aquatic and Terrestrial Wildlife	10%	10%	21%	
136	Conservation of Biological Diversity	0%	0%	3%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	3%	
206	Basic Plant Biology	0%	0%	2%	
213	Weeds Affecting Plants	0%	0%	1%	
215	Biological Control of Pests Affecting Plants	0%	0%	7%	
301	Reproductive Performance of Animals	0%	0%	3%	
311	Animal Diseases	0%	0%	2%	
312	External Parasites and Pests of Animals	0%	0%	3%	
605	Natural Resource and Environmental Economics	5%	5%	7%	
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%	7%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890

Plan	14.0	2.0	38.0	0.0
Actual Paid	9.0	2.0	37.9	0.0
Actual Volunteer	3.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
178437	58081	385559	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
761449	78081	4262691	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
50000	0	1898310	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 that informed forest landowners of issues pertaining to forestry and wildlife. Topics included management and marketing. Volunteers were recruited and trained; they presented at group meetings, provided information, demonstrated equipment and provided 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 Forest Landowners Association meetings. UT and TSU Extension worked closely with private consultants, Tennessee Wildlife Resources Agency, Tennessee Division of Forestry, and others in forestry related industries to develop educational programs and activities for professionals and landowners.

UT and TSU Extension will continue 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 will provide 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, UT AgResearch characterizes 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.
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?

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 research results with their CoP colleagues.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	24205	817534	11494	0

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	10	61	71

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Release of Hemlock Woolly Adelgid predators reared in Tennessee (Parkman).
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

- Develop phytosanitary methods for disinfecting walnut logs that are currently under quarantine for walnut twig beetle. (Taylor)
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- New insecticidal strategies, such as the use of RNA interference, can be employed to decrease the damage from insect pests that rely on cellulolytic enzymes for a significant portion of their digestion. (Oppert)
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Work has been used to highlight the importance of non-timber uses of Tennessee's forests and open space. The results of work in west Tennessee watersheds will identify the value of these services and could be used to assess the benefits of additional stream restoration efforts. (Hodges)
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Proposed research will considerably enhance our knowledge regarding the spread and distribution of Thousand Cankers Disease in the native range of black walnut with a focus on Great Smoky Mountains National Park. Our goal is to provide a platform for informed disease management to prevent widespread epidemics and conservation of park resources. (Hadziabdic)

Year	Actual
2014	1

Output #6

Output Measure

- Utilizing the draft Chinese chestnut reference genome and high-throughput DNA sequencing of American chestnut, identified SNPs fixed in American and Chinese trees useful for marker-assisted breeding (Stanton)

Year	Actual
2014	0

Output #7

Output Measure

- Released book that characterized oil spill impacts fish and wildlife in marine habitats (Alford).

Year	Actual
2014	0

Output #8

Output Measure

- Developed assay for the pathogen, Geosmithia morbida, that reduced both assay time and cost by more than 50%, and is more reliable for detection (Grant, Lambdin, Hadziabdic, Windham).

Year	Actual
2014	0

Output #9

Output Measure

- Presented research on the impact of commercial tomato production on rare fish in the Nolichucky River and other east Tennessee watersheds (Alford).

Year	Actual
2014	0

Output #10

Output Measure

- Based on collection of natural enemies of Walnut Twig Beetle, provided a rational basis for a sustainable integrated pest management program against this pest in the southern Appalachians (Lambdin).

Year	Actual
2014	0

Output #11

Output Measure

- Assembled six new transcriptome sequences for forest trees (northern red oak, black walnut, green ash, honeylocust, tulip poplar, blackgum) and annotated the transcripts with open read frames, microsatellites with primer design, sequence similarity to public tree reference genes, protein domain function and gene ontology terms (Staton).

Year	Actual
2014	0

Output #12

Output Measure

- Completed a field study demonstrating that Lone Star tick populations in a middle Tennessee retirement community are infested with three species of Ehrlichia, and that current tick mitigation measures in the community are not adequate to protect residents from the risk of tick-borne disease (Hickling, Gerhardt, Trout-Fryxell).

Year	Actual
2014	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	Pond Management: Number of landowners who properly fertilized their pond, followed stocking/harvesting recommendations, or controlled weeds/algae.
4	Tennessee's Master Logger Program
5	National Advanced Silviculture Program
6	4-H Wildlife Habitat Education Program
7	Improving Railway Crossties
8	Tennessee Healthy Hardwoods
9	Log-on Before You Log in Tennessee
10	Sustainable Sturgeon fishery (Alford)

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
2014	172

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
2014	35

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

Pond Management: Number of landowners who properly fertilized their pond, followed stocking/harvesting recommendations, or controlled weeds/algae.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	288

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
135	Aquatic and Terrestrial Wildlife

Outcome #4

1. Outcome Measures

Tennessee's Master Logger Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	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. The program is a cooperative effort between UT Extension, Tennessee Department of Agriculture Forestry Division, and the Tennessee Forestry Association.

What has been done
UT Extension conducted:
*18 continuing education logger workshops (8 hours each, 3,500 contact hours) in 2014 for 438 loggers, foresters, and landowners.
*three logger workshops of five days each (36 hours of instruction, 1,800 contact hours) were held in 2014 for 51 loggers.

Results

*Each participant increased their knowledge on BMPs to protect water quality during harvesting operations during the one-day continuing education workshop. Approximately 50% of the trained logging work force in Tennessee attended the workshops (requirement to maintain Master Logger designation is to attend one continuing education workshop every two years).
*Based on Master Logger class surveys (highly variable to characterize each logging operation), each logger is estimated to harvest 500 acres per year, averaging 3,000 board feet per acre (partial harvests included), and with an estimated average timber value of $1,000 per acre.
*The Tennessee Master Logger educational program has reached more than 1,200 loggers and 300 forestry professionals since 1983 or about 90% of the state logging workforce.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #5

1. Outcome Measures

National Advanced Silviculture Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Nationwide training for federal employees in advanced silviculture and formulating stand prescriptions in preparation for the USDA Forest Service certified silviculture panels.

What has been done
UT Extension provided 17 days of training for 35 forest silviculturists from the Forest Service, Bureau of Land Management and Bureau of Indian Affairs in March and April 2014. Training consisted of in-class lectures, field tours and exercises, and a stand prescription project conducted by six university silviculture professors (four are from out-of-state).

Results
*Participants increased their knowledge about possible silvicultural options to meet various forest sustainability management objectives

*An average of 85% (30 of the 35) of the participants annually receive the 4-year certification in silviculture resulting in more effective forest management operations on federal lands.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #6

1. Outcome Measures

4-H Wildlife Habitat Education Program

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Youth receive limited education and training in natural resources management. Increased knowledge and understanding is needed for youth to appreciate the challenges we face today with regard to soil, water, and wildlife resources.

What has been done
The 4-H Wildlife Habitat Education (WHEP) Program teaches youth principles and practices of wildlife management through local training (usually at the county level through Extension agents and volunteer leaders) and a series of contests. In Tennessee, three regional contests and one state contest were conducted. The structure of the contests helps youth develop leadership, team-building, and communication skills.

Results
*An annual average of 214 youth from 26 counties participated in 4-H Wildlife Judging contests, 2012 ? 2014.
*State-winning Tennessee teams finished 1st at the National 4-H WHEP Invitational in 2012, 2013, and 2014.
*In a survey of WHEP participants, 94% indicated WHEP had a positive effect on their

understanding of natural resources.
*More than 30% indicated they implement wildlife management practices as a result of the program and nearly 50% indicated they taught others (22 individuals per participant) about wildlife management.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

Outcome #7

1. Outcome Measures

Improving Railway Crossties

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Twenty two million wooden railway crossties are installed each year in the United States, mostly to replace old ties that have failed due to fungal decay or other deterioration. Most crossties are treated with creosote preservative after a lengthy drying period for the unprotected wood. During this drying process decay can become established that weakens the wood. Also, the creosote treatment usually does not penetrate the tie completely, leaving the interior portions of the wood unprotected. Pre-treatment of railway crossties with a borate ?a preservative that can diffuses throughout the tie -prevents degradation and improves the durability of the finished product.

What has been done
Applied research by UT Extension has shown that sufficient borate can be applied in an ambient temperature dipping process. The presence, and deleterious effects, of pre-creosote treatment decay have also been documented. The results of this research have been presented at numerous trade association meetings.

Results

A low-cost ($2 per tie), environmentally-benign protective treatment has been adopted by three Class 1 railroads. Ties receiving this treatment are expected to last 50% longer in service.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #8

1. Outcome Measures

Tennessee Healthy Hardwoods

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The University of Tennessee Extension has been instrumental in formation and support of County Forestry Associations (CFAs) involving 48 counties since 1999. Members of these associations have expressed desire and need in joining with other associations to hold regional forestry field days to view and learn first-hand about sustainable forest management practices.

What has been done
The Tennessee Healthy Hardwoods (THH) program was initiated in 2006 as a partnership with the Tennessee Department of Agriculture Forestry Division and the Tennessee Forestry Association. Since inception, the program has been funded through $375,696 in grants, has reached 1,840 landowners, and has impacted over 330,000 acres of forestland (for an average investment of approximately $1 per acre). During 2014, three THH field days were held throughout the state, located at three Tennessee State Forests. The theme was "On the Ground Steps to Administering a Timber Sale."

Results
During 2014, 45 percent of the 178 participants completed a survey, with the following results: 100 percent indicated that they had gained knowledge about the process of administering a timber sale. All landowners indicated that the field day was worth attending. Most encouraging is that 99 percent felt they would adopt practices addressed and would seek professional advice

prior to selling timber. Finally, new Extension audiences were reached in that nearly 20 percent had never attended an Extension educational event before.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #9

1. Outcome Measures

Log-on Before You Log in Tennessee

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Considerable forestry educational materials exist for the purpose of educating private landowners about forest best management practices. Some of these include the Forest*A*Syst and the Guide to Forestry Best Management Practices in Tennessee. Making landowners aware of these types of publications, and giving them access to them, is an ongoing challenge. Most of the sedimentation originating from forest lands occurs intermittently, usually during or immediately following a commercial logging operation. Solving BMP problems after silvicultural operations are complete is much more challenging than addressing the issues in advance.

What has been done
To resolve this problem, other states have developed a program titled ?Call Before You Cut.? Modeled after this, UT's ?Log-on Before You Log? program reaches landowners via the internet. The site serves as a clearing-house for current timber marketing educational material, including BMPs.

Results
During 2014, there were 677 unique visits to this web site (an average of two per day, and a seven percent increase over 2013). The site survey indicated that 100 percent of the visitors owned forestland, with total ownership of 240,335 acres. Additional impacts include: 76 percent

indicated they would seek professional help when marketing timber, 89 percent gained better understanding about forestry BMPs, and 97 percent would implement forestry BMPs as a result of viewing the website.

4. Associated Knowledge Areas

KA Code	Knowledge Area
123	Management and Sustainability of Forest Resources

Outcome #10

1. Outcome Measures

Sustainable Sturgeon fishery (Alford)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Sturgeon are not currently a sustainable fishery population.

What has been done
We partnered with the TN Aquarium Conservation Institute, who is funding the server space, to develop a real-time data reporting system for commercial and recreational anglers to report incidental bycatch of Lake Sturgeon in the Tennessee River system.

Results
These data will be critical to recovering the species to a sustainable recreational fishery.

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife

136 Conservation of Biological Diversity

301 Reproductive Performance of Animals

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Nationwide training for federal employees in advanced silviculture and formulating stand prescriptions in preparation for the USDA Forest Service certified silviculture panels. UT Extension provided 17 days of training for 35 forest silviculturists from the Forest Service, Bureau of Land Management and Bureau of Indian Affairs in March and April 2014. Training consisted of in-class lectures, field tours and exercises, and a stand prescription project conducted by six university silviculture professors (four are from out-of-state). Key impacts included:
*Participants increased their knowledge about possible silvicultural options to meet various forest sustainability management objectives
*An average of 85% (30 of the 35) of the participants annually receive the 4-year certification in silviculture resulting in more effective forest management operations on federal lands.

Key Items of Evaluation

Nationwide training for federal employees in advanced silviculture and formulating stand prescriptions in preparation for the USDA Forest Service certified silviculture panels. UT Extension provided 17 days of training for 35 forest silviculturists from the Forest Service, Bureau of Land Management and Bureau of Indian Affairs in March and April 2014. Training consisted of in-class lectures, field tours and exercises, and a stand prescription project conducted by six university silviculture professors (four are from out-of-state). Key impacts included:
*Participants increased their knowledge about possible silvicultural options to meet various forest sustainability management objectives
*An average of 85% (30 of the 35) of the participants annually receive the 4-year certification in silviculture resulting in more effective forest management operations on federal lands.

V(A). Planned Program (Summary)

Program # 10

1. Name of the Planned Program

Global Food Security and Hunger

☐ Reporting on this Program

Reason for not reporting

Global Food Security and Hunger previously included Extension and Research activities, methods, outputs, and outcomes for corn, soybeans, and wheat programs, and all of these are now reported in the Agronomic Crop Systems planned 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%	100%	
	Total	0%	0%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	27.0	3.0	0.0	0.0
Actual Paid	{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

Various needs assessments conducted by Extension specialists show that the following practices are key for Tennessee row crops producers: 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 is targeted to all Tennessee corn, soybeans, wheat and commercial vegetable producers.

3. How was eXtension used?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2014	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: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total

Actual	0	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of exhibits displayed to educate producers.

Year	Actual
2014	0

Output #2

Output Measure

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

Year	Actual
2014	0

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).

Outcome #1

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

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).

Not Reporting on this Outcome Measure

Outcome #4

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #6

1. **Outcome Measures**

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

   Not Reporting on this Outcome Measure

Outcome #7

1. **Outcome Measures**

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

   Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

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%	
511	New and Improved Non-Food Products and Processes	5%	5%	0%	
724	Healthy Lifestyle	70%	70%	0%	
805	Community Institutions and Social Services	20%	20%	0%	
	Total	100%	100%	0%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	18.0	1.0	0.0	0.0
Actual Paid	19.0	4.0	0.0	0.0
Actual Volunteer	6.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
383641	124873	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1637116	167873	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 Diabetes was 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 their 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 delivered by Extension, in partnership with the Tennessee Chapter of the Arthritis Foundation, the Tennessee Department of Health's Arthritis Control Program, and the University of Tennessee Medical Center's Department of Family Medicine. Specific efficacy-enhancing strategies used in this program were:

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

Living Well with Chronic Conditions targeted citizens living with chronic health issues such as asthma, arthritis, and heart disease. Extension helped these individuals to manage their pain and engage in daily activities.

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?

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

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	19909	9045212	132240	0

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

Patent Applications Submitted

Year: 2014

Actual: 0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	2	0	2

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
2014	2118

Output #2

Output Measure

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

Year	Actual
2014	88301

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 eat at least five servings of fruits and vegetables each day.
5	Dining with Diabetes: Number of participants surveyed who now use artificial sweeteners.
6	Dining with Diabetes: Number of participants surveyed who use spices and other seasonings to cut back on fat, sugar, and salt.
7	Living Well with Chronic Conditions: Number of participants controlling their anger and frustration caused by their condition by using positive thinking techniques six months after completing the program.
8	Living Well with Chronic Conditions: Number of participants making healthy food decisions six months after completing the program.
9	Living with Chronic Conditions: Number of participants who have had fewer doctor visits and/or emergency room visits six months after completing the program.
10	Sugar Free with Justin T.: Diabetes Education Through Community Partnerships

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
2014	458

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 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
2014	192

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 and Social Services

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	196

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 and Social Services

Outcome #4

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
2014	196

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 and Social Services

Outcome #5

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
2014	380

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 and Social Services

Outcome #6

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
2014	380

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 and Social Services

Outcome #7

1. Outcome Measures

Living Well with Chronic Conditions: Number of participants controlling their anger and frustration caused by their condition by using positive thinking techniques six months after completing the program.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2014	543

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 and Social Services

Outcome #8

1. Outcome Measures

Living Well with Chronic Conditions: Number of participants making healthy food decisions six months after completing the program.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	631

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area

724 Healthy Lifestyle

Outcome #9

1. Outcome Measures

Living with Chronic Conditions: Number of participants who have had fewer doctor visits and/or emergency room visits six months after completing the program.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	234

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #10

1. Outcome Measures

Sugar Free with Justin T.: Diabetes Education Through Community Partnerships

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Diabetes is an epidemic, and the effects of the disease are far-reaching. The Centers for Disease Control and Prevention (2011) state that 25.8 million people in the United States are affected by diabetes (8.3% of the population), and the annual direct medical costs are 2.3 times higher for a person with diabetes than a person without the disease.

What has been done
To share information with diabetics, pre-diabetics, and caregivers, a diabetes education program was produced and broadcasted on the Roane County, Tennessee community cable outlet. The program was targeted at improving dietary quality. The production was named "Sugar Free with Justin T." to add local flavor and to emphasize the show's host (Mr. Justin Thomas), who serves as the UT Extension Family and Consumer Sciences agent in the community where the show is broadcast. Numerous studies have identified television as a valuable medium for delivery of Extension family and consumer sciences programs over the past five decades (Medved, 1966; Sunnarborg, Bradley, & Haynes, 1988; Kristiansson, 1981). Sugar Free with Justin T. is a result of partnerships among representatives of the Roane County Health Department, Roane State Community College, Channel 15, Coordinated School Health, and TENNderCARE. Roane County Health Department provided all food demonstration needs through a diabetes education grant. Roane State Community College Communications department, which oversees Channel 15, filmed, edited, and produced all video segments. Students were responsible for all parts of production. Following the TV broadcast, videos are posted to Facebook.

Results
The program has increased visibility for Extension Family and Consumer Sciences programs in Roane County. Calls have increased in regards to diabetes education classes and food safety.

Facebook metrics show that the Sugar Free with Justin T. video posting resulted in increased visitors to the UT Extension Roane County page. A random week was selected for promotion of American Diabetes Month in November 2013 for posting of video segments. Three segments were posted in one week that resulted in 1,656 viewers. The previous five posts on the UT Extension Roane County Facebook page had a total of 970 views, and the five posts after the week of Sugar Free with Justin T. had 1,075 views. From the five preceding posts, there was a 71% increase during the week when videos were shown. The week videos were posted also drew 54% more viewers than the next five posts in the following weeks.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Public priorities
- Competing Programmatic Challenges

Brief Explanation

{No Data Entered}

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The Extension Family and Consumer Sciences program, Living Well With Chronic Conditions, was evaluated through participant surveys and interviews six months after the program. Results included:

- 489 participants are applying action-planning and problem-solving to better self-manage their chronic condition six months after completing the program.
- 631 participants are applying healthy eating principles when making daily food decisions.
- 281 participants are communicating better their needs and concerns with their healthcare providers six months after completing the program.
- 682 participants are confident they can better manage their chronic condition on a day-to-day basis because of participating in this program.
- 264 participants are controlling their anger and frustration caused by their condition by using positive thinking techniques six months after completing the program.
- 543 participants are controlling their anger and frustration caused by their condition by using positive thinking techniques.
- 616 participants are exercising more often to help manage their chronic condition.
- 269 participants are finding their chronic condition is interfering less with the things they like to do six months after completing the program.
- 285 participants are making healthy food decisions six months after completing the program.
- 246 participants are using the UT Med Minder card to keep a record of their medications.
- 609 participants can better manage their pain by using the various techniques of distraction, muscle relaxation, breathing and guided imagery.
- 269 participants continue to using action-planning and problem-solving to better manage their condition six months after completing the program.
- 234 participants have had fewer doctor visits and/or emergency room visits six months after completing the program.

- 255 participants have less pain from their chronic condition six months after completing the program.
- 229 participants have maintained an exercise routine six months after completing the program.

Key Items of Evaluation

The Extension Family and Consumer Sciences program, Living Well With Chronic Conditions, was evaluated through participant surveys and interviews six months after the program. Results included:

- 489 participants are applying action-planning and problem-solving to better self-manage their chronic condition six months after completing the program.
- 631 participants are applying healthy eating principles when making daily food decisions.
- 281 participants are communicating better their needs and concerns with their healthcare providers six months after completing the program.
- 682 participants are confident they can better manage their chronic condition on a day-to-day basis because of participating in this program.
- 264 participants are controlling their anger and frustration caused by their condition by using positive thinking techniques six months after completing the program.
- 543 participants are controlling their anger and frustration caused by their condition by using positive thinking techniques.
- 616 participants are exercising more often to help manage their chronic condition.
- 269 participants are finding their chronic condition is interfering less with the things they like to do six months after completing the program.
- 285 participants are making healthy food decisions six months after completing the program.
- 246 participants are using the UT Med Minder card to keep a record of their medications.
- 609 participants can better manage their pain by using the various techniques of distraction, muscle relaxation, breathing and guided imagery.
- 269 participants continue to using action-planning and problem-solving to better manage their condition six months after completing the program.
- 234 participants have had fewer doctor visits and/or emergency room visits six months after completing the program.
- 255 participants have less pain from their chronic condition six months after completing the program.
- 229 participants have maintained an exercise routine six months after completing the program.

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%	10%	
205	Plant Management Systems	60%	60%	13%	
211	Insects, Mites, and Other Arthropods Affecting Plants	10%	10%	7%	
212	Diseases and Nematodes Affecting Plants	10%	10%	41%	
213	Weeds Affecting Plants	10%	10%	7%	
215	Biological Control of Pests Affecting Plants	0%	0%	4%	
216	Integrated Pest Management Systems	10%	10%	0%	
607	Consumer Economics	0%	0%	4%	
702	Requirements and Function of Nutrients and Other Food Components	0%	0%	14%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	36.0	5.0	37.0	0.0
Actual Paid	45.0	9.0	26.2	0.0
Actual Volunteer	13.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
892188	290403	694288	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
3807248	390403	1741526	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
100000	0	1012726	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

UT AgResearch variety evaluations of different vegetable crops are conducted to determine suitability to climate, soils and cultural practices for state producers. Yields, quality and market potential are evaluated to assess potential production by growers seeking additional crops or alternative crops. Crops suitable for greenhouse production in farmers' tobacco transplant greenhouses are 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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	403620	20286789	0	0

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

Patent Applications Submitted

Year:	2014
Actual:	1

Patents listed

Cornus kousa 'Pam's Mountain Bouquet', US Plant Patent, revised. Trigiano, R.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	2	28	30

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Horticultural workshops and conferences.

Year	Actual
2014	25901

Output #2

Output Measure

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

Year	Actual
2014	101

Output #3

Output Measure

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

Year	Actual
2014	565

Output #4

Output Measure

- Development of genetic linkage maps for two economically important dogwood species will lay a

foundation for marker assisted selection for desirable traits such as, disease resistance, heat tolerance, bract color, and foliage color. (Wadl)

Year	Actual
2014	0

Output #5

Output Measure

- Results from the analysis of population structure and reintroduction of Pityopsis ruthii will provide critical information for resource managers in the conservation and recovery of the species. (Trigiano)
  Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Demonstrated that foliar applications of Se can increase Se content in Brassica vegetables while still maintaining high levels of glucosinolates. Demonstrated that ITCs from Brassica decreased the growth of Human Colon Cancer cells in vitro and that Se also decreased the cancer cell growth. (Sams)

Year	Actual
2014	0

Output #7

Output Measure

- Currently in the final stages of negotiations with a publically-traded company to sub-license the genetic-variation measurement technology and to work cooperatively to develop novel applications. (Lamour)

Year	Actual
2014	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Consumer Horticulture: Number of consumers who applied fewer fertilizers and pesticides due to a better understanding of landscape best management practices.
2	Consumer Horticulture: Number of consumers who learned about plant selection and proper planting to save money and time in the landscape.
3	Preventing fungal rot in Muscadine grapes. (Trigiano)

Outcome #1

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
2014	924

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	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #2

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
2014	3978

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	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
216	Integrated Pest Management Systems

Outcome #3

1. Outcome Measures

Preventing fungal rot in Muscadine grapes. (Trigiano)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Muscadine grapes have been precision breed to resist fungal rots. We needed to know the fungi involved in the rot process as well as their capacity to cause rots via productions of extracellular enzymes.

What has been done
We can now laboratory test the fungi against the precision bred grapes.

Results
This approach should facilitate faster, more cost-effective testing.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Diseases and Nematodes Affecting Plants

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

x

Key Items of Evaluation

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: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	14.0	2.0	0.0	0.0
Actual Paid	15.0	3.0	0.0	0.0
Actual Volunteer	4.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
294422	95833	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1256391	128833	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 will involve professionals, parents, child care providers, older adults, and community leaders. The target audiences are child care providers, adolescents, and parents who are divorced or

incarcerated, court-ordered parents and relatives as caregivers.

The following will be 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 will be created and dissiminated. Extension FCS Agents in over 60 of Tennessee's 95 counties will offer the four-hour class Parenting Apart: Effective Co-Parenting, an information and skills-based program that utilizes lecture, class discussion, videos, and handouts to inform parents about the potential effects of divorce on their children and provides them with strategies for minimizing those effects. It is expected that approximately 2,000 participants will complete the Extension class annually.

For 2014 - 2018, TSU Extension Family and Community Health programs will place special emphasis on "Healthy Aging" for the mind, body and spirit. The ultimate goal is 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 will produce and distribute resource materials and educational programs on a variety of topics for interested individuals, caregivers, and professionals. Various methods will be employed, including inter-generational connections.

2. Brief description of the target audience

The target audiences for this planned program are Tennessee child care providers, parents, and adolescents. While all parents of infants and young children are targeted for literacy programs, parents seeking a divorce are 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?

{No Data Entered}

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	46970	2835290	0	0

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	1	0	1

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2014	35

Output #2

Output Measure

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

Year	Actual
2014	1085

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Child Care/Parenting: Number of parents and childcare providers who report using suggested guidance techniques more often.
2	Child Care/Parenting: Number of parents and child care providers who report putting down or blaming their child less.
3	Child Care/Parenting: Number of parents and child care providers who report talking, singing and playing more with their children than before the program.
4	Divorcing Parents: Number of parents who plan to decrease exposure of their children to parental conflict.
5	Caregiving Education: Number of caregivers who report the Extension program helped them to minimize stress.

Outcome #1

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
2014	984

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #2

1. Outcome Measures

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
2014	238

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #3

1. Outcome Measures

Child Care/Parenting: Number of parents and 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
2014	139

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

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
2014	1525

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
802	Human Development and Family Well-Being

Outcome #5

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Government Regulations

Brief Explanation

V(I). Planned Program (Evaluation Studies)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

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%	6%	
102	Soil, Plant, Water, Nutrient Relationships	0%	0%	8%	
121	Management of Range Resources	0%	0%	6%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	10%	
202	Plant Genetic Resources	0%	0%	2%	
205	Plant Management Systems	0%	0%	9%	
212	Diseases and Nematodes Affecting Plants	0%	0%	4%	
215	Biological Control of Pests Affecting Plants	0%	0%	2%	
402	Engineering Systems and Equipment	0%	0%	6%	
404	Instrumentation and Control Systems	0%	0%	9%	
501	New and Improved Food Processing Technologies	0%	0%	4%	
511	New and Improved Non-Food Products and Processes	0%	0%	23%	
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%	
607	Consumer Economics	0%	0%	2%	
608	Community Resource Planning and Development	0%	0%	2%	
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

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	4.0	1.0	75.0	0.0
Actual Paid	5.0	1.0	62.0	0.0
Actual Volunteer	1.0	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
89218	29040	750451	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
380724	39040	4934678	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	5289891	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

UT AgResearch 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 UT AgResearch's engineering work, 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 are identifying 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, UT AgResearch is 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?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	971	80256	583	0

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

Patent Applications Submitted

Year: 2014

Actual: 5

Patents listed

Methods, systems and devices for simultaneous production of lactic acid and propylene glycol from glycerol. Ye, X.P. and L. Liu.

Development of a renewable carbon-based bio-modifier for asphalt cement. Bao. Huang, X.P. Ye, S. Zhao, and X. Shu.

Novel glycerol dehydration methods and products thereof. Ye, X.P.

Comprehensive Process for Selectively Separating Lignocellulosic Biomass into Purified Components with High Yield. McCall, A., J.J. Bozell, D. Harper, O. Hosseineai, N. Labbé, and T. Rials

Terpene Synthases and Methods of Using the Same. Chen, F.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total

Actual	1	65	66

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Actual
2014	25

Output #2

Output Measure

- Release improved high yielding synthetic and hybrid varieties of switchgrass. (Bhandari, Allen)
  Not reporting on this Output for this Annual Report

Output #3

Output Measure

- We continue to use screening data from nearly 100 different insect species to help focus identification of unique protein cellulases. We expect that these enzymes may be useful in increasing the efficiency of biofuel production and continue to seek external funding to support work on species that have demonstrated high levels of enzymatic activity. (Klingeman)

Year	Actual
2014	0

Output #4

Output Measure

- The first year of work has laid the foundation for long term cultivar development research in feedstock switchgrass. The nurseries are already well established and will generate reportable data in the fall of 2013. (Bhandari)
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Evaluations of the effects of tillage, fertilization, etc. are showing less carbon gas emissions from certain agricultural practices. These results are being used to modify models used at the state and federal governmental levels to assist in minimizing the effects of food production on air quality. (Tyler)
  Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Estimated required facilities, biomass, cost, and timing for an 11 billion gallon per year cellulosic biofuel target in the southeast region. (Clark, Jensen, Lambert, Yu)

Year	Actual
2014	0

Output #7

Output Measure

- Determined that chemical reduction of lignin derived from our organosolv process has a marked effect on the glass transition temperature of the lignin polymer. Our studies indicate that increases in hydroxyl group content coincide with increases in glass transition temperature, and structural component changes in the lignin polymer are evident and related to reaction time. (Chmely)

Year	Actual
2014	0

Output #8

Output Measure

- Synthesized a sponge-like carbon aerogel from nanocellulose, the most abundant organic polymer on Earth. This carbon aerogel has super-absorbing ability for many oils and organic solvents, up to 64 times its own weight. Those characteristics, along with good recyclability, give the carbon aerogel great potential to separate oil from water and to clean up large-scale oil spills. (Wang)

Year	Actual
2014	0

Output #9

Output Measure

- Developed a catalyst that is capable of producing furfuryl alcohol from furfural, which is the initial step in the production of methyl furan. Our catalyst is cheaply produced from earth-abundant metals and is magnetic, which makes it easily separable and recyclable. (Chmely)

Year	Actual
2014	0

Output #10

Output Measure

- Optimized switchgrass conversion facility management and siting. (Larson, Yu)

Year	Actual

2014	0

Output #11

Output Measure

- Reduced costs of biomass delivery to the biorefinery. (English, Yu)

Year	Actual
2014	0

Output #12

Output Measure

- Showed advantages of integrating 1st-stage size-reduction processing of switchgrass with harvest logistics to enable economies of automated bulk-format handling. (Womac)

Year	Actual
2014	0

Output #13

Output Measure

- Analyzed switchgrass production relative to feedstock costs and GHG emissions. (Yu)

Year	Actual
2014	0

Output #14

Output Measure

- Created Wood2Energy database for development and expansion of US and Canadian markets. (Rials)

Year	Actual
2014	0

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Evaluate precision-farming / variable-rate technology for switchgrass and other bioenergy crops (Tyler).
2	Mills using integrated process to produce bioenergy plus enhanced-strength OSB (Wang).
3	TSU Extension Enhances Biofuel Crop Production in Tennessee
4	Switchgrass biomass yield improvement. (Allen, Bhandari)
5	Stabilization of bio-oil by deoxygenation. (Chmely)
6	Transfer hydrogenation of polar double bonds. (Chmely)

Outcome #1

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #2

1. **Outcome Measures**

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

Not Reporting on this Outcome Measure

Outcome #3

1. **Outcome Measures**

TSU Extension Enhances Biofuel Crop Production in Tennessee

2. **Associated Institution Types**

- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Fuel prices are high and volatile which can adversely affect national, regional, and local economies. Utilizing production agriculture to produce crops for fuel without taking food crops out of production can help create greater energy independence and mitigate these economic issues. Farmers need to gain knowledge related to biofuels and biofuel-related crops and how to produce them to make educated decisions and become part of a growing agricultural sector.

What has been done
Eleven counties participated in biofuel related activities. Five of the 11 counties were part of a mobile biodiesel production workshop that targeted producers held in February/March or June

and engaging 40 individuals. Other programming related to the mobile demonstration engaged the general public and youth and led to over 25,000 contacts. Overall, biofuel programs in Tennessee engaged over 79,000 indirect contacts and over 1,600 direct contacts.

Results
Participants involved in the mobile biodiesel production workshops indicated a significant increase in perceptions, awareness, interest and knowledge related to on-farm biodiesel production. For example, prior to the workshops, participants were uncertain whether biodiesel production was too difficult or not economically feasible for farmers to produce. After the workshops, they disagreed that it was too difficult and they disagreed that it was not economically feasible. Following the workshops, they were also more likely to produce their own biodiesel in the next 5 years, discuss the information with other farmers and create a cooperative for biodiesel production.

4. Associated Knowledge Areas

KA Code	Knowledge Area
402	Engineering Systems and Equipment
605	Natural Resource and Environmental Economics

Outcome #4

1. Outcome Measures

Switchgrass biomass yield improvement. (Allen, Bhandari)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Switchgrass needs significant improvement in yield for its viable use as a feedstock in bioenergy production.

What has been done
Our emphasis of switchgrass cultivar development is to improve biomass yield. Initially, we collected halfsib seeds from about 200 plants each of Alamo and Kanlow that were phenotypically selected from four-year-old swards of corresponding population.

Results
Mean biomass yield of halfsib progeny was about 15% higher compared to original population demonstrating potential genetic yield improvement that could be achieve using phenotypic selection.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources

Outcome #5

1. Outcome Measures

Stabilization of bio-oil by deoxygenation. (Chmely)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Bio-oil is the liquid product from the fast pyrolysis of whole biomass. It has been considered as a surrogate for crude oil, as it is a viscous mixture of products that could be distilled and refined like petroleum. However, removal of oxygen is necessary to stabilize the oil, which would allow for refining, shipment, and storage.

What has been done
We developed a novel catalyst system using mixed metal oxides to reduce the oxygen content of pyrolysis oil vapors.

Results
We discovered that this system is capable of removing oxygen from vapors generated by the pyrolysis of pure cellulose.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
605	Natural Resource and Environmental Economics

Outcome #6

1. Outcome Measures

Transfer hydrogenation of polar double bonds. (Chmely)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Catalytic reduction of platform chemicals is an important process in the production of alcohols that are utilized in the pharmaceutical, agricultural, flavoring, and cosmetic industries. However, these processes typically require expensive and dangerous hydrogen gas as well as rare, expensive, and toxic noble metals such as platinum, palladium, or iridium.

What has been done
We have synthesized a novel catalyst species based on iron, the most earth-abundant transition metal, which is capable of catalyzing the transfer hydrogenation of polar double bonds using isopropanol in lieu of hydrogen gas.

Results
This process is cost effective and safer than traditional hydrogenations.

4. Associated Knowledge Areas

KA Code	Knowledge Area
511	New and Improved Non-Food Products and Processes
601	Economics of Agricultural Production and Farm Management
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

TSU Extension coordinated 11 counties for biofuel-related activities. Five of the 11 counties were part of a mobile biodiesel production workshop that targeted producers held in February/March or June, engaging 40 individuals. Other programming related to the mobile demonstration engaged the general public and youth and led to over 25,000 contacts. Overall, biofuel programs in Tennessee engaged over 79,000 indirect contacts and over 1,600 direct contacts. Participants involved in the mobile biodiesel production workshops indicated a significant increase in perceptions, awareness, interest and knowledge related to on-farm biodiesel production. For example, prior to the workshops, participants were uncertain whether biodiesel production was too difficult or not economically feasible for farmers to produce. After the workshops, they disagreed that it was too difficult and they disagreed that it was not economically feasible. Following the workshops, they were also more likely to produce their own biodiesel in the next 5 years, discuss the information with other farmers and create a cooperative for biodiesel production.

Key Items of Evaluation

TSU Extension coordinated 11 counties for biofuel-related activities. Five of the 11 counties were part of a mobile biodiesel production workshop that targeted producers held in February/March or June, engaging 40 individuals. Other programming related to the mobile demonstration engaged the general public and youth and led to over 25,000 contacts. Overall, biofuel programs in Tennessee engaged over 79,000 indirect contacts and over 1,600 direct contacts. Participants involved in the mobile biodiesel production workshops indicated a significant increase in perceptions, awareness, interest and knowledge related to on-farm biodiesel production. For example, prior to the workshops, participants were uncertain whether biodiesel production was too difficult or not economically feasible for farmers to produce. After the workshops, they disagreed that it was too difficult and they disagreed that it was not economically feasible. Following the workshops, they were also

more likely to produce their own biodiesel in the next 5 years, discuss the information with other farmers and create a cooperative for biodiesel production.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
3788	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
0	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
0	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
0	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
12	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.