2008 University of Tennessee Research and Extension and Tennessee State University Extension Combined Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

This report consists of the FY 2008 results and accomplishments of the Tennessee Agricultural Research and Extension System. The University of Tennessee Extension and the Tennessee Agricultural Experiment Station (TAES) comprise the 1862 institution and the Tennessee State University Cooperative Extension Program and the Tennessee State University Institute for Agricultural and Environmental Research comprise the 1890 institution.

This report represents the combined efforts of the University of Tennessee (UT) Extension, the Tennessee Agricultural Experiment Station (UT AgResearch), and the Tennessee State University (TSU) Cooperative Extension Program. UT and TSU Extension extend the knowledge and expertise of the state's two land grant institutions to the 5.9 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 2008, Extension continued its excellence in economic development and outreach.

Economic Development: Extension's educational programs in 4 H youth development, agriculture and natural resources, family and consumer sciences and resource development produce substantial returns for Tennessee. Using research, questionnaires, observations and sales records, an estimated impact is $343 million for FY 2008.

The recurring economic impacts were estimated at $116 million. These recurring economic values include increased revenue, increased savings and one time capital purchases associated with three Extension programs: Crop Variety Trials, Master Beef Producer and 4-H camping. Using the United States Department of Defense formula, an estimated 2,322 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 $227 million from seven Extension programs. The programs included in this analysis were nutrition education, health literacy, Tennessee Saves, 4-H scholarships, feeder cattle marketing, genetic improvement for cattle, and volunteerism.

Outreach: UT and TSU Extension professionals and the volunteers they recruited, trained and managed made over 4.9 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. UT Extension had over 400,000 downloads of educational materials from its websites.

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

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.

Total Actual Amount of professional FTEs/SYs for this State

Year:2008	Extension		Research	
	1862	1890	1862	1890
Plan	464.6	43.0	306.0	0.0
Actual	450.0	43.0	300.3	0.0

II. Merit Review Process

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

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

2. Brief Explanation

The merit review and peer review processes established in the latest Plan of Work were fully implemented in FY 2008. In addition, UT Extension conducted an external university panel review with program development and evaluation specialists from Virginia and 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 while focusing on measuring fewer, more important outcome indicators.

UT AgResearch merit review was strengthened by the continued (second year) 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 2008, UT and TSU Extension made 18,924 contacts for needs assessment purposes. Tennessee Extension Agents placed special emphasis on involving youth and other under represented groups in needs assessment activities. Of these needs assessment contacts, 30% were young people under 18 years of age. A special accomplishment was the involvement of racial and ethnic minority groups; 3,909 contacts (21% of total) represented racial-ethnic minority groups.

Each 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
- Open Listening Sessions
- Needs Assessments

Brief Explanation

All Extension Agents receive instruction in selecting needs assessment strategies and in selecting individuals for Advisory Committees. Community leaders selected for Advisory Committees are chosen to represent the diversities (i.e., gender, age, racial/ethnic, socio economic, political, educational, etc.) of the county or area served. Extension Agents recruit individuals who have participated in past and current Extension programs; and they recruit individuals who have not used Extension to serve on local advisory committees and participate in open listening sessions. In FY 2008, UT and TSU Extension Agents conducted 325 local advisory committee meetings.

A PR firm previously retained for our research efforts reinforced our understanding of a number of critical stakeholders: a 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

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

Brief Explanation

The System for University Planning, Evaluation and Reporting (SUPER) tracks Extension's needs assessment efforts across Tennessee. In FY 2008, of the 1,114 different focus groups and interviews with key informants, 486 involved individuals who were not previously active in Extension (defined as those not previously on an Extension mailing list). These individuals were indentified in various ways such as asking Advisory Committee members and community leaders to suggest names.

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

3. A statement of how the input was 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

Over 300 Extension advisory committee meetings were held across the state. Other needs assessment activities conducted by UT and TSU Extension included: document reviews, focus groups, interviews with key informants, open listening sessions, invitations to stakeholder groups. Needs assessment data at the local level was entered into the Extension System for University Planning, Evaluation and Reporting (SUPER).

The State Action Agendas (state plans of work) delineated programs, curricula, partners and resources for addressing these concerns. Individual plans were created and implemented by every Extension Agent and Specialist based on the results of the needs assessment. The plans were monitored and adjusted by Regional Program Leaders and Department Heads.

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

The Extension statewide needs assessment analysis showed that four strategic priorities were producing measurable results, and that these priorities hould should continue for the foreseeable future:

•Promoting healthy lifestyles;

•Protecting our food, environmental and agricultural resources;

•Preparing youth for a diverse and demnading future; and

•Building and sustaining personal and family financial skills.

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**
7827392	2358359	4940730	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	7827392	2358354	6442479	0
Actual Matching	30258295	2358354	33202318	0
Actual All Other	11669268	0	7566889	0
Total Actual Expended	49754955	4716708	47211686	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous years				
Carryover	0	0	1501749	0

V. Planned Program Table of Content

Program #1

V(A). Planned Program (Summary)

1. Name of the Planned Program

4-H Positive Youth Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
806	Youth Development	100%	100%	100%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	97.0	6.0	0.0	0.0
Actual	138.0	13.0	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
2413967	727317	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
9331659	727317	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
2087005	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

In 2008, Tennessee Extension Agents in 85 of the 95 Tennessee counties organized over 2,500 4-H clubs where workforce preparation was the major emphasis. UT and TSU Extension made 286,973 direct educational contacts to help youth gain new knowledge, acquire new skills and change aspirations regarding workforce preparation. Curriculum was selected and programs implemented to help youth attain basic work skills and personal attributes in two areas, achieving goals and communicating. Project work was emphasized, and the experiential learning model was used to highlight jobs and careers aligned with 4-H projects. Activity sheets were developed and delivered to emphasize practical skills which align with jobs and careers. Various school enrichment programs focused on workforce preparation, and youth were encouraged to set a goal for their job or career.

4-H workforce preparation programs were delivered through 7,803 group meetings including organized clubs, camps, project groups and school enrichment by Extension 4-H agents and volunteers. Educational programs were reinforced by 220 exhibits, 341 news articles, 146 radio programs and 13 television programs.

2. Brief description of the target audience

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

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

Year	Direct Contacts Adults Target	Indirect Contacts Adults Target	Direct Contacts Youth Target	Indirect Contacts Youth Target
Plan	5000	0	35000	100000
2008	32314	0	308922	2052522

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	3	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of volunteers utilized in delivering this program.

Year	Target	Actual
2008	250	12556

Output #2

Output Measure

- Number of exhibits produced.

Year	Target	Actual
2008	10	220

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 youth who report that they now achieve goals they set for themselves.
4	Achieving Goals: Number of youth who are now making plans to acheive their goals.
5	Achieving Goals: Number of youth who have set a goal for their job or career.
6	Communicating: Number of youth who can express ideas with a poster, exhbit, or other display.
7	Communicating: Number of youth who can now share their ideas through writing.
8	Communicating: Number of youth who can use technology to help themselves express ideas.
9	Communicating: Number of youth who have learned at least five jobs in which communication skills are important.
10	Communicating: Number of youth who are now better listeners.
11	Communicating: Number of youth who haved explored careers in communications.
12	Communicating: Number of youth who report they have improved photography skills.
13	Communicating: Number of youth who report they have learned skills in visual communications.
14	Communicating (Public Speaking): Number of youth who can deal with their nervousness when giving a speech or talk.
15	Communicating (Public Speaking): Number of youth who can select a topic for a speech or talk.
16	Communicating (Public Speaking): Number of youth who can speak loudly enough to be heard when giving a speech or talk.
17	Communicating (Public Speaking): Number of youth who feel comfortable sharing their thoughts and feelings in a speech or talk.

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20000	10619

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20000	6796

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 youth who report that they now achieve goals they set for themselves.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	2500	7539

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

Achieving Goals: Number of youth who are now making plans to acheive their goals.

Not reporting on this Outcome for this Annual Report

Outcome #5

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1000	4890

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
806	Youth Development

Outcome #6

1. Outcome Measures
Communicating: Number of youth who can express ideas with a poster, exhbit, or other display.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15000	13657

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: Number of youth who can now share their ideas through writing.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15000	13465

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15000	12620

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15000	12489

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: Number of youth who are now better listeners.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10000	3077

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

Communicating: Number of youth who haved explored careers in communications.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	200	2258

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 #12

1. Outcome Measures

Communicating: Number of youth who report they have improved photography skills.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15000	2926

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 #13

1. Outcome Measures
Communicating: Number of youth who report they have learned skills in visual communications.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10000	2625

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 #14

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	30000	20125

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 #15

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	25000	22491

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 #16

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	25000	20812

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 #17

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	25000	17814

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Public priorities

Brief Explanation

This Extension planned program in youth development was created after an extensive and well-documented statewide needs assessment. In several counties, local advisory boards shift their emphasis from communications to achieving goals. Targets were set without considering such important factors as staff vacancies, for example, due to retirement.

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

1. Evaluation Studies Planned

- After Only (post program)

Evaluation Results

14,586 youth were involved in programs in which an outcome evaluation was conducted of their practices toward achieving goals. Intact groups of 4-H youth were randomly selected for post-test only questionnaires. The questionnaires were valid and reliable instruments from the Tennessee Extension Program Evaluation Network, an online tool to measure and evaluate the outcomes of statewide programs. The questionnaires used a five part scale (never, rarely, sometimes, often and always) to determine achieving goals behaviors at the beginning, intermediate and advanced levels after the program. A typical questionnaire item would be phrased "Because of my 4-H experiences, I work to achieve my goals."

Key Items of Evaluation

50,221 Tennessee youth were involved in programs in which an outcome evaluation was conducted of their knowledge, attitudes and skills in communicating. Intact groups of 4-H youth were randomly selected for post-test only questionnaires from the Tennessee Extension Program Evaluation Network. The questionnaires used a five-part scale (I can do it, I need a lot of help, don’t know, I need a little help and I can do it by myself) to obtain outcome indicator data. Outcome numbers reported are those where answers were "I need a little help" and "I can do it myself".

Program #2

V(A). Planned Program (Summary)

1. Name of the Planned Program

Agronomic Crop Systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	12%	
205	Plant Management Systems	50%	50%	62%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%	5%	3%	
212	Pathogens and Nematodes Affecting Plants	5%	5%	16%	
601	Economics of Agricultural Production and Farm Management	40%	40%	7%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	**Extension**		**Research**	
	1862	**1890**	**1862**	**1890**
Plan	57.9	10.9	49.0	0.0
Actual	86.0	8.0	61.7	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**
1501293	452333	1149839	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
5803541	452333	9974814	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
293000	0	1554912	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

The Extension portion of this plan was implemented via the Innovation-Decision Process (Rogers, 1995). It is important to conduct the agronomic crop systems programs in this way because producers of various row crops, in various locations in the state are in different stages of this process for the array of research-based practices. Based on needs assessments conducted by Extension Specialists, the following pactices will be targeted:

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

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

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

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

Implementation: On-farm demonstrations were conducted, particularly in the 31 West Tennessee counties, to highlight research-based practices. Integrated research and extension efforts were conducted, such as test plots in most West Tennessee counties.

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

From a research perspective, molecular, marker-assisted and traditional breeding techniques are used to develop genetic lines and varieties of corn, soybeans, tobacco, and wheat which are adapted, high-yielding, and disease-resistant. Varieties of these crops and cotton are evaluated in replicated field research plots at our Research and Education Centers and with producer cooperators in selected counties. Likewise, cropping systems research addressing tillage systems and rotation schemes are conducted to develop production system information.

We conduct surveillance for exotic and invasive organisms using both conventional and molecular technologies.We research the effects of biological, cultural and chemical control technology for efficacy and effect on productivity of cropping systems under study.We search for new organisms to use in integrated control programs for pests and diseases of those agronomic systems that are predicted to be in danger of severe damage from new, emerging, and re-emerging pests and diseases.

Economic data are developed from field experiments on agricultural experiment stations, through surveys of producers, and through simulation modeling. Data are analyzed using standard methods for estimating yield response functions, budgeting, optimization techniques, risk analysis procedures, simulation modeling, and other methods of economic analysis as appropriate.

2. Brief description of the target audience

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

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	10000	15000	1000	0
2008	65844	400000	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	2

Patents listed

B. Oppert, J.L. Jurat-Fuentes, J. Fabrick, C. Oppert. 2008. Novel cadherin receptor for potentiating Bt biopesticides. Patent application.

Armel, G.R. and W. Hong. 2008. Herbicidal mixtures. World Patent Application, WO073369

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	28	
2008	20	40	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Target	Actual
2008	10	10

Output #2

Output Measure

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

Year	Target	Actual
2008	2000	2424

Output #3

Output Measure

- Local/regional research presentations, workshops, media releases.

Not reporting on this Output for this Annual Report

Output #4

Output Measure

- National/US level research presentations, workshops.

Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Yield gain resulting from regional soybean breeding, tenths of bushels per acre per year.

Not reporting on this Output for this Annual Report

Output #6

Output Measure

- DNA-based Asian Soybean Rust early detection program for Tennessee soybean acreage, acres protected. (Lamour)

Year	Target	Actual
2008	{No Data Entered}	1000000

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Annual tons of soil erosion prevented due to adopting conservation-tillage encouraged by the availability of herbicide-resistant seed for cotton production in Tennessee.
2	Acres of herbicide-resistant cotton in Tennessee encouraged by the adoption of conservation tillage.
3	Farm operators with sales over $10K using TAES economic research in decisions.
4	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).
5	Row Crops Production: Number of producers, farm workers and other ag professionals who received pesticide certification, recertification and pesticide safety training.
6	Row Crops Production: Number of participants who improved their income by following the recommended best management practices for crop production, including plant pest management.
7	Tennessee soybean production increase attributable to breeding, bushels per year.
8	Adoption rate of bioactive natural products in place of conventional pesticide on cotton, driven by organic cotton price premium.
9	Improving Corn Production
10	Molecular mechanisms for plant defense.
11	Enhanced-nutrition soybeans.
12	Economical use of fertilizers and lime.
13	Agronomic crop variety testing and information dissemination.
14	Skip-row cotton planting to reduce costs.
15	Optimum soybean variety selection for disease and nematode resistance.
16	Foliar fungicides for higher wheat yields.
17	Creation of Genetic and Genomic Tools.
18	Identification of glyphosate-resistant Palmer amaranth.
19	Characterizing the Insect Gut Healing Response.
20	Mycorrhizae: Plant and Soil Protection.
21	Sprayer Drift Reduction.
22	Statistical Analysis Tools For Research Data.

Outcome #1

1. **Outcome Measures**

Annual tons of soil erosion prevented due to adopting conservation-tillage encouraged by the availability of herbicide-resistant seed for cotton production in Tennessee.

Not reporting on this Outcome for this Annual Report

Outcome #2

1. **Outcome Measures**

Acres of herbicide-resistant cotton in Tennessee encouraged by the adoption of conservation tillage.

Not reporting on this Outcome for this Annual Report

Outcome #3

1. **Outcome Measures**

Farm operators with sales over $10K using TAES economic research in decisions.

Not reporting on this Outcome for this Annual Report

Outcome #4

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	Quantitative Target	Actual
2008	100	5958

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 #5

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

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	250	1872

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #6

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	Quantitative Target	Actual
2008	200	1118

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Tennessee, the major production issue for row crop producers remains controlling insects, weeds or plant diseases.

What has been done

UT Extension taught producers of four major crops how to effectively to control insects, weeds and plant diseases to boost the bottom line and protect the environment. Radio programs, farm visits, field days and winter meetings were held throughout the 31 major row crop-producing counties.

Results

Questionnaires and on-farm interviews revealed that 1,118 producers of corn, cotton, soybeans and wheat reported a reduction in pest control costs of $6.7 million by following recommended control strategies for insects, weeds or plant diseases.

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Tennessee soybean production increase attributable to breeding, bushels per year.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	48000	48000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

There is a continual need to increase soybean yield, while adding beneficial variety characteristics.

What has been done

In 2008 we released a new Roundup Ready soybean developed by our program, and just on the market it sold enough seeds to plant about 2,700 acres in Tennessee. This new variety ranked #4 of 86 commercial varieties in the 2008 Tennessee State Variety Test 4L, and it significantly out yielded the commercial average by 3 Bu/A.

Results

Our new Roundup Ready 'USG Allen' soybean, which topped the yield tests last year, was well received by farmers who planted an estimated 31,000 acres in 2008. An additional 9,000 acres was planted in two of our other Roundup Ready varieties (USG 56293 and USG 56379) and 4,300 acres were planted in our conventional soybean varieties (USG 5601T and USG 5002T). In addition to this direct impact, Tennessee soybean genetics are utilized as crossing parents by breeders in USDA, other universities, and in industry to bolster seed yields and plant disease resistance. Tennessee soybean genetics provides an estimated $1 million in additional revenue directly to soybean producers each and every year through production increases. (Pantalone)

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
601	Economics of Agricultural Production and Farm Management

Outcome #8

1. Outcome Measures

Adoption rate of bioactive natural products in place of conventional pesticide on cotton, driven by organic cotton price premium.

Not reporting on this Outcome for this Annual Report

Outcome #9

1. Outcome Measures

Improving Corn Production

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tennessee produced over 550,000 acres of corn for grain in 2008. Improving profit margins for corn producers benefits Tennessee's economy.

What has been done

Many counties across Tennessee had dry growing conditions during middle and late season which impacted corn yields. UT Extension taught producers the benefits of using higher-yielding varieties and proper pest management.

Results

1519 corn producers reported harvesting higher corn yields or better quality crops using university trial results. 422 corn producers report $862,024 reduction in pest control costs by following recommended control strategies for insects, weeds or plant diseases.

4. Associated Knowledge Areas

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

Outcome #10

1. Outcome Measures

Molecular mechanisms for plant defense.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Insects are constant threat to agricultural production. Our major project is focused on understanding the molecular mechanisms of plant defense.

What has been done

We identified a number of critical defense genes. A number of publications based on these finding have been published or are in preparation.

Results

Modifying the expression of these defense genes in crops using genetic engineering may provide the crops with enhanced resistance against insects. (Chen)

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
201	Plant Genome, Genetics, and Genetic Mechanisms

Outcome #11

1. Outcome Measures

Enhanced-nutrition soybeans.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Soybean varieties with better livestock feed characteristics are needed.

What has been done

The gene symbols cqPha-001 and cqPha-002 were approved in 2008 by the Soybean Genetics Committee for our research that led to discovery of the first confirmed genomic regions governing soybean seed phytate concentration.

Results

We are applying that knowledge for molecular marker assisted selection to develop a low phytate soybean variety for enhanced poultry and swine nutrition and water quality protection from phosphorous loads. (Pantalone)

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
601	Economics of Agricultural Production and Farm Management

Outcome #12

1. Outcome Measures

Economical use of fertilizers and lime.

2. Associated Institution Types

•1862 Extension
•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tennessee residents and producers need optimized application guidelines in these times of high fertilizer and lime prices.

What has been done

Forage and Agronomic P and K fertilizer and lime recommendations were updated. K Fertilizer rates in hybrid bermuda hay systems were reduced by 120 lbs/acre based on collected data. A nitrogen rate calculator for corn production systems that takes both nitrogen and corn commodity price into account was approved for use by Tennessee farmers.

Results

These changes can save producers $96.00 per acre or several million dollars yearly on a statewide basis. (Savoy)

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures
Agronomic crop variety testing and information dissemination.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agricultural producers have a constant need for new, unbiased agronomic variety information to increase yields, lower management costs, preserve soil, and combat insect and disease pressure.

What has been done

We coordinated the work on 8600+ plots on RECs of 543 varieties of corn, soybean, wheat, grain sorghum and oat varieties. Coordinated the publication of data on 176 varieties of corn, soybean, wheat and grain sorghum from County Standard Tests.

Results

According to producer surveys in Northwest TN, over 90% of them use the variety test information from the County and REC tests to make variety purchases. Assuming that producers state-wide use the information in a similar manner, then the added farm gate revenue due to those kinds of decisions for corn, soybean and wheat is over $100 million annually. (Allen)

4. Associated Knowledge Areas

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

Outcome #14

1. Outcome Measures

Skip-row cotton planting to reduce costs.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Cotton producers desire to reduce input costs while maintaining yield.

What has been done

The project reported to producers that planting cotton in a 2x1 skip-row pattern can reduce planting costs with minimal loss of lint yield or earliness in relatively narrow row widths. Reducing planting costs by one-third are particularly helpful to producers interested in planting cotton in 15- or 30-inch rows for spindle picking.

Results

Assuming cost of $75 per acre for seed and technology fees for solid planting, adoption of 2x1 skip rows on 20% of Tennessee cotton acres would save $1.5 million in production costs annually. (Gwathmey)

4. Associated Knowledge Areas

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

Outcome #15

1. Outcome Measures

Optimum soybean variety selection for disease and nematode resistance.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Soybean producers need to select varieties that have disease and nematode resistance that fits their field situations.

What has been done

Without the disease and nematode ratings that we produce, producers would have to rely on seed companies for their information or in many cases no disease and nematode information at all.

Results

This has saved Tennessee producers about $75 per acre or about $75 million statewide each year. In some severe cases the savings from disease and nematode resistant varieties are $100 per acre, especially, since prices for soybeans have increased significantly. Since producers have realized the value of disease control their production levels have risen significantly in the last two to three years compared to surrounding states like Mississippi where yields have gone down. (Newman)

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
601	Economics of Agricultural Production and Farm Management
205	Plant Management Systems

Outcome #16

1. Outcome Measures
Foliar fungicides for higher wheat yields.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Wheat growers can increase yields with proper application of foliar fungicides.

What has been done

Wheat producers are able to increase yields by 8-10 bushels per acre when using the foliar disease point system and the new foliar fungicides.

Results

In 2008, wheat prices reached $8-$10 per bushel and producers increased their fungicide spraying significantly. This has given about $12 million increase annually. (Newman)

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management
212	Pathogens and Nematodes Affecting Plants

Outcome #17

1. Outcome Measures

Creation of Genetic and Genomic Tools.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Genetic tools are lacking in economically important crops. New molecular techniques, optimized for large genome species such as wheat and switchgrass, will facilitate basic and applied research.

What has been done

We create the genetic and biotechnological tools for gene transfer, and for characterizing the chromosomal regions flanking the transgene, thereby eliminating the more tedious, time-consuming, and expensive molecular analyses.

Results

The input costs and time required to achieve a transgenic event are significantly reduced. (Zale)

4. Associated Knowledge Areas

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

Outcome #18

1. Outcome Measures

Identification of glyphosate-resistant Palmer amaranth.

2. Associated Institution Types

•1862 Extension
•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Related to herbicide-resistant seed, we have identified glyphosate-resistant Palmer amaranth in 10 counties. Most of these cases are spots of GR Palmer ranging from the size of a car to several acres to in a few cases the whole field.

What has been done

We have conducted research this year and last year on non-glyphosate options to control Palmer at both WTREC and REC at Milan. Based in part on this research we have worked with the herbicide manufacturer to rebate up to $12.00 an acre for various management strategies.

Results

If cotton acres remain flat, this research potentially will save Tennessee cotton growers $2.4 million dollars in 2009 while combating glyphosate resistance. (Steckel)

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
201	Plant Genome, Genetics, and Genetic Mechanisms
601	Economics of Agricultural Production and Farm Management

Outcome #19

1. Outcome Measures

Characterizing the Insect Gut Healing Response.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Exposure to pathogens or pesticides activates a gut healing mechanism in insects that is involved in resistance. We are identifying the factors and cellular processes involved in activation of this process to be able to inhibit it and use these factors in cell culturing.

What has been done

The gut healing response is controlled by molecules secreted to induce stem cells to multiply and replace damage. To identify the molecules, we prepared stem cell cultures and treat them with proteins produced by gut cells that have been treated with Bt toxins.

Results

Identification of gut healing growth factors may allow design strategies to make insects more susceptible -- leading to reduced pesticide use and more environmentally-friendly pesticides. These growth factors may also be useful for vertebrate stem cell research and biomedicine. (Jurat-Fuentes)

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants

Outcome #20

1. Outcome Measures

Mycorrhizae: Plant and Soil Protection.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agriculture relies on plant and soil health. Each is hurt by environmental stresses such as erosion drought, and saline irrigation water.

What has been done

We studied how symbiosis of plant roots with mycorrhizal fungi can make both plants and soils more resilient to environmental stress.

Results

Mycorrhizal symbiosis helped reform damaged soil structure, and it helped plants maintain better water status and more normal photosynthesis during drought. (Auge)

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #21

1. Outcome Measures

Sprayer Drift Reduction.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sprayer drift results in high wasted-material, environmental, and liability costs.

What has been done

Sprayer best management procedures (bmp) using modern spray nozzle selection techniques aid applicators in selecting and using the right equipment to make responsible applications to reduce drift by 40% compared to 10 years ago.

Results

Drift reduction savings were $2.25 million of off-target losses, not including savings in liability costs and environmental impact. Nozzle classification and improved technologies impacted the engineering design of 190,000 spray tips sold annually, $500,000 annual spray boom sales, and $3.8 million of sprayer unit sales including as many as 50 new self propelled units annually. If 2007 values of $2.2M decrease linearly over 5 years, 2008 value is 2.2 * 0.8 = $1.8M (Womac)

4. Associated Knowledge Areas

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

Outcome #22

1. Outcome Measures

Statistical Analysis Tools For Research Data.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Agricultural research produces data that needs statistical analysis in order to decide what treatments increase productivity. Most scientists have minimal training in statistics, so the objective is to create tools that assist scientists with correct statistical analysis.

What has been done

This project is developing a 'how-to' website that provides instructions for using SAS software to analyze research data. The website is open to the world, hopefully maximizing its impact.

Results

The website will assist scientists in the statistical analysis of their research. These tools should improve productivity, reducing time wasted on computer programming, and quality of publications should also increase, as current standard statistical methods are used. (Auge, Saxton)

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

In some cases, intellectual property issues prevent fully discussing progress at this time.

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

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Other (Third-Party)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #3

V(A). Planned Program (Summary)

1. Name of the Planned Program

Animal Systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
301	Reproductive Performance of Animals	15%	15%	16%	
302	Nutrient Utilization in Animals	0%	0%	5%	
303	Genetic Improvement of Animals	10%	10%	5%	
307	Animal Management Systems	60%	60%	57%	
311	Animal Diseases	15%	15%	17%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	43.5	1.2	63.0	0.0
Actual	37.0	3.5	27.0	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
638715	192442	492122	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
2469077	192442	3653276	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
715967	0	508467	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

We conduct applied and basic research in animal health, nutrition, physiology, and genomics to address high priority problems of the livestock industries. We disseminate information gained from these studies to producers, veterinarians, and others associated with the animal industries through outreach programs and publications.

The Master Beef Producer Program was led by a team of University of Tennessee Extension specialists and agents, with the support and involvement of representatives of state agencies, businesses and organizations that have an interest in the state's cattle industry. In addition to agents, industry professionals, veterinarians, and other local industry leaders are included as a part of the teaching team. The Master Beef Producer Program was a series of 12 educational sessions focusing 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. The program enhanced the profitability and competitiveness of cow-calf operations by providing essential, technical information.

Surveillance of possible disease vectors is maintained throughout the insect season; suspected vectors are tested for appropriate viruses. Risk factor analysis test results are compared between sites where disease risk is high vs. those where disease risk is low. Mastitis susceptible and resistant dairy cows are used to identify potential genes, immune components, and other factors associated with and responsible for mastitis resistance. A series of trials uses pigs to test various feeding regimens and feed additives to determine effects on the number of antibiotic resistant foodborne pathogens occurring in those animals and their environment. Additional studies are detecting the prevalence of antibiotic resistant bacteria associated with cattle and surrounding environments. These studies should help determine strategies to limit such foodborne risks.

2. Brief description of the target audience

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

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

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	10000	15000	5000	0
2008	129596	567000	7125	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	1

Patents listed

Kojima, C.J. Use of syndyphalin-33 as a therapeutic agent to enhance the health and well-being of newly-weaned animals. US provisional patent application filed September 23, 2008.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	37	
2008	6	42	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Target	Actual
2008	5	20

Output #2

Output Measure

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

Year	Target	Actual
2008	5000	4488

Output #3

Output Measure

- Improved summer pregnancy success in dairy cattle due to heat stress management, pregnancy rate.

Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Percentage of livestock producers that adapt prudent use guidelines for antibiotic use in their herds based on information derived and disseminated.
2	Percent of cattle producers using preventative treatments.
3	Beef Production and Marketing: The added value of calves marketed that were managed according to BQA guidelines (dollars).
4	Beef Production and Marketing: The increase in value of feeder calves as result of cooperative marketing or marketing through an alliance.
5	Beef Production and Marketing: Number of beef producers who utilized improved sires, artiifcial insemination or other genetic improvement methods.
6	Beef Production and Marketing: Number of beef producers who have improved knowledge about genetic improvement, nutrition, health, reproduction and other topics covered by Master Beef Program.
7	Adoption of reproduction-enhancing media additive for cattle embryo transfer, annual uses in Tennessee.
8	Tennessee cattle industry savings due to use of tall fescue toxicosis management strategies, millions of dollars.
9	Reduction in mastitis in Tennessee dairy cattle by genetic marker screening, percent reduction.
10	Extension Beef Programs: Economic Impact
11	Milk quality improvement.
12	Maintaining cattle breeding program participation.
13	Black fly suppression program.
14	Preventing 'Curly Calf Syndrome'.
15	Sales of multiple ovulation embryo transfer (MOET) technology for cattle embryo transfer, dollars (Schrick)
16	Heat stress induces premature aging of the egg to reduce dairy cow fertility.
17	Diagnosing Johne's disease in domestic and wild animals.
18	Helping pigs survive weaning.
19	Measuring stressor effect in poultry production.
20	Better bull genetics through the central bull evaluation center.
21	Supplementing cool season grass-fed beef cattle with soybean hulls.
22	Improving Reproductive Efficiency in Cattle, dollar value
23	Antibiotic Resistance in Livestock.

Outcome #1

1. Outcome Measures

Percentage of livestock producers that adapt prudent use guidelines for antibiotic use in their herds based on information derived and disseminated.

Not reporting on this Outcome for this Annual Report

Outcome #2

1. Outcome Measures

Percent of cattle producers using preventative treatments.

Not reporting on this Outcome for this Annual Report

Outcome #3

1. Outcome Measures

Beef Production and Marketing: The added value of calves marketed that were managed according to BQA guidelines (dollars).

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	200000	1410326

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Feeder cattle marketing and health have been two critical issues for Tennessee beef cattle producers over the past 10 years.

What has been done

UT Extension has been a leader in teaching beef quality assurance and teaching producers the benefits of cooperative marketing.

Results

In 2008, the added value of calves marketed that were managed according to BQA guidelines was over $1.4 million. The increase in value of feeder calves as result of cooperative marketing or marketing through an 'alliance' was over $2.1 million.

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #4

1. Outcome Measures

Beef Production and Marketing: The increase in value of feeder calves as result of cooperative marketing or marketing through an alliance.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension
- 1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100000	1410326

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #5

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	350	1716

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 #6

1. Outcome Measures

Beef Production and Marketing: Number of beef producers who have improved knowledge about genetic improvement, nutrition, health, reproduction and other topics covered by Master Beef Program.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	3997

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
303	Genetic Improvement of Animals
302	Nutrient Utilization in Animals
307	Animal Management Systems
311	Animal Diseases

Outcome #7

1. Outcome Measures

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

Not reporting on this Outcome for this Annual Report

Outcome #8

1. Outcome Measures

Tennessee cattle industry savings due to use of tall fescue toxicosis management strategies, millions of dollars.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	40	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tall fescue toxicosis continues to be the number one, grass-related disease in the U.S. in terms of economic loss to animal producers, affecting over 8.5 million beef cows and 700,000 horses. Annual economic losses of $600 million to the U.S. cattle industry are probably an underestimate, covering both growth and reproduction. Tennessee beef cattle losses due to tall fescue toxicosis are over $100 million annually.

What has been done

We have continued research on management strategies and alternative forages for endophyte-infected tall fescue for Tennessee livestock producers.

Results

Adding clover (25-40%) to tall fescue pastures results in improved animal performance regardless of the endophyte status of the tall fescue. Clover has the potential to increase income of Tennessee beef cattle industry $40 to 50 million each year through improved animal performance and fertilizer savings. Jesup MaxQ tall fescue and Persist orchardgrass appear to be promising alternative forages. (Waller)

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
302	Nutrient Utilization in Animals
311	Animal Diseases

Outcome #9

1. Outcome Measures
Reduction in mastitis in Tennessee dairy cattle by genetic marker screening, percent reduction.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Mastitis, an inflammation of the mammary gland most commonly caused by bacteria, negatively impacts food safety and represents one of the most economically devastating diseases in the dairy industry.

What has been done

A series of genetic markers for mastitis susceptibility have been identified by our lab.

Results

This research has the potential to select for cows and sires more resistant to disease, thereby increasing the health and productivity of the animal and enhancing safety of the milk supply. (Pighetti)

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases
303	Genetic Improvement of Animals

Outcome #10

1. Outcome Measures

Extension Beef Programs: Economic Impact

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tennessee has over 2.1 million head of beef cattle. To remain viable in a troubled economy, beef producers need comprehensive educational programs in their communities.

What has been done

UT Extension educational programs targeted nutrition, forage management and marketing. Extension agents and specialists made 130,000 contacts in beef production in group meetings, field days, demonstrations, office visits, mail, telephone and farm visits. Volunteers recruited and managed by UT Extension made an additional 8,500 contacts with producers.

Results

the total economic impact from UT Extension beef programs in 2008 was $24.9 million. This includes $21.1 million in recurring impact (i.e., increased savings and capital improvements on Tennessee farms) and $3.8 million in one-time, non-recurring impact. The $21.1 million recurring economic impact created or maintained an estimated 422 jobs in the state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals
307	Animal Management Systems

Outcome #11

1. Outcome Measures

Milk quality improvement.

2. Associated Institution Types

•1862 Extension
•1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Poor quality milk in Tennessee and in the southeast continues to be of concern. Lost premiums and/or penalties due to poor quality milk have had a significant financial impact on dairy producers. Furthermore, dairy producers are concerned about difficulties of sustaining competitive milk production as regulations concerning quality milk are becoming more stringent.

What has been done

We have been leading a collaborative grass roots effort to establish a Tennessee Quality Milk Initiative (TQMI).

Results

Based on information published annually by USDA, milk quality in Tennessee has improved considerably in the last two years as evidenced by a reduction in the somatic cell count of milk from ~ 500,000 somatic cells per milliliter of milk in 2005 prior to the initiation of TQMI to ~ 416,000 somatic cells per milliliter of milk suggesting that TQMI is having a substantial impact in the state. Dr. Oliver plans on taking the TQMI program beyond the borders of Tennessee and establish a Southeast Quality Milk Initiative. (Oliver, Hill-Campbell)

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
311	Animal Diseases

Outcome #12

1. Outcome Measures
Maintaining cattle breeding program participation.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The inflation of grain prices had the potential of limiting participation in sire and progeny evaluation for post weaning gain tests. This would limit a breeder's ability to evaluate his/her breeding program for genetic evaluation of traits of economic importance and limit the supply and source of genetically superior germplasm for the commercial cow-calf producer in the state.

What has been done

An analysis of the previous 5 years data from the station revealed that bulls could be similarly ranked for gain after 84 days on test as they would have been on the 112 day test. So the decision was made to reduce the days on test to 84 days to maintain the opportunity for breeder participation.

Results

This decision was met with continued maximum participation in the program. (Kirkpatrick)

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals

Outcome #13

1. Outcome Measures

Black fly suppression program.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Black flies, Simulium jenningsi, are pest to both humans and animals.

What has been done

A black fly suppression program using the biological control agent, Bacillus thuringiensis var. israelensis (Bti), was conducted in the Greater Newport area to control a burgeoning population.

Results

The value of this project has been estimated to exceed $500,000 annually based upon results of an intensive telephone-based survey aimed at determining the local public's willingness-to-pay for this black fly suppression. (Moulton)

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

Outcome #14

1. Outcome Measures

Preventing 'Curly Calf Syndrome'.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

As a result of inbreeding in the purebred industry, some genetic defects or deleterious genes expose themselves. The 'Curly Calf Syndrome' is a result of the combination of both Arthrogryposis Multiplex genes appearing in the animal and its effects are lethal.

What has been done

Identifying carriers (heterozygotes) for the AM gene can eliminate the proliferation of the condition. Bulls in our sponsored test that were suspected (as a result of their pedigree) were DNA tested for the gene and those that were carriers were eliminated from the sale.

Results

Genetic transmission through sale animals was prevented. (Kirkpatrick)

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases
303	Genetic Improvement of Animals
301	Reproductive Performance of Animals

Outcome #15

1. Outcome Measures
Sales of multiple ovulation embryo transfer (MOET) technology for cattle embryo transfer, dollars (Schrick)

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	750000

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

301	Reproductive Performance of Animals

Outcome #16

1. Outcome Measures

Heat stress induces premature aging of the egg to reduce dairy cow fertility.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Efforts to gain a better understanding of the basic mechanisms through which heat stress compromises the ovum are critical first steps towards development of practical cattle management solutions to ameliorate heat-induced infertility related to reductions in ovum quality.

What has been done

Consequences of exposing maturing ova to heat stress go beyond obvious effects to reduce development, but carry over to otherwise morphologically-normal embryos to increase their susceptibility to heat stress. Thermolability of the few embryos that do develop from heat-stressed ova emphasizes importance of managing/cooling dairy cows to minimize exposure to stressor(s) during estrus. Data also emphasize the need for avoiding use of multiple ovulation embryo transfer procedures during heat stress conditions.

Results

Results from this study may be useful for the development of therapeutic strategies aimed at augmenting the protective mechanisms of the oocyte. This would provide practical solution(s) to ameliorate heat-induced infertility thereby increasing economic livelihood of dairy and other livestock producers. Research findings are/will be transposable, at least in part, to preventing negative effects of environmental heat stress for reducing reproduction in other agriculturally important species, as well as human beings. (Edwards)

4. Associated Knowledge Areas

KA Code	Knowledge Area
303	Genetic Improvement of Animals
307	Animal Management Systems
301	Reproductive Performance of Animals

Outcome #17

1. Outcome Measures

Diagnosing Johne's disease in domestic and wild animals.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Johne's disease (JD) occurs in domestic and wild animals worldwide and, in the United States, it causes an estimated annual loss of $200-$250 million to the agricultural economy.

What has been done

In this reporting period, we further optimized and evaluated our diagnostic test for Johne's disease and believe a company may license the method in 2009 with a plan of starting promotion of their kit.

Results

Since our test is much more sensitive (accurate) than currently available commercial tests, it will have a major positive impact on Johne's disease control in the U.S. and other countries. (Eda)

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases
307	Animal Management Systems

Outcome #18

1. Outcome Measures
Helping pigs survive weaning.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Weaning constitutes a tremendous stress on the pig resulting in weight loss and increased mortality.

What has been done

Experiments conducted by UT AgResearch have confirmed that a single intramuscular injection of SD33 prior to weaning improves feed intake, weight gain, gene expression, and immune response in weaned pigs.

Results

These findings may represent a management tool to combat post-weaning declines in pig health and well-being, thereby increasing the profitability and sustainability of livestock operations and ensuring an adequate and low cost meat product for consumers. (Kojima, Kattesh)

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems

301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals

Outcome #19

1. Outcome Measures

Measuring stressor effect in poultry production.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Poultry producers need to know the effect of stressors in avian environments.

What has been done

We found that the impact of poor air quality associated with sawdust bedding caused an aggravated suppression of fertility among avian males selected for reduced tolerance to mycotoxin challenge. We also found that high levels of stress hormones predispose avians to reductions in reproductive performance, particularly when challenged with feed born mycotoxins.

Results

The overall impact of our research is that stress leads to reduced immune strength which leads to reductions in not only health, but reproductive performance in meat type animals. Stressors have an additive and negative impact on reproduction. (Grizzle)

4. Associated Knowledge Areas

KA Code	Knowledge Area
307	Animal Management Systems
302	Nutrient Utilization in Animals
301	Reproductive Performance of Animals

Outcome #20

1. Outcome Measures

Better bull genetics through the central bull evaluation center.

2. Associated Institution Types

•1862 Extension
•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Identifying and using bulls in Tennessee that have the ability to increase the weaning weight of our state's calf crop by 7 pounds per calf could increase the state's beef returns by $5.775 million a year.

What has been done

The Central Bull Evaluation center is a cooperative effort of Extension, Research, College of Veterinary Medicine, TBCIA, Tennessee Farm Bureau and Tennessee Livestock Producers.

Results

As a result of this effort, purebred breeders are making directional changes in the kind of genetics they are supplying the commercial industry. Breeders are decreasing genetics for birth weight, which is associated with dystocia, and at the same time increasing genetics for growth and maternal traits. Demand and value have increased for quality bulls, with the average price per bull at the On-Farm PT Bull sale increasing from $2093 (2001) to $3184 (2006). In one county with 20 producers, all 20 are now using performance tested bulls. (Kirkpatrick)

4. Associated Knowledge Areas

KA Code	Knowledge Area
302	Nutrient Utilization in Animals
301	Reproductive Performance of Animals
303	Genetic Improvement of Animals

Outcome #21

1. Outcome Measures

Supplementing cool season grass-fed beef cattle with soybean hulls.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Beef producers need economical new feed sources, while maintaining animal performance.

What has been done

Supplementing soybean hulls or other highly digestible fiber sources to cattle grazing cool season grasses enhanced animal performance and promoted efficient use of the nutrients in the forage.

Results

Beef producers can use these fiber sources to market more animal weight and return more dollars to their investment in forage resources. (Waller)

4. Associated Knowledge Areas

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

Outcome #22

1. Outcome Measures

Improving Reproductive Efficiency in Cattle, dollar value

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	14200000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Increasing pregnancy rates of recipient cattle following transfer of embryos collected from genetically superior donor cows.

What has been done

Collection of bovine embryos with medium containing an prostaglandin receptor antagonist improved pregnancy rates of these embryos after transfer into recipients; no abnormalities in calf health, birth weight or weaning weight have been observed.

Results

Utilization of a prostaglandin F2Ã*ƒ*Â*ƒ*Ã‚Â¡ receptor antagonist during embryo recovery will significantly improve pregnancy rates of recipient animals and thus efficiency in production of genetically superior offspring. (Schrick, Edwards)

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
307	Animal Management Systems

Outcome #23

1. Outcome Measures

Antibiotic Resistance in Livestock.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

We wanted to determine if homologous integrons occurred in E. coli and Salmonella co-existing on the same livestock production site and/or animal in the US and Thailand, suggesting transfer of genetic resistance elements between those two organisms.

What has been done

Our results indicate that while in most cases, integrons of co-existing E. coli and Salmonella differed, identical integron amplicons were found in those species from a single swine farm in Thailand, suggesting horizontal transfer between these two organisms may have occurred on-farm.

Results

The information derived from these studies will help develop intervention strategies, husbandry practices, and therapeutic treatments to maintain livestock health and productivity while at the same time reducing the risk of antibiotic resistance in foodborne bacteria that may infect humans. (Mathew)

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Time series (multiple points before and after program)
- Other (Ongoing Economic Development Studies)

Evaluation Results

The University of Tennessee has pursued a benchmarking process to improve measurement of strtageic initiatives, such as economic development from UT Extension programs. The total economic impact from UT Extension beef programs in 2008 was $24.9 million. This includes $21.1 million in recurring impact (i.e., increased savings and capital improvements on Tennessee farms) and $3.8 million in one-time, non-recurring impact. The $21.1 million recurring economic impact created or maintained an estimated 422 jobs in the state, using a formula from the United States Department of Defense, Procurement Division.

Key Items of Evaluation

The total economic impact from UT Extension beef programs in 2008 was $24.9 million. This includes $21.1 million in recurring impact (i.e., increased savings and capital improvements on Tennessee farms) and $3.8 million in one-time, non-recurring impact. The $21.1 million recurring economic impact created or maintained an estimated 422 jobs in the state.

Program #4

V(A). Planned Program (Summary)

1. Name of the Planned Program

Biomass Utilization

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	28%	28%	28%	
501	New and Improved Food Processing Technologies	10%	10%	10%	
511	New and Improved Non-Food Products and Processes	18%	18%	18%	
601	Economics of Agricultural Production and Farm Management	10%	10%	10%	
603	Market Economics	16%	16%	16%	
605	Natural Resource and Environmental Economics	10%	10%	10%	
606	International Trade and Development	4%	4%	4%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources.	4%	4%	4%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	17.0	0.0
Actual	0.0	0.0	41.6	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	1076754	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	3758195	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	1309075	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

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

2. Brief description of the target audience

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

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2008	0	0	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	2

Patents listed

X.P. Ye, R. He, B.C. English, 2008. Provisional patent. Improve bio-oil stability by high pressure homogenization process. UT Research Foundation. Application#: 61076628

Jurat-Fuentes, J-L., J.D. Willis, C.J. Oppert, B. Oppert and W.E. Klingeman. 2008. Novel cellulases from Dissosteira carolina (Carolina grasshopper) and applications for biofuel production. Patent Application filed Nov. 2008.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	10	
2008	0	15	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Compilation of biomass monograph.

Year	Target	Actual
2008	0	1

Output #2

Output Measure

- Peer-reviewed technical resource pages in online BioWeb resource.

Year	Target	Actual
2008	600	110

Output #3

Output Measure

- Reduced average biomass harvest cost (current $10-15), dollars per dry ton.

Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Reduced grinding cost of fiber-rich biomass, dollars per dry ton.

Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Remove undesirable components from size-reduced biomass using low-cost, physical means, percent reduction.

Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Development of a rapid biomass compositional analysis method.

Year	Target	Actual
2008	0	1

Output #7

Output Measure

- Yield increase of switchgrass varieties in Tennessee, percent increase.

Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Number of growers producing bio-mass for commercial sale as "energy crops".
2	Acreage producing dedicated energy crops in Tennessee.
3	Research-oriented biorefinery to test range of processes for biomass to cellulosic ethanol.
4	Improve truck loading rates by in-field ambient and solar drying, average pounds per truck.
5	Improving bio-oil stability.
6	Assisting switchgrass establishment against weed pressure.
7	Biomass processing improvements.
8	Evaluating economic impacts of bioenergy on the nation.
9	Data and analysis of feedstock production.
10	Defining disease and insect pressures on emerging switchgrass energy crops.
11	Optimizing brassica for biodiesel production.
12	Better Hay Storage Methods.
13	Bio-diesel from Canola Oil.
14	Insect Cellulases for Biofuel Production.
15	Switchgrass Production Initiation.

Outcome #1

1. Outcome Measures

Number of growers producing bio-mass for commercial sale as "energy crops".

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	7	16

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Acreage producing dedicated energy crops in Tennessee.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	500	723

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Farmers need to maximize their return on seed and fertilizer inputs and thereby enhance the competitiveness of switchgrass as a future crop for Tennessee.

What has been done

723 acres of switchgrass were established and plans for another 2000 acres were made. Switchgrass yield responds to increased nitrogen rates but not seeding rate in Tennessee. Optimal nitrogen rates are 60 lbs N/acre for well-drained soils and 60-120 lbs N/acre higher for less well drained soils. Production costs ranged from $45-67/ton depending on the location.

Results

Refined switchgrass recommendations for TN producers have greatly reduced seed costs, and assisted in field selection and most efficient management techniques. Eleven of the initial sixteen farmers requested new switchgrass acreage for 2009 production season. (English, Garland, Larson, Tyler)

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Pragmatic challenges in chemistry, processing, feedstocks, and supply chain logistics must be resolved for cellulosic ethanol to become economically competitive and viable.

What has been done

The UT Biofuels Initiative has been set up to address these issues and to propel the South's emerging bioeconomy forward.

Results

Construction has begun on a 10% scale research and demonstration cellulosic ethanol plant, in cooperation with industrial technology partners. (Rials, Tiller)

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Improve truck loading rates by in-field ambient and solar drying, average pounds per truck.

Not reporting on this Outcome for this Annual Report

Outcome #5

1. Outcome Measures

Improving bio-oil stability.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The DOE Renewable Energy Research and Development program specifically called for research on biomass fast pyrolysis oil (bio-oil) stabilization.

What has been done

A filed patent on improving bio-oil stability by high pressure homogenization process addressed this bottleneck problem.

Results

The patent provides a novel and unique method to improve the stability of bio-oil pyrolyzed from biomass. (Ye)

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Assisting switchgrass establishment against weed pressure.

2. Associated Institution Types

•1862 Extension
•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Although switchgrass is an aggressive, warm season native grass, it is slow to establish and vulnerable to weeds during the first 2 years of growth (average of 61 percent yield reduction in research at Milan Center).

What has been done

Special Local Need 24(c) labels for two herbicides were obtained for switchgrass grown for biofuel. The current estimate for production in Tennessee is 6 to 8 tons per acre at a value of $110.00 per ton. Utilizing the average yield of 7 tons per acre, this translates to a market value of $770 per acre per year, or $770,000 over 1000 acres. Assuming a 61 percent yield loss, the value of this production would be reduced by 4.3 tons per acre per year, or $473 per acre per year. The total loss over 1000 acres would be $473,000 per year.

Results

One herbicide provided virtually complete control of broadleaf signalgrass and johnsongrass; the second also provided clear economic benefit. Based on application rates and herbicide cost, controlling broadleaf signalgrass and johnsongrass over $1,000 acres will result in a net gain of $420,750. The current goal is to establish as much as 6,000 acres in the vicinity of the pilot Tennessee biorefinery. (Rhodes)

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

Outcome #7

1. Outcome Measures

Biomass processing improvements.

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Advances are needed in integrated biomass size reduction and separation of chopped plant components to enable conversion of harvested plant material into energy and/or products.

What has been done

Systematic research revealed processing cost savings of 25% per dry ton based on energy-efficient size reduction coupled with optimum particles for separation. Integration included spectra of particles, bulk density, flowability, and use of a size reduction model. Low-moisture physical separation technologies were developed to partition biomass botanic fractions based on chemistry.

Results

Project findings were distributed via 15 presentations, 48 publications, 34 significant potential user contacts, ~723,000 biomassprocessing.org -hits, a research & demonstration trailer, and best management practices (BMPs). (Womac, Ye, Hayes)

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Evaluating economic impacts of bioenergy on the nation.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Department of Energy (DOE) and US Department of Agriculture (USDA) both sought our advice and involvement in developing renewable energy goals for their organizations.

What has been done

We continued to established Tennessee as the University of choice when evaluating economic impacts of bioenergy on the nation.

Results

We continued to relate with DOE national laboratories at Oak Ridge, Golden (NREL), and Moscow, Idaho (INL). We assisted USDA's Research, Extension, and Education services to develop a pathway to move towards increased involvement in developing renewable energy. (English)

4. Associated Knowledge Areas

KA Code	Knowledge Area
606	International Trade and Development
603	Market Economics
605	Natural Resource and Environmental Economics

Outcome #9

1. Outcome Measures

Data and analysis of feedstock production.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Government agencies require timely, accurate data and analysis for bioenergy planning and program development.

What has been done

The work done under the bioenergy program, in conjunction with the close collaboration with other faculty and staff of the Department of Agricultural Economics has led to the development of analytical capabilities that are unique in the country. Because of this, we provide DOE and USDA with data and analysis of feedstock production that no one else can.

Results

Two UT AgResearch economists were the only agricultural economists from land grant Universities contributing to the latest Inter-Agency Feedstock report released in December of 2008. (De La Torre Ugarte, Hellwinckel)

4. Associated Knowledge Areas

KA Code	Knowledge Area
603	Market Economics
606	International Trade and Development
605	Natural Resource and Environmental Economics

Outcome #10

1. Outcome Measures

Defining disease and insect pressures on emerging switchgrass energy crops.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

In Tennessee, switchgrass (Panicum virgatum) was selected for development as a biofuel crop, partly due to the assumption that because it was a native grass, it lacked disease problems. Unfortunately, that was an incorrect assumption.

What has been done

The USDA fungal indicates that 80 pathogens of Panicum virgatum have been reported. However, there is only one report of a switchgrass disease from Tennessee. The reason that no other diseases are reported from Tennessee is that switchgrass has been overlooked, rather than there are no diseases. We have isolated several pathogens from switchgrass.

Results

The paper on Puccinia was chosen by the editor of Plant Disease as 'key research.' Encouraging growers to adopt this new crop without providing information on occurrence and management of diseases and insects could lead to less than optimal adoption. (Ownley, Zale, Gwinn)

4. Associated Knowledge Areas

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

Outcome #11

1. Outcome Measures

Optimizing brassica for biodiesel production.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Producers need to know which brassica species may be best suited for production in Tennessee and still have good qualities for biodiesel.

What has been done

We continued work with a new biodiesel processing plant in the state to gather information on optimum brassica species. We planted a brassica trial in three locations and collected yield and oil quality data for 75 varieties and lines in 2008. We purchased a small scale oil press for this purpose. We have extracted oil from the 2008 crop.

Results

We are currently evaluating the oil for biodiesel qualities (viscosity, cloud point, fatty acid composition and oxidative stability). This data will be analyzed in 2009 and prepared for publication in an appropriate outlet. We demonstrated that Se content could be enhanced in Brassica crops while still maintaining sufficient levels of Glucosinolates to be important in human nutrition. (Sams)

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Better Hay Storage Methods.

2. Associated Institution Types

•1862 Extension
•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Approximately 50% of Tennessee producers use good storage systems of barns, sheds, and covered stacks. The remaining 50% use less-than-adequate storage systems and are experiencing dry matter losses of as much as 40% per bale.

What has been done

The Tennessee Agricultural Enhancement Program in recent years has contributed to more and better hay storage facilities by cost-sharing the expense of building approved storage facilities for hay.

Results

Participation in this program has allowed producers to maximize farm profits, adapt to changing market situations, improve operation safety, increase farm efficiency and make positive economic impacts in their communities. (Wills)

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Bio-diesel from Canola Oil.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

We wanted to investigate the potential of canola to produce bio-diesel fuel in Tennessee.

What has been done

We evaluated 60 winter canola varieties for adaptation and productivity at three Research and Education Centers in Tennessee in 2008. The highest yielding variety produced 2000 pounds of seed per acre.

Results

Canola can produce 100 gallons of bio-diesel fuel per acre in Tennessee, with a co-product of high protein meal for animal feed. Winter canola can be double-cropped with soybean to produce two crops of bio-diesel per year. (West, Sams)

4. Associated Knowledge Areas

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

Outcome #14

1. Outcome Measures

Insect Cellulases for Biofuel Production.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Current cellulase enzymes available to degrade cellulosic plant feedstock to glucose for production of ethanol are expensive and not efficient in some cases. We hypothesize insects feeding on cellulosic material express cellulases that will be more efficient.

What has been done

We screened more than 100 different insect species for the presence of high cellulosic activity compared to a commercial standard. We identified a number of species displaying high cellulase activity.

Results

We expect to identify and clone new cellulases that would be used to degrade plant material to glucose in biorefineries or through in planta expression. (Jurat-Fuentes, Klingeman)

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 #15

1. Outcome Measures
Switchgrass Production Initiation.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Incentives must provided to producers to begin switchgrass production for biofuels use.

What has been done

We provided initial seed stocks and production incentives for ~700 acres of switchgrass.

Results

This was a direct economic benefit of about $490,000 to farmers beginning switchgrass production. (Tiller)

4. Associated Knowledge Areas

KA Code	Knowledge Area
603	Market Economics

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

2008 was a year of flux in the development of biofuels and bioenergy, driven by dramatic changes in conventional fuel costs and the ebb and flow of the US presidential election cycle with its varying policy priorities.Despite these fluctuations, a very strong and broad research program is in place, producing steady advances on many critical bioenergy questions.

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

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- During (during program)
- Time series (multiple points before and after program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #5

V(A). Planned Program (Summary)

1. Name of the Planned Program

Economic Infrastructure and Commerce

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
601	Economics of Agricultural Production and Farm Management	30%	30%	30%	
602	Business Management, Finance, and Taxation	4%	4%	4%	
603	Market Economics	4%	4%	4%	
604	Marketing and Distribution Practices	26%	26%	26%	
607	Consumer Economics	6%	6%	6%	
608	Community Resource Planning and Development	10%	10%	10%	
609	Economic Theory and Methods	10%	10%	10%	
610	Domestic Policy Analysis	10%	10%	10%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	72.6	5.9	11.0	0.0
Actual	26.0	2.5	18.6	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
450075	135605	532448	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1739852	135605	1197229	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
542281	0	359469	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

•review their current financial situation •capitalize on strengths and reduce weaknesses in the farm business •develop individualized farm and financial plans •explore alternatives both on and off the farm •evaluate capital investment opportunities including land and/or machinery purchases •analyze likely consequences of changing the scope of enterprises •determine appropriate production practices

In addition to individualized farm and financial planning assistance, Extension offered hundreds of of workshops to help farmers improve their financial situation. For example, workshops were offered in improved marketing, goal-setting, and strategic planning.

The MANAGE program provided farm families with a clear understanding of their current financial situation and helped them evaluate their alternatives for the future. The educational program is offered at no cost to participating farm families in all 95 Tennessee counties.

2. Brief description of the target audience

•Limited-resource and small farmers •Farmers transitioning from tobacco to other crops

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	10000	25000	5000	0
2008	25646	34804	343	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	8	
2008	1	22	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Target	Actual
2008	10	9

Output #2

Output Measure

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

Year	Target	Actual
2008	5000	5178

Output #3

Output Measure

- Provide analysis of Tennessee watersheds to determine suitability for water quality trading.

Year	Target	Actual
2008	1	1

Output #4

Output Measure

- Widespread availability of report on spurring economic development by attracting retirees to rural communities.

Year	Target	Actual
2008	1	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Land Ownership Information Program: Number of African-American landowners who increased their knowledge of property rights and responsibilities.
2	Land Ownership Information Program: Number of African-American landowners who developed farm management plans.
3	Land Ownership Information Program: Number of African-American landowners who developed estate plans to reduce the financial and legal risks farm family businesses face as they transition betwen generations.
4	Farm Financial Analysis and Planning: Number of farmers and rural business operators who gained new knowledge and skills through the Quickbooks, fIRM and other record keeping workshops.
5	Farm Financial Analysis and Planning: Number of farm families and rural business operators who implemented partial budgeting decisions (examples include sell calves now or later, evaluating equitable leasing arrangements and mach
6	Farm Financial Analysis and Planning: Number of farm families and rural business operators implementing improved record systems.
7	Farm Financial Analysis and Planning: Number of farm families who used FINPACK for developing and implementing whole farm plans.
8	Farm Financial Management: Number of farmers who increased their knowledge and skills in farm and financial planning.
9	Farm Financial Management: Number of farmers who developed financial plans for their farms.
10	Farm Financial Management: Number of farmers who increased their potential cash income from their farming operation.
11	Farm Financial Management: Amount (in dollars) that farmers increased their potential cash income from implementing a farm plan.
12	Farmer-owned biomass cooperative to help capture economic advantage of bioenergy production.
13	Attitudes and preferences regarding land use.

Outcome #1

1. Outcome Measures

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

2. Associated Institution Types

•1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	80	44

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics
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	Quantitative Target	Actual
2008	80	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	80	15

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

Farm Financial Analysis and Planning: Number of farmers and rural business operators who gained new knowledge and skills through the Quickbooks, fIRM and other record keeping workshops.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	272

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 who implemented partial budgeting decisions (examples include sell calves now or later, evaluating equitable leasing arrangements and mach

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	643

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 and rural business operators implementing improved record systems.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	390

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
Farm Financial Analysis and Planning: Number of farm families who used FINPACK for developing and implementing whole farm plans.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	176

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 #8

1. Outcome Measures

Farm Financial Management: Number of farmers who increased their knowledge and skills in farm and financial planning.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	2225

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 #9

1. Outcome Measures

Farm Financial Management: Number of farmers who developed financial plans for their farms.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	195

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 #10

1. Outcome Measures

Farm Financial Management: Number of farmers who increased their potential cash income from their farming operation.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	63

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 #11

1. Outcome Measures

Farm Financial Management: Amount (in dollars) that farmers increased their potential cash income from implementing a farm plan.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	50000	360142

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 #12

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The bioenergy industry faces classic obstacles in scaling up to economically viable levels.

What has been done

A farmer-owned biomass cooperative is envisioned as one means of increasing the economic incentive and reward of bioenergy production.

Results

UT AgResearch hopes to assist in the startup of such a cooperative in 2010. (Tiller)

4. Associated Knowledge Areas

KA Code	Knowledge Area
604	Marketing and Distribution Practices
601	Economics of Agricultural Production and Farm Management
603	Market Economics
608	Community Resource Planning and Development

Outcome #13

1. Outcome Measures

Attitudes and preferences regarding land use.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

UT AgResearch, as well as dairy and other producers, need guidance on concerns residents may have about having an animal operation in their community.

What has been done

We surveyed a sample of Blount County residents to determine attitudes toward, and preferences for, the conversion of land in their community from a 'vacant' or 'idle' state to either a residential subdivision or a dairy farm.

Results

The results of this survey provide specific guidance on concerns residents may have about having an animal operation in their community. The research also provides more general guidance to policymakers on the differences in how residents view real estate development for animal agricultural operations and residential subdivisions. (Clark)

4. Associated Knowledge Areas

KA Code	Knowledge Area
610	Domestic Policy Analysis
608	Community Resource Planning and Development

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

Many economic outcomes are closely associated with other program areas (e.g., animal systems, bioenergy), and so are reported in those sections.

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

1. Evaluation Studies Planned

- Before-After (before and after program)
- Time series (multiple points before and after program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #6

V(A). Planned Program (Summary)

1. Name of the Planned Program

Environmental and Water Quality Impacts

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	0%	0%	12%	
102	Soil, Plant, Water, Nutrient Relationships	0%	0%	22%	
112	Watershed Protection and Management	0%	0%	25%	
131	Alternative Uses of Land	0%	0%	10%	
133	Pollution Prevention and Mitigation	0%	0%	20%	
403	Waste Disposal, Recycling, and Reuse	0%	0%	11%	
	Total	0%	0%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	0.0	0.0	29.0	0.0
Actual	0.0	0.0	40.6	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	925351	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	4029174	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	646630	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

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

2. Brief description of the target audience

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

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	0	0	0	0
2008	0	0	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	30	
2008	0	20	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Reduce water-flux measurement error of heat-pulse probe, percent error.

Year	Target	Actual
2008	20	30

Output #2

Output Measure

- Proof of concept of biodegradable polymer mulch from lactic acid as bioproduct of making ethanol from cellulosic materials.

Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Approximate RUSLE2 modeling software runs (per day) for conservation planning, new USDA programs, construction site erosion, and other natural resource conservation issues (e.g., nutrient management planning, carbon sequestration).
2	Percent of Tennessee row-crop acreage under some form of no-till or conservation tillage.
3	Greenhouse and nursery crop use of bioactive natural products in place of conventional pesticide on tomato, percent of operators adopting.
4	Analyzing impoundment failure in the Missouri Bootheel.
5	Modernizing wastewater regulations in Tennessee.
6	Developing a long-term strategy for Off-Highway Vehicle trail management.

Outcome #1

1. Outcome Measures

Approximate RUSLE2 modeling software runs (per day) for conservation planning, new USDA programs, construction site erosion, and other natural resource conservation issues (e.g., nutrient management planning, carbon sequestration).

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	14000	1000000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Soil erosion due to improper layout, cropping, and management has a massive, cumulative effect on agricultural productivity and land and water quality.

What has been done

The RUSLE2 erosion prediction model was developed by researchers at The University of Tennessee in cooperation with scientists and field personnel from USDA-Agricultural Research Service and USDA-Natural Resource Conservation Service (NRCS). RUSLE2 has now been implemented in the 2500+ NRCS field offices across the US and its protectorates and territories.

Results

RUSLE2 is being used an estimated 5000 times a day to compare management alternatives for their ability to reduce erosion and to enhance soil quality. In addition, RUSLE2 is now being used for planning on construction sites, helping managers keep sediment from damaging streams and rivers by comparing best management practices using cost-benefit analyses. (Yoder)

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
112	Watershed Protection and Management
101	Appraisal of Soil Resources

Outcome #2

1. Outcome Measures

Percent of Tennessee row-crop acreage under some form of no-till or conservation tillage.

Not reporting on this Outcome for this Annual Report

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

•1862 Extension
•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	1	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures
Analyzing impoundment failure in the Missouri Bootheel.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Rice farmers of the Missouri Bootheel are well aware that their flooded fields may leak excessively without explanation. Federal and state agencies are faced with this same perplexity in their attempts to develop artificial wetlands, as multi-million dollar impoundments about the Missouri Bootheel have inexplicably failed to hold water.

What has been done

We employed ground-penetrating radar (GPR) to locate the cause of the excessive leakage in an abandoned waterfowl impoundment. A design blunder has been determined to be the cause, in that during the design phase only geotechnical soil cores were evaluated, all of which implied a contiguous gleyed horizon that was highly capable of perching water.

Results

The surveys found long and narrow sand-filled fissures caused by liquefaction from the region's reoccurring cataclysmic earthquake have breached the water-perching horizon. (Freeland)

4. Associated Knowledge Areas

KA Code	Knowledge Area
101	Appraisal of Soil Resources

131	Alternative Uses of Land
112	Watershed Protection and Management

Outcome #5

1. Outcome Measures

Modernizing wastewater regulations in Tennessee.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

New regulations are being promulgated that allow advanced domestic wastewater treatment technologies to be used in Tennessee. Before advanced domestic wastewater treatment systems can be permitted in Tennessee, there must be a community of trained service providers.

What has been done

We developed and delivered a new two-day workshop that focuses on the operation and maintenance of small wastewater treatment systems.

Results

One of the impacts of this program has been the modernization of the wastewater regulations in Tennessee. (Buchanan)

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
403	Waste Disposal, Recycling, and Reuse

Outcome #6

1. Outcome Measures

Developing a long-term strategy for Off-Highway Vehicle trail management.

2. Associated Institution Types

•1862 Extension
•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The Forest Service must balance the needs of various potentially competing users, such as Off-Highway Vehicle users and trout anglers.

What has been done

UT researchers conducted an economic impact assessment of Upper Tellico Off-Highway Vehicle Users and Tellico River Trout Anglers to assist the Forest Service in developing a long-term strategy for OHV trail management in the area.

Results

Projected annual expenditures in the area are about $3.1 million by OHV users and $0.7 million by trout anglers. With multiplier effects, the projected area economic impacts from OHV users are nearly $4.8 million and from trout anglers are about $1.1 million. Area businesses indicating the highest percent of economic impact if OHV trails were closed were campgrounds. (English)

4. Associated Knowledge Areas

KA Code	Knowledge Area
133	Pollution Prevention and Mitigation
112	Watershed Protection and Management
131	Alternative Uses of Land

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Public Policy changes
- Competing Public priorities

Brief Explanation

{No Data Entered}

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

1. Evaluation Studies Planned

- Before-After (before and after program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #7

V(A). Planned Program (Summary)

1. Name of the Planned Program

Family Economics

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

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

V(C). Planned Program (Inputs)

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	29.0	3.4	0.0	0.0
Actual	20.0	2.0	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
353019	106361	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1364649	106361	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
59270	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension supported 10 regional and local social marketing campaigns organized by UT and TSU Extension and supported by coalitions of volunteers across Tennessee. The Tennessee toolkit for savings lesson plans and activities for teaching financial and savings education was implemented in schools, workplaces, community centers and other locations to teach youth and adults. Extension maintained a partnership with the national Extension "Finanacial Security in Later Life" initiative and with the "America Saves" national organization and other national and state partners with the TN Jumpstart Coalition. Extension deployed its On My Own curriculum and youth TN Saves in over 100 financial education simulations throughout the state to reach 30,000 youth with savings and financial education. Additional classes, newletters, news releases and community events were conducted for adult audiences.

2. Brief description of the target audience

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

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

Year	Direct Contacts Adults Target	Indirect Contacts Adults Target	Direct Contacts Youth Target	Indirect Contacts Youth Target
Plan	10000	50000	20000	50000
2008	114561	2839803	57280	114395

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	7	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Target	Actual
2008	15	68

Output #2

Output Measure

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

Year	Target	Actual
2008	10000	21419

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	TN Saves: Number of participants who analyzed their readiness for home ownership.
2	TN Saves: Number of participants who determined their net worth.
3	TN Saves: Number of participants who estimated their retirement income needs.
4	TN Saves: Number of participants who gained a better understanding of their options for financing health care.
5	TN Saves: Number of participants who identified more effective strategies for dealing with reductions or gaps in income.
6	TN Saves: Number of participants who identified ways to avoid being victimized by predatory practices or fraud.
7	TN Saves: Number of participants identified ways to increase savings.
8	TN Saves: Number of participants identified ways to reduce debt.
9	TN Saves: Number of participants who increased their financial management skills.
10	TN Saves: Number of participants who set financial or retirement goals.
11	TN Saves: Number of participants who felt more confident that they could build wealth.
12	Youth Finanacial Education Simluation: Number of participants who better understood their parent's concerns about money.
13	Youth Finanacial Education Simluation: Number of participants who felt more strongly that they needed to get a good education.
14	Youth Financial Education Simulation: Number of participants who learned better how to plan their spending.
15	Youth Financial Education Simulation: Number of participants who learned how education will affect the kind of job they can get.
16	Youth Financial Education Simulation: Number of participants who learned how having a family can affect their lifestyle.
17	Youth Financial Education Simulation: Number of participants who learned how much money it takes to get by.
18	Youth Financial Education Simulation: Number of participants who learned how occupation and income will affect their lifestyle.
19	Youth Financial Education Simulation: Number of participants who learned how payroll deductions are taken from gross pay.
20	Youth Financial Education Simulation: Number of participants who learned how to keep a checkbook register.
21	Youth Financial Education Simulation: Number of participants who learned how to write a check.
22	Youth Financial Education Simulation: Number of participants who planned to change their career goals.
23	TN Saves: Number of participants who followed a spending plan.
24	Youth Financial Education Simulation: Number of participants who planned to get more education after high school.
25	TN Saves: Number of participants who initiated or increased savings.
26	Youth Financial Education Simulation: Participants began or increased savings an average of $ ___ per month.
27	TN Saves: Participants initiated or increased savings an average of $ ___ per month.
28	Youth Financial Education Simulation: Number of participants who made a change in career plans.
29	TN Saves: Number of participants who kept a record of spending.
30	Youth Financial Education Simulation: Number of participants who made a change in financial behavior.
31	TN Saves: Number of participants who made a change in a financial practice to avoid being a victim of fraud or predatory practices.
32	Youth Financial Education Simulation: Number of participants who made a spending plan.
33	TN Saves: Number of participants who reduced debt.
34	Youth Financial Education Simulation: Number of participants who talked over the simulation with their parents.
35	TN Saves: Participants reduced debt an average of $ ___ per month.
36	Tennessee Saves Produces $21.8 Million Economic Impact

Outcome #1

1. Outcome Measures

TN Saves: Number of participants who analyzed their readiness for home ownership.

Not reporting on this Outcome for this Annual Report

Outcome #2

1. Outcome Measures

TN Saves: Number of participants who determined their net worth.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10000	2083

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 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	Quantitative Target	Actual
2008	10000	80192

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

TN Saves: Number of participants who gained a better understanding of their options for financing health care.

Not reporting on this Outcome for this Annual Report

Outcome #5

1. Outcome Measures

TN Saves: Number of participants who identified more effective strategies for dealing with reductions or gaps in income.

Not reporting on this Outcome for this Annual Report

Outcome #6

1. Outcome Measures

TN Saves: Number of participants who identified ways to avoid being victimized by predatory practices or fraud.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10000	88211

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 identified ways to increase savings.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10000	49833

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #8

1. Outcome Measures

TN Saves: Number of participants 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	Quantitative Target	Actual
2008	10000	48688

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management

Outcome #9

1. Outcome Measures

TN Saves: Number of participants who increased their financial management skills.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	10000	49260

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 #10

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	Quantitative Target	Actual
2008	10000	80192

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 #11

1. Outcome Measures

TN Saves: Number of participants who felt more confident that they could build wealth.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	44105

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 #12

1. Outcome Measures

Youth Finanacial Education Simluation: Number of participants who better understood their parent's concerns about money.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15000	28640

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 #13

1. Outcome Measures
Youth Finanacial Education Simluation: Number of participants who felt more strongly that they needed to get a good education.
Not reporting on this Outcome for this Annual Report

Outcome #14

1. Outcome Measures
Youth Financial Education Simulation: Number of participants who learned better how to plan their spending.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15000	29212

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 #15

1. Outcome Measures

Youth Financial Education Simulation: Number of participants who learned how education will affect the kind of job they can get.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15000	29212

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 #16

1. Outcome Measures

Youth Financial Education Simulation: Number of participants who learned how having a family can affect their lifestyle.

Not reporting on this Outcome for this Annual Report

Outcome #17

1. Outcome Measures

Youth Financial Education Simulation: Number of participants who learned how much money it takes to get by.

Not reporting on this Outcome for this Annual Report

Outcome #18

1. Outcome Measures

Youth Financial Education Simulation: Number of participants who learned how occupation and income will affect their lifestyle.

Not reporting on this Outcome for this Annual Report

Outcome #19

1. **Outcome Measures**
   Youth Financial Education Simulation: Number of participants who learned how payroll deductions are taken from gross pay.
   Not reporting on this Outcome for this Annual Report

Outcome #20

1. **Outcome Measures**
   Youth Financial Education Simulation: Number of participants who learned how to keep a checkbook register.
   Not reporting on this Outcome for this Annual Report

Outcome #21

1. **Outcome Measures**
   Youth Financial Education Simulation: Number of participants who learned how to write a check.
   Not reporting on this Outcome for this Annual Report

Outcome #22

1. **Outcome Measures**
   Youth Financial Education Simulation: Number of participants who planned to change their career goals.
   Not reporting on this Outcome for this Annual Report

Outcome #23

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	Quantitative Target	Actual
2008	6000	58426

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 #24

1. **Outcome Measures**

Youth Financial Education Simulation: Number of participants who planned to get more education after high school.

Not reporting on this Outcome for this Annual Report

Outcome #25

1. **Outcome Measures**

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

Not reporting on this Outcome for this Annual Report

Outcome #26

1. **Outcome Measures**

Youth Financial Education Simulation: Participants began or increased savings an average of $ ___ per month.

2. **Associated Institution Types**

- 1862 Extension
- 1890 Extension

3a. **Outcome Type:**

Change in Action Outcome Measure

3b. **Quantitative Outcome**

Year	Quantitative Target	Actual
2008	30	23

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 #27

1. **Outcome Measures**

TN Saves: Participants initiated or increased savings an average of $ ___ per month.

2. **Associated Institution Types**

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	75	117

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 #28

1. Outcome Measures
Youth Financial Education Simulation: Number of participants who made a change in career plans.
Not reporting on this Outcome for this Annual Report

Outcome #29

1. Outcome Measures
TN Saves: Number of participants who kept a record of spending.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	976

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 #30

1. Outcome Measures

Youth Financial Education Simulation: Number of participants who made a change in financial behavior.

Not reporting on this Outcome for this Annual Report

Outcome #31

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	1188

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 #32

1. Outcome Measures

Youth Financial Education Simulation: Number of participants who made a spending plan.

Not reporting on this Outcome for this Annual Report

Outcome #33

1. Outcome Measures

TN Saves: Number of participants who reduced debt.

Not reporting on this Outcome for this Annual Report

Outcome #34

1. Outcome Measures

Youth Financial Education Simulation: Number of participants who talked over the simulation with their parents.

Not reporting on this Outcome for this Annual Report

Outcome #35

1. Outcome Measures

TN Saves: Participants reduced debt an average of $ ___ per month.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	75	208

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 #36

1. Outcome Measures

Tennessee Saves Produces $21.8 Million Economic Impact

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

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.

What has been done

Tennessee Saves activities are conducted through bankruptcy education, homebuyer education,saving education for adults and youth, credit education, employee education and financial education simulations for youth. Counties across Tennessee reported over 114,000 direct educational contacts, including over 66,000 contacts via group meetings and financial education programs. An additional 5 million Tennesseans were reached with the message of the importance of savings and financial responsibility through media and exhibits. The Governor proclaimed Tennessee Saves Week.

Results

The annual economic impact through savings and debt reduction associated with the program was:

* Increased savings or investment - $14,246,016
* Debt reduction - $7,651,680
* Total - $21,897,696

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

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

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)

Evaluation Results

Both the Expert Panel and USDA reviewers suggested that UT and TSU Extension concentrate on evaluating the leading indicators for our planned programs. Extension also demonstrated the economic impact of the Tennessee Saves program. Extension evalutions over the past five years have been so successful that Tennessee's Govenor proclaimed "Tennessee Saves Week" in 2008.

Key Items of Evaluation

The annual economic impact through savings and debt reduction associated with the program was:
•Increased savings or investment – $14,246,016 •Debt reduction – $7,651,680 •Total – $21,897,696

Program #8

V(A). Planned Program (Summary)

1. Name of the Planned Program

Food Safety, Quality, and Nutrition

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	0%	0%	10%	
502	New and Improved Food Products	0%	0%	5%	
702	Requirements and Function of Nutrients and Other Food Components	0%	0%	5%	
703	Nutrition Education and Behavior	60%	60%	40%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	40%	40%	40%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	43.5	2.5	38.0	0.0
Actual	97.0	9.0	34.8	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
1682106	506811	1087035	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
6502508	506811	4262448	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
6093037	0	778964	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Extension used the Power U curriculum in Tennessee schools and afterschool programs. Extension personnel and volunteers used the curriculum to teach diet quality to young people.

Extension delivered the Walk Across Tennessee program in over 25 communities in the state. This eight-week walking program organized teams for walking, jogging, or biking. Instruction was delivered in the prevention of obesity-related diseases such as cancer, diabetes and heart disease. Also, physical activity and weight management were taught.

In the Safe Food for Tennessee initiative, lessons were delivered 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, newsppaer articles and radio programs) will emphasize the following:

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

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

Research projects in food safety are multi-pronged in their objectives. A major thrust is characterization of the antimicrobial activity of novel natural (i.e., plant-, animal- or microbial-based) compounds and better targeting through controlled-delivery encapsulation systems and incorporation into nanofibers and packaging films. Encapsulation strategies include micelles, liposomes, chitosans, supercritical carbon dioxide, high pressure homogenization and ultrasound. Novel molecular biology strategies are used to identify stress mechanisms in bacteria that allow them to resist interventions.

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

2. Brief description of the target audience

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

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	100000	300000	100000	0
2008	700000	7607058	324149	0

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

Patent Applications Submitted

Year	Target
Plan:	1
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	14	
2008	4	25	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Target	Actual
2008	15	243

Output #2

Output Measure

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

Year	Target	Actual
2008	15	7279

Output #3

Output Measure

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

Year	Target	Actual
2008	0	0

Output #4

Output Measure

- Achieve five-log (99.999%) micro-organism reduction (including E coli) on fresh vegetables at reduced temperature, pressure, and time of treatment.

Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Provide proof-of-concept for using casein micelles as controlled release carriers for antimicrobials in food.

Year	Target	Actual
2008	1	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Safe Food Handling Practices for Consumers: Number of participants surveyed who made a positive change in their attitude about keeping the temperature in the refrigerator at 40 degrees F or below.
2	Safe Food Handling Practices for Consumers: Number of participants surveyed more often washed items that came in contact with raw meat, chicken or seafood with hot, soapy water before continuing to cook.
3	Safe Food Handling Practices for Consumers: Number of participants surveyed who more often washed their hands with soap and warm running water before eating.
4	Safe Food Handling Practices for Consumers: Number of participants surveyed who more often washed their hands with soap and warm running water before preparing food.
5	Safe Food Handling Practices for Consumers: Number of participants surveyed who used a thermometer to check the internal temperature of food.
6	Safe Food Handling Practices for Consumers: Number of participants who washed their hands with soap and warm running water after working with raw meat, chicken, or seafood.
7	Number of medium or large food processing companies using an anti-microbial strategy developed through the food safety program.
8	Diet Quality: Number of participants who learned how to use the Healthy Plate to balance their diet.
9	Diet Quality: Number of participants who decreased consumption of high-fat foods such as chips, fast food, fried foods, sausage, bacon, bologna, hot dogs, etc.
10	Diet Quality: Number of participants who decreased consumption of high-sugar foods and sweetened beverages, such as soft drinks, Kool Aide type beverages, sweetened tea, etc.
11	Diet Quality: Number of participants who increased consumption of dairy foods.
12	Diet Quality: Number of participants who increased consumption of fruits.
13	Diet Quality: Number of participants who increased consumption of vegetables.
14	Diet Quality: Number of participants increased consumption of whole grains.
15	Diet Quality: Number of participants who improved their blood sugar.
16	Diet Quality: Number of participants who improved their cholesterol levels.
17	Pending chitosan being granted GRAS (Generally Recognized As Safe) status, our research will lead to applications in edible films and food additives with anti-microbial and thickening properties.
18	Adoption of a homogenization pasteurization process as an alternative to thermal processing by small or mid-sized juice processors.
19	Safe, stable, nutritious troop food rations.
20	Antioxidant Content in Prepared Frozen Vegetables.
21	Genetic, Nutritional & Hormonal Factors in Obesity.
22	Identifying Diabetes and Obesity Mechanisms.
23	Nanocatalysts to Reduce Trans-fatty Acid Formation.
24	Targeting the Leading Foodborne Human Pathogen.
25	Technologies for Developing Protein Ingredients.

Outcome #1

1. Outcome Measures

Safe Food Handling Practices for Consumers: Number of participants surveyed who made a positive change in their attitude about keeping the temperature in the refrigerator at 40 degrees F or below.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	13212

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	13346

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	12011

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	9742

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures
Safe Food Handling Practices for Consumers: Number of participants surveyed who used 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	Quantitative Target	Actual
2008	6000	7740

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Safe Food Handling Practices for Consumers: Number of participants who washed their hands with soap and warm running water after working with raw meat, chicken, or seafood.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	9742

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures

Number of medium or large food processing companies using an anti-microbial strategy developed through the food safety program.

Not reporting on this Outcome for this Annual Report

Outcome #8

1. Outcome Measures

Diet Quality: Number of participants who learned how to use the Healthy Plate to balance their diet.

Not reporting on this Outcome for this Annual Report

Outcome #9

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	15251

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior

Outcome #10

1. Outcome Measures
Diet Quality: Number of participants who decreased consumption of high-sugar foods and sweetened beverages, such as soft drinks, Kool Aide type beverages, sweetened tea, etc.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	13613

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 #11

1. Outcome Measures

Diet Quality: Number of participants who increased consumption of dairy foods.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	19607

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 #12

1. Outcome Measures

Diet Quality: Number of participants who increased consumption of fruits.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	27548

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 #13

1. Outcome Measures

Diet Quality: Number of participants who increased consumption of vegetables.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	27548

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 #14

1. Outcome Measures

Diet Quality: Number of participants increased consumption of whole grains.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	18144

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 #15

1. Outcome Measures

Diet Quality: Number of participants who improved their blood sugar.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	469

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 #16

1. Outcome Measures

Diet Quality: Number of participants who improved their cholesterol levels.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	6000	1990

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 #17

1. Outcome Measures
Pending chitosan being granted GRAS (Generally Recognized As Safe) status, our research will lead to applications in edible films and food additives with anti-microbial and thickening properties.
Not reporting on this Outcome for this Annual Report

Outcome #18

1. Outcome Measures
Adoption of a homogenization pasteurization process as an alternative to thermal processing by small or mid-sized juice processors.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	0	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #19

1. Outcome Measures

Safe, stable, nutritious troop food rations.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Advances are needed in nutritional quality and shelf-life of rations for the U.S. military.

What has been done

Completed project for improvement of cheese spread used in combat rations and determined method for reducing loss of rations by slowing degradation of the pouches of cheese spread.

Results

These results will result in safer, longer lasting rations. (Zivanovic)

4. Associated Knowledge Areas

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

Outcome #20

1. Outcome Measures

Antioxidant Content in Prepared Frozen Vegetables.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Consumers are preparing increased amounts of frozen vegetables by either microwaving or boiling in water. This project determined the antioxidant capacities as related to nutritional value of commercially frozen broccoli, carrots, sweet corn, and peas before and after preparation.

What has been done

This research determined that boiling vegetables for 10 min results in lower oxygen radical absorbance capacity and boiled broccoli, peas and corn contained significantly lower values than frozen broccoli or peas and microwaved corn.

Results

Addition of antioxidant capacities of cooked vegetables and method of preparation in nutritional databases would be useful to consumers wanting to increase consumption of antioxidants. (Mount, Zivanovic, Morris)

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
501	New and Improved Food Processing Technologies

Outcome #21

1. Outcome Measures

Genetic, Nutritional & Hormonal Factors in Obesity.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Our goal is to understand how dietary factors modulate hormonal secretions from fat cells and subsequently impact obesity and related metabolic disorders such as hypertension and diabetes.

What has been done

We are investigating how different types of dietary fatty acids modulate secretion of a hypertensive hormone, angiotensin II from fat cells.

Results

Findings will help identify major proteins and genes that control fat cell development and fat storage in individuals who are susceptible to western-diet induced hypertension and diabetes. Through such research, we will be able to provide guidance regarding nutritional regimens, which will ultimately lead to improved health and well-being of a large segment of the US population and worldwide. (Moustaid-Moussa)

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
702	Requirements and Function of Nutrients and Other Food Components

Outcome #22

1. Outcome Measures

Identifying Diabetes and Obesity Mechanisms.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

We seek to identify cellular receptors and mechanisms mediating local effects of angiotensin II in fat cells as well as endocrine effects of this hormone using animal models of dietary and genetic obesity.

What has been done

We are using mouse models overexpressing the precursor for angiotensin II or lacking its receptors to illucidate mechanisms of action of this hormone in obesity and insulin resistance.

Results

Through these studies we are identifying mechanisms involved in obesity, diabetes, and other nutritional disorders. Our findings will lead to therapies to reduce the incidence of such in high-risk individuals. (Moustaid-Moussa)

4. Associated Knowledge Areas

KA Code	Knowledge Area
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior

Outcome #23

1. Outcome Measures

Nanocatalysts to Reduce Trans-fatty Acid Formation.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Although the health effects of trans-fatty acids are still being debated, the food industry is looking for catalysts that can improve the stability of edible oils with low concentrations of trans-fat.

What has been done

A class of amorphous nanocatalysts were synthesized by incorporating nickel, boron and copper. The nanocatalysts were researched for the ability to hydrogenate soybean oils and the ability to reduce the trans-fat formation in hydrogenated products.

Results

The catalysts synthesized significantly reduced the trans-fat formation and enabled a simple approach to incorporate catalytic elements for future work. (Zhong)

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
702	Requirements and Function of Nutrients and Other Food Components

Outcome #24

1. Outcome Measures

Targeting the Leading Foodborne Human Pathogen.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Campylobacter jejun is the leading foodborne human pathogen in the United States and many other industrialized countries. Increasing evidence also indicates that antibiotic use in poultry selects for resistant C. jejuni, posing a significant threat to public health.

What has been done

We have made significant progress in understanding the molecular mechanisms of pathogenesis and antibiotic resistance in Campylobacter during the reporting period. The findings have filled a significant gap in antimicrobial resistance development in Campylobacter and provided important information for the development of an effective vaccine to control Campylobacter.

Results

Our studies focus on the development of innovative strategies to control Campylobacter infection in humans and in animal reservoirs, consequently reducing the occurrence of foodborne illness. Our studies may open new avenues for treatment and prevention of resistant foodborne pathogens important in animal health and food safety. Zoonotic human pathogens (e.g. Campylobacter) could be used as biological agents in acts of terrorism. Thus, our findings are also significant in biodefense. The studies will provide important information to develop effective vaccines, diagnostics and therapeutics to protect the public health. (Lin)

4. Associated Knowledge Areas

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

Outcome #25

1. Outcome Measures

Technologies for Developing Protein Ingredients.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Proteins are important nutrients to humans. Applications of proteins in foods require unique functional properties.

What has been done

Functionalities of commercial whey protein preparations were evaluated before and after processing by supercritical carbon dioxide. Post treatment of whey protein powders, compositional changes included increased protein concentrations and reduced lipids contents, and changes in functionality included improved visual appearance of powders and enhanced gelling properties. Supercritical carbon dioxide is also being researched to deflavor whey protein ingredients for novel applications.

Results

Supercritical fluids may produce ingredients with functionalities that cannot be provided by other technologies. The enhanced gelation properties may improve the texture of foods with incorporated whey proteins. Deflavored whey proteins can be used in situations where the flavor of whey proteins is undesirable. (Zhong)

4. Associated Knowledge Areas

KA Code	Knowledge Area
502	New and Improved Food Products
501	New and Improved Food Processing Technologies
702	Requirements and Function of Nutrients and Other Food Components

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

1. Evaluation Studies Planned

- After Only (post program)
- Retrospective (post program)
- Before-After (before and after program)
- During (during program)
- Comparisons between program participants (individuals,group,organizations) and non-participants

Evaluation Results

Tennessee youth are among the most obese in the nation. Power U, was taught in 42 and adopted by 100 schools, has helped participating students increase their activity levels and decrease their intake of high-fat and high-sugar foods. As just one example, more than 2,800 Tennessee children now report eating more whole grains in their diet.

Key Items of Evaluation

Tennessee youth are among the most obese in the nation. Power U, was taught in 42 and adopted by 100 schools, has helped participating students increase their activity levels and decrease their intake of high-fat and high-sugar foods. As just one example, more than 2,800 Tennessee children now report eating more whole grains in their diet.

Program #9

V(A). Planned Program (Summary)

1. Name of the Planned Program

Forestry, Wildlife, and Fishery Systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
123	Management and Sustainability of Forest Resources	76%	76%	38%	
125	Agroforestry	7%	7%	7%	
135	Aquatic and Terrestrial Wildlife	12%	12%	12%	
311	Animal Diseases	0%	0%	33%	
605	Natural Resource and Environmental Economics	5%	5%	5%	
610	Domestic Policy Analysis	0%	0%	5%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	24.2	4.7	49.0	0.0
Actual	8.0	1.0	45.0	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
135413	40799	525949	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
523468	40799	3128082	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
481548	0	1841198	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

UT and TSU Extension partnered with the Tennessee Forestry Association to plan and conduct group meetings to inform forest landowners of issues pertaining to forestry and wildlife. Topics included management and marketing. Volunteers were recruited and trained to present at group meetings, provide information, demonstrate equipment and provide materials for demonstrations. UT and TSU Extension provided education at local, regional and statewide events, such as the Tennessee Forest Festival to inform the general public about forest management issues. Demonstartions were provided for landowners and forestry workers. Extension Agents and Specialists educated attendees at County Forestry Landowners Association meetings. UT and TSU Extension worked closely with private consultants, Tennessee Wildlife Resources Agency employees, Tennessee Division of Forestry and others in forestry related industries to develop educational programs and activities for professionals and landowners.

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

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

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

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

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

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

2. Brief description of the target audience

The target audiences for this program are forest landowners and the professionals and volunteers who serve them.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	**Target**	**Target**	**Target**	**Target**
Plan	10000	20000	10000	20000
2008	16143	190934	29563	20000

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

Patent Applications Submitted

Year	Target
Plan:	1

2008 : 2

Patents listed

Wang S. and C. Xing. 2008. Wood adhesives containing reinforced additives for structural engineering products. Patent application

Tim Young. 2008. Spectroscopic prediction of formaldehyde emission and thickness swell of wood panels. Patent Application No. 61037171.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	40	
2008	5	60	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Target	Actual
2008	5	8

Output #2

Output Measure

- Release of Hemlock Woolly Adelgid predators reared in Tennessee.

Year	Target	Actual
2008	200000	120000

Output #3

Output Measure

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

Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Identify whether or not amphibians are suitable hosts of E coli, and determine aquatic factors that contribute to infectivity.

Year	Target	Actual
2008	0	1

Output #5

Output Measure

- Engage in discussions with TVA to consider advancing reservoir drawdowns, as a means of increasing mudflat habitat and slowing population loss of migrating shorebirds.

Year	Target	Actual
2008	1	1

Output #6

Output Measure

- Deploy tree-scale field cages for evaluation of introduced natural enemies against Hemlock Woolly Adelgids, number of cages.

Year	Target	Actual
2008	20	19

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Agroforestry for Underserved Landowners: Number of underserved landowners who are now alley cropping with annual crops and high-value hardwoods due to technical assistance provided by specialists.
2	Agroforestry for Underserved Landowners: Number of underserved landowners who began pursuing forest farming operations of high-value speciality crops such as herbs, medicinal plants or mushrooms due to technical assistance provided by specialists.
3	Agroforestry for Underserved Landowners: Number of underserved landowners who planted riparian buffer strips along waterways due to technical assistance provided by specialists.
4	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.)
5	Forest Landowner Education: Number of landowners who improved profitability (marketing) of forest ownership.
6	Scientists employing our findings on forest health, including resilience to drought stress, and the role of beneficial soil organisms in modeling environmental changes to drought.
7	Acres of production of freshwater prawn in Tennessee as an alternative income source.
8	Cerulean warbler response to forest management.
9	Effects of native grassland management on bird species.
10	The National Survey on Recreation and Environment.
11	Setting hunting and fishing regulations.
12	Quality Deer Management.
13	Mixing natural and synthetic polymers.
14	Crop tree management for optimum growth.
15	Forest product mill optimization.
16	Improved wooden barrel quality.
17	Lyme disease and the primary tick vector.
18	Forest Protection in Great Smoky Mountains.
19	Managing Disturbance In Hardwood Forests.
20	Mycorrhiza, Drought, and Forest Health.
21	Oriented Strandboard Process Monitoring.

Outcome #1

1. Outcome Measures

Agroforestry for Underserved Landowners: Number of underserved landowners who are now alley cropping with annual crops and high-value hardwoods due to technical assistance provided by specialists.

2. Associated Institution Types

•1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
125	Agroforestry

Outcome #2

1. Outcome Measures

Agroforestry for Underserved Landowners: Number of underserved landowners who began pursuing forest farming operations of high-value speciality crops such as herbs, medicinal plants or mushrooms due to technical assistance provided by specialists.

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	15	2

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
125	Agroforestry

Outcome #3

1. Outcome Measures

Agroforestry for Underserved Landowners: Number of underserved landowners who planted riparian buffer strips along waterways due to technical assistance provided by specialists.

Not reporting on this Outcome for this Annual Report

Outcome #4

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100	260

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 #5

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100	194

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 #6

1. Outcome Measures
Scientists employing our findings on forest health, including resilience to drought stress, and the role of beneficial soil organisms in modeling environmental changes to drought.
Not reporting on this Outcome for this Annual Report

Outcome #7

1. Outcome Measures
Acres of production of freshwater prawn in Tennessee as an alternative income source.
Not reporting on this Outcome for this Annual Report

Outcome #8

1. Outcome Measures
Cerulean warbler response to forest management.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Declining populations of cerulean warblers in North America have led the species to be petitioned to be listed for protection under the Endangered Species Act. The underlying cause of the decline was thought to be incompatible forest management practices on the breeding grounds. Listing of ceruleans would likely have hugely significant negative impacts on forest management, mining, and other land use activities in the region.

What has been done

In response to this potential listing in 2005, we implemented a forest management experiment to evaluate the response of cerulean warblers to a range of alternative forest management practices. Study sites include the Cumberland Mountains of Tennessee (2 sites), with additional sites in Kentucky, West Virginia (3 sites) and Ohio. This research has demonstrated that cerulean warblers respond to forest management in a variety of ways, depending on the extent of the canopy disturbance and underlying conditions of the forest at the time of management.

Results

Results from this study will allow the development of a forest management prescription that ceruleans will tolerate and will allow landowners to achieve economic returns from their forest lands. Implementation of this prescription, in part, may help preclude the need for listing of this species. (Buehler)

4. Associated Knowledge Areas

KA Code	Knowledge Area
610	Domestic Policy Analysis
125	Agroforestry
605	Natural Resource and Environmental Economics
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife

Outcome #9

1. Outcome Measures

Effects of native grassland management on bird species.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Native grasslands are one of the most endangered ecosystems in North America because of their conversion to alternative land uses. Grassland bird species, including northern bobwhites, have experienced significant population declines as the result of the loss of native grasslands.

What has been done

We have documented the importance of native grasslands as wintering habitat when compared to harvested row crop fields and idle fescue hayfields through research at Fort Campbell and in eastern Tennessee. In general, native grasslands supported greater densities and greater species richness of grassland birds than alternative cover types.

Results

Based on these results, we are developing alternative management strategies for grassland birds in winter for the mid-South. (Buehler)

4. Associated Knowledge Areas

KA Code	Knowledge Area

605	Natural Resource and Environmental Economics
135	Aquatic and Terrestrial Wildlife

Outcome #10

1. Outcome Measures

The National Survey on Recreation and Environment.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The National Survey on Recreation and Environment is in support of the National Assessment of Outdoor Recreation and Wilderness as required by a law enacted by Congress in 1974.

What has been done

Research findings include outdoor recreation participation trends, the use and management of private lands, wilderness values, changing public environmental concerns and opinions, public land management and practices, lifestyles, mental and physical health benefits, and lifestyles of children and adults.

Results

The research findings are used by Congress and federal agencies, private industry (e.g. National Marine Manufacturers Association), state agencies and legislative bodies, and non-governmental organizations (e.g. American Canoeing Association). Seventeen states have used the survey findings to develop their statewide comprehensive outdoor recreation plans (SCORP) and to qualify for federal park and recreation funding. This research directly affects every outdoor recreation user of public lands and waters in the U.S. (Fly)

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
123	Management and Sustainability of Forest Resources
610	Domestic Policy Analysis

Outcome #11

1. Outcome Measures

Setting hunting and fishing regulations.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tennessee Wildlife Resources Agency needs to set game and fish seasons, regulations and related policies.

What has been done

Survey findings from people who hunt and fish in Tennessee were provided to the Tennessee Wildlife Resources Agency to aid in their strategic planning process for over 1,000,000 resident and non-resident hunters and anglers and wildlife-viewers in Tennessee who contribute over $1.5 billion dollars to Tennessee's economy (U.S. Fish & Wildlife Service, 2001).

Results

The effective outcome of this research is that it affects everyone who hunts and fishes in Tennessee in terms of seasons, regulations, and management applications. (Fly)

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
123	Management and Sustainability of Forest Resources
135	Aquatic and Terrestrial Wildlife

Outcome #12

1. Outcome Measures

Quality Deer Management.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Appropriate management is needed to optimize deer populations, while enhancing the hunting experience.

What has been done

Quality Deer Management (QDM) programs have been successful across Tennessee.

Results

On the Ames Plantation, hunt lease membership initiated after implementing QDM provided more than $180,000 in income for 2008. After implementing QDM guidelines over 4 years, deer harvest per hunter increased 7-fold from pre-QDM levels, and hunter success for harvesting mature bucks exceeded 30%. (C. Harper)

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
135	Aquatic and Terrestrial Wildlife
123	Management and Sustainability of Forest Resources

Outcome #13

1. Outcome Measures

Mixing natural and synthetic polymers.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

We addressed incompatibility between synthetic polymers and natural polymers.

What has been done

Novel compolymers developed through this work have proven to be effective in dispersing lignin and nanocrystalline cellulose in nonpolar matrices and weakly polar solvents. Fundamental understanding of copolymer architecture led to improvements in the development of coupling agents for wood plastic composites and blends.

Results

This paves the way for lignin utilization in carbon fiber precursors, which could contribute $4 Billion dollars annually to rural economies. (D. Harper)

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics

Outcome #14

1. Outcome Measures

Crop tree management for optimum growth.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Management decisions during the tree stand life-cycle have huge impacts on stand value.

What has been done

Stands in mid-life, when growth is at its peak, provide the best opportunity for significant growth gains. This can be accomplished by stand-wide thinning. Also, stocking rates or nutrient allocations can be manipulated to enhance the growth of specifically chosen trees, referred to as crop tree management.

Results

Parts of the work described here has been underway on Ames since 1993. A recent economic/growth analysis in a natural white oak stand at Ames having received crop tree treatments indicated that growth can be doubled. (Houston)

4. Associated Knowledge Areas

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

Outcome #15

1. Outcome Measures

Forest product mill optimization.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Mills need to reduce resin usage and increase throughput.

What has been done

The process analytics research program and the 'ensemble' real-time process modeling system has directly impacted the three test site mills in the forest products industry.

Results

A pre-alpha version of the system in 2007 saved two test site mills approximately $1.9 million per year. The potential of a larger impact to the North American forest products industry could be significant given there are 122 mills that could directly befit from use of the system. The emerging biofuels industry could also directly benefit from optimization of throughput and yield from use of an 'ensemble' process modeling system that predicts final product attributes. (Young)

4. Associated Knowledge Areas

KA Code	Knowledge Area
125	Agroforestry
605	Natural Resource and Environmental Economics

Outcome #16

1. Outcome Measures

Improved wooden barrel quality.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

A producer of spirits needed more consistent barrel quality.

What has been done

A significant research initiative has resulted in development of a new measurement system for wood barrel staves.

Results

The improvement in wooden barrel quality for one corporation has had a direct cost savings of approximately $250,000 per year, from increased barrel fills of approximately 0.3 gallons per barrel over a six month period. The direct benefit to the state of Tennessee tax revenues may be significant in an increased bourbon tax base. (Young)

4. Associated Knowledge Areas

KA Code	Knowledge Area
605	Natural Resource and Environmental Economics
125	Agroforestry

Outcome #17

1. Outcome Measures
Lyme disease and the primary tick vector.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Currently public health officials are reluctant to diagnose a patient with Lyme disease because of the previously reported absence of the primary tick vector.

What has been done

Ixodes scapularis, the vector of the causative organism of Lyme disease, were collected from 85 of 215 hunter-killed deer. I. scapularis was found in 15 TN counties with new records from nine counties. These data indicate the vector is much more widely distributed in Tennessee than previously believed and may have important adverse consequences for human health among rural residents and those engaged in outdoor recreation.

Results

As a result of these data and plans to isolate pathogens for the vectors that have been collected, public health officials and physicians will be able to better serve the health needs of Tennessee.
(Hickling and Gerhardt)

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
311	Animal Diseases

Outcome #18

1. Outcome Measures

Forest Protection in Great Smoky Mountains.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Loss of tree species will change the composition of forests comparable to the loss of the chestnut tree during the 1930's by dramatically destroying habitats used by invertebrates and mammals.

What has been done

Research is underway in the Department of Entomology and Plant Pathology to develop specific procedures to protect and enhance forest health, not only in the Park but in all forested areas throughout the southern Appalachians.

Results

The Great Smoky Mountains National Park provides economic, environmental, and aesthetic benefit to the region. Its popularity was evident by the 9.3 million people who visited it during 2006. Unfortunately, the health, vitality, and appearance of the Park is currently negatively impacted by invasive exotic insects (e.g., hemlock woolly adelgid, elongate hemlock scale, and beech scale), weeds (e.g., Chinese yam, kudzu, and Japanese stilt grass), and plant diseases (Sudden Oak Death, dogwood anthracnose, and beech bark disease). (Lambdin, Grant)

4. Associated Knowledge Areas

KA Code	Knowledge Area
135	Aquatic and Terrestrial Wildlife
605	Natural Resource and Environmental Economics
123	Management and Sustainability of Forest Resources

Outcome #19

1. Outcome Measures

Managing Disturbance In Hardwood Forests.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Information is incomplete on effects of different intensities and frequencies of controlled disturbances applied through silvicultural treatments, as is information on techniques for expediting reforestation after major disturbances.

What has been done

Effects of prescribed fire on fire-adapted oak and less valuable hardwoods were compared, measurements of understory light were initiated in hardwood forests receiving different silvicultural treatments, and American chestnut and other hardwoods were planted to compare their performance on reclaimed mine soils.

Results

Research under this project reveals effects of different intensities and frequencies of disturbance on the composition, health, and value of forests, and helps lead to silvicultural solutions for mitigating effects of major disturbances on hardwood forest ecosystems. (Buckley)

4. Associated Knowledge Areas

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

Outcome #20

1. Outcome Measures
Mycorrhiza, Drought, and Forest Health.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

How will predicted climate changes affect mycorrhizal symbiosis, a critical component of forest tree health?

What has been done

We completed measurements of mycorrhizal colonization of roots and soil response to severe drought.

Results

Our studies help scientists, forest managers and policy makers better predict how drought and other global climate changes may affect our forests, and industries and pastimes that depend on them. (Auge, Hanson)

4. Associated Knowledge Areas

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

Outcome #21

1. Outcome Measures

Oriented Strandboard Process Monitoring.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The inherent variability in wood properties creates significant challenges in raw material management for producers of engineered wood composites.

What has been done

As such, innovations in process monitoring technologies can create dramatic savings by reducing losses due to inferior product performance. Recent work has generated a multiple linear regression model for process monitoring and control in oriented strandboard.

Results

Known as EWood, the system was installed in one of the manufacturing facilities owned by our industrial partner. Annual savings with EWood, attributed primarily to weight target reductions, were determined to be over $500k at this one plant ($567,187). Adoption of this innovative process monitoring tool in the 60 oriented strandboard mills operating in the United States would conceivably lead to $35MM in savings, and significantly reduce raw material demands. Importantly, these savings are recurring on an annual basis. (Rials)

4. Associated Knowledge Areas

KA Code	Knowledge Area
125	Agroforestry
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

Brief Explanation

In several cases, research is proceeding normally, but initial targets were overly optimistic.

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

1. Evaluation Studies Planned

- After Only (post program)
- Time series (multiple points before and after program)
- Case Study
- Comparisons between different groups of individuals or program participants experiencing different levels of program intensity.
- Comparison between locales where the program operates and sites without program intervention
- Other (Observation)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #10

V(A). Planned Program (Summary)

1. Name of the Planned Program

Health and Safety

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
402	Engineering Systems and Equipment	5%	5%	5%	
511	New and Improved Non-Food Products and Processes	0%	0%	5%	
724	Healthy Lifestyle	70%	70%	70%	
805	Community Institutions, Health, and Social Services	25%	25%	20%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	**Extension**		**Research**	
	1862	**1890**	**1862**	**1890**
Plan	48.4	3.9	5.0	0.0
Actual	15.0	2.0	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**
263000	79240	0	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
1016678	79240	0	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
1060154	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

Arthritis Self-Help is an evidence-based program 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 included:

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

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

The protective apparel uses for agricultural commodities and by products will be expanded. Investigations will continue to produce lyocell from agrifibers and consumer wastes. Undervalued cellulose sources such as hardwoods and softwood pulps, recycled newsprint, bagasse, and kudzu will be explored as starting materials for lyocell solutions. Solution properties will be measured and related to processing. Value-added products from sugarcane bagasse fibers will be further developed.Needlepunched nonwoven mats will be produced and evaluated.The effects of different delignification and post treatments on dyeability of bagasse fibers will be determined. Carded fiber webs will be further processed into sliver and spun into yarns and yarn characteristics determined. Optimal bonding conditions will be determined for cotton core nonwovens. Hand properties of the nonwovens will be evaluated.

An examination and inventory of available lawnmower ROPS will be conducted.The ease of rollover will be determined. ROPS currently available for a full-size front drive lawnmower will be tested. The modeling aspect of the standard will be evaluated to determine the accuracy of simulating a vehicle rollover. Model parameters, including ROPS height, mass moment of inertia, and rollover test slope surface strength properties will be investigated. Angular velocities at critical vehicle positions will be compared to simulation results to evaluate model accuracies. ROPS test results for the currently available ROPS will be reported to the manufacturer. Following the roll-over tests, recommendations and concerns relative to the application of the ASAE S547 Standard will be developed.

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 profesionals and volunteers who serve them.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	Target	Target	Target	Target
Plan	20000	80000	20000	40000
2008	36578	3400895	24174	40000

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	4	
2008	2	3	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Target	Actual
2008	25	48

Output #2

Output Measure

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

Year	Target	Actual
2008	800	1259

Output #3

Output Measure

- Test market production of cotton-enhanced spun-melt fabric hospital gowns through a major textile and medical appliances company.

Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Disaster Preparedness for Food Safety: Number of participants surveyed who know how much food they need on hand in case of an emergency.
2	Disaster Preparedness for Food Safety: Number of participants and their families who now have an adequate supply of safe water and food in case of an emergency.
3	Arthritis Self-Help Course: Number of participants surveyed who have improved their mental health regarding difficult emotions (sadness, frustration and anger).
4	Arthritis Self-Help Course: Number of participants surveyed who have less pain from their arthritis.
5	Arthritis Self-Help Course: Number of participants surveyed who have less stiffness from their arthritis.
6	Arthritis Self-Help Course: Number of participants surveyed who take fewer medications for their arthritis pain.
7	Dining with Diabetes: Number of participants surveyed who reduced weight.
8	Dining with Diabetes: Number of participants surveyed who reduced A1c.
9	Dining with Diabetes: Number of participants surveyed who reduced blood cholesterol.
10	Dining with Diabetes: Number of participants surveyed who reduced blood pressure.
11	Dining with Diabetes: Number of participants surveyed who better manage their diabetes as a result of this program.
12	Dining with Diabetes: Number of participants surveyed who eat at least five servings of fruits and vegetables each day.
13	Dining with Diabetes: Number of participants surveyed who eat three meals a day.
14	Dining with Diabetes: Number of participants surveyed who eat three servings of low-fat dairy foods each day.
15	Dining with Diabetes: Number of participants surveyed who gat an A1c test.
16	Dining with Diabetes: Number of participants surveyed who now use artificial sweeteners.
17	Dining with Diabetes: Number of participants surveyed who use spices and other seasonings to cut back on fat, sugar, and salt.
18	Tai Chi: Number of participants surveyed who continue doing the Tai Chi after the Tai Chi program ends.
19	Tai Chi: Number of participants surveyed who have less stiffness from their arthritis as a result of Tai Chi.
20	Tai Chi: Number of participants surveyed who have no pain from arthritis.
21	Tai Chi: Number of participants surveyed who improved balance, body posture and joint flexibility.
22	Tai Chi: Number of participants surveyed who now practice Tai Chi every day.
23	Sanitary Operating Procedure adoption by daycare programs in Tennessee pending grant funding, centers involved.

Outcome #1

1. **Outcome Measures**

Disaster Preparedness for Food Safety: Number of participants surveyed who know how much food they need on hand in case of an emergency.

Not reporting on this Outcome for this Annual Report

Outcome #2

1. **Outcome Measures**

Disaster Preparedness for Food Safety: Number of participants and their families who now have an adequate supply of safe water and food in case of an emergency.

Not reporting on this Outcome for this Annual Report

Outcome #3

1. **Outcome Measures**

Arthritis Self-Help Course: Number of participants surveyed who have improved their mental health regarding difficult emotions (sadness, frustration and anger).

2. **Associated Institution Types**

- 1862 Extension
- 1890 Extension

3a. **Outcome Type:**

Change in Action Outcome Measure

3b. **Quantitative Outcome**

Year	Quantitative Target	Actual
2008	1000	324

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

Issue (Who cares and Why)

What has been done

Results

4. **Associated Knowledge Areas**

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #4

1. **Outcome Measures**

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	Quantitative Target	Actual
2008	500	369

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #5

1. Outcome Measures
Arthritis Self-Help Course: Number of participants surveyed who have less stiffness from their arthritis.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	500	552

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #6

1. Outcome Measures

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	Quantitative Target	Actual
2008	500	552

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #7

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	111

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #8

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	121

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #9

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	98

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #10

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	129

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #11

1. Outcome Measures

Dining with Diabetes: Number of participants surveyed who better manage their diabetes as a result of this program.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	252

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #12

1. Outcome Measures
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	Quantitative Target	Actual
2008	800	211

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 #13

1. Outcome Measures

Dining with Diabetes: Number of participants surveyed who eat three meals a day.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	276

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 #14

1. Outcome Measures

Dining with Diabetes: Number of participants surveyed who eat three servings of low-fat dairy foods each day.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	167

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 #15

1. Outcome Measures

Dining with Diabetes: Number of participants surveyed who gat an A1c test.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	211

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 #16

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	Quantitative Target	Actual
2008	800	293

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 #17

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	Quantitative Target	Actual
2008	800	289

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 #18

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	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
724	Healthy Lifestyle

Outcome #19

1. Outcome Measures
Tai Chi: Number of participants surveyed who have less stiffness from their arthritis as a result of Tai Chi.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	136

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 #20

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	38

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 #21

1. Outcome Measures

Tai Chi: Number of participants surveyed who improved balance, body posture and joint flexibility.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	5000	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
724	Healthy Lifestyle

Outcome #22

1. Outcome Measures

Tai Chi: Number of participants surveyed who now practice Tai Chi every day.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	800	122

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 #23

1. Outcome Measures

Sanitary Operating Procedure adoption by daycare programs in Tennessee pending grant funding, centers involved.
Not reporting on this Outcome for this Annual Report

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Competing Public priorities
- Competing Programmatic Challenges
- Other (Change in research focus)

Brief Explanation

The outcomes Extension proposed for Agrosecurity, Homeland Secuiry and Disaster Preparedness have been achieved or exceeded; therefore, these outcomes were not part of this annual report. The EDEN Plant Biosecurity Management Plan continues to be used for agricultural and natural resource programs in the state.

The targets Extension proposed for Dining with Diabetes, Arthritis Self-Help and Tai Chi did not consider important factors such as staff vacancies, for example, due to retirements. These three health programs are nested in community partnerships, and it takes new employees time to build and effectively engage the community in health education.

With retirements and changes in research focus, UT AgResearch no longer has a defined program in this area, although there are related projects in the Food Safety and Forestry, Wildlife, and Fisheries program areas.

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

1. Evaluation Studies Planned

- After Only (post program)
- Other (Surveillance Data)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #11

V(A). Planned Program (Summary)

1. Name of the Planned Program

Horticultural Systems

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	10%	
204	Plant Product Quality and Utility (Preharvest)	0%	0%	20%	
205	Plant Management Systems	0%	0%	28%	
211	Insects, Mites, and Other Arthropods Affecting Plants	0%	0%	8%	
212	Pathogens and Nematodes Affecting Plants	0%	0%	12%	
213	Weeds Affecting Plants	0%	0%	8%	
216	Integrated Pest Management Systems	0%	0%	14%	
	Total	0%	0%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	5.0	2.0	45.0	0.0
Actual	0.0	0.0	31.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
0	0	652981	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
0	0	3199100	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
0	0	568174	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

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

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

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

2. Brief description of the target audience

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

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Year	**Target**	**Target**	**Target**	**Target**
Plan	15000	50000	1000	0
2008	0	0	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	8	
2008	0	12	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Horticultural workshops and conferences.

Year	Target	Actual
2008	4	0

Output #2

Output Measure

- Annual Vegetable Initiative Report summary of research results.

Not reporting on this Output for this Annual Report

Output #3

Output Measure

- Pilot production of spun-melt agricultural row covers impregnated with phase-change oils for freeze-protection of crops.

Not reporting on this Output for this Annual Report

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Projected licenses for dogwood cultivars.
2	Target number of research laboratories using our reverse-genetic tool for Phytophthora gene function analysis.
3	Horticulture: Number of nursery, greenhouse, turf, landscape, and associated Green Industry entrepreneurs who adopted and implemented business management and marketing practices profitably.
4	Horticulture: Number of Green Indutsry entrepreneurs who developed marketing plans for their business.
5	Horticulture: Number of nursery, greenhouse and turf producers who improved profits through innovative marketing practices (group or individual) and/or value-added practices or services.
6	Consumer Horticulture: Number of consumers who used the results of their soil test to properly amend their soil.
7	Consumer Horticulture: Number of consumers who applied fewer fertilizers and pesticides due to a better understanding of landscape best management practices.
8	Annual Tennessee economic contribution of Encore azaleas based on TAES research, dollars.
9	Spotted wilt virus of tomatoes.
10	Post-freeze tree and vine care.
11	Limiting bee colony losses in Tennessee.
12	Putting green management on golf courses.
13	Evaluating 'disease resistant' rose cultivars.
14	Addressing big leaf hydrangea disease issues.
15	A Culinary Herb for Plant Disease Protection.
16	Biological Control Agents Enhance Broccoli Yield.
17	Increased Vegetable Crop Revenue.

Outcome #1

1. Outcome Measures

Projected licenses for dogwood cultivars.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	50	65

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The need for fungicide treatments for dogwood increases nursery labor, chemical, and equipment costs.

What has been done

Nurseries using mildew resistant dogwoods (Appalachian series) developed by the Dogwood Team are saving $1200/acre/year in fungicide sprays when you consider fungicide, equipment, and labor costs. Budwood of disease resistant dogwoods is supplied to registered nurseries.

Results

Five nurseries are already marketing and selling the 'Appalachian Series' of dogwoods. All report that they sell out their existing inventory. (M. Windham, Trigiano, A. Windham)

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
212	Pathogens and Nematodes Affecting Plants

Outcome #2

1. Outcome Measures

Target number of research laboratories using our reverse-genetic tool for Phytophthora gene function analysis.

Not reporting on this Outcome for this Annual Report

Outcome #3

1. Outcome Measures

Horticulture: Number of nursery, greenhouse, turf, landscape, and associated Green Industry entrepreneurs who adopted and implemented business management and marketing practices profitably.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #4

1. Outcome Measures
Horticulture: Number of Green Indutsry entrepreneurs who developed marketing plans for their business.
Not reporting on this Outcome for this Annual Report

Outcome #5

1. Outcome Measures
Horticulture: Number of nursery, greenhouse and turf producers who improved profits through innovative marketing practices (group or individual) and/or value-added practices or services.

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	20	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #6

1. Outcome Measures

Consumer Horticulture: Number of consumers who used the results of their soil test to properly amend their soil.

2. Associated Institution Types

•1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #7

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

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	100	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
216	Integrated Pest Management Systems

Outcome #8

1. Outcome Measures

Annual Tennessee economic contribution of Encore azaleas based on TAES research, dollars.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300000	300000

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
204	Plant Product Quality and Utility (Preharvest)

Outcome #9

1. Outcome Measures

Spotted wilt virus of tomatoes.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tomato growers were puzzled by the sporadic nature of spotted wilt virus, which severely damages their crops only in certain years.

What has been done

A system of forecasting the severity of this disease, using spring rainfall as an indicator, has been successful the last two growing seasons.

Results

A warning issued in 2007 prevented potential yield losses of $500,000 to Tennessee growers who reacted by using resistant varieties and insecticide applications. The forecasting system accurately predicted a lower level of spotted wilt activity in 2008, thus avoiding unnecessary control measures. (Bost)

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)

Outcome #10

1. Outcome Measures
Post-freeze tree and vine care.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Much of Tennessee suffered severe freeze damage in 2007 followed by drought. The primary objective of tree and vine care following the 2007 freeze drought was survival and healing.

What has been done

Differences in pruning, cropping levels and pest control were identified and communicated to growers to help overcome problems.

Results

As a result of these efforts, plant losses were minimized with vine losses in vineyards being estimated at less than 15 percent, and redeveloping fruiting wood was developed. (Lockwood)

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

Outcome #11

1. Outcome Measures

Limiting bee colony losses in Tennessee.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The value of each bee colony lost to parasitic mites is approximately $420.00 for bees, hive parts, medications and honey production. This estimate has increased recently with the higher demand/price of honey.

What has been done

We estimate beekeeping research and extension programs in Tennessee have aided beekeepers to reduce their losses of colonies to parasitic mites and other causes by 25%.

Results

We estimate that beekeepers following recommendations have saved 10,000 colonies of bees valued in excess of $4,200,000 annually. This figure does not include suspected losses in pollination of fruits and vegetables valued in excess of $200 million annually in Tennessee. The figure does not include value-added products made from wax, propolis, royal jelly and pollen that could boost this total by several million dollars. (Skinner)

4. Associated Knowledge Areas

KA Code	Knowledge Area
211	Insects, Mites, and Other Arthropods Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

Outcome #12

1. Outcome Measures

Putting green management on golf courses.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

New management strategies are needed for improving putting green quality while reducing costs on golf courses.

What has been done

Golf courses in Tennessee, out of state and in other countries are implementing the alternating mowing and rolling practices for putting green management based on research conducted in my research program at the University of Tennessee. This research improves putting green quality and has an economic savings potential of as much as $30,000 annually for participating golf courses.

Results

There are over 100 golf courses around the world participating which have an economic savings impact of more than $3,000,000 annually, and can be translated to adding 60 new jobs. Countries where our research has had an impact include: the United States, Canada, Germany, and the Netherlands. (Sorochan)

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

Outcome #13

1. Outcome Measures
Evaluating 'disease resistant' rose cultivars.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Consumers benefit from objective testing of industry claims of disease resistant rose cultivars.

What has been done

Rose cultivars with industry resistant claims for disease resistance (n=16) were evaluated for their ability to resist black spot and cercospora leaf spot in Mississippi and Tennessee. A list of 'no-spray' roses (n=20) was developed.

Results

The economic impact of this objective list of 'no-spray' roses for the southeastern U.S. is estimated at $1,930,000. (M. Windham)

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

Outcome #14

1. Outcome Measures

Addressing big leaf hydrangea disease issues.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Big leaf hydrangea are susceptible to cercospora leaf spot and powdery mildew.

What has been done

Big leaf hydrangea cultivars resistant to cercospora leaf spot and powdery mildew were identified in Mississippi and Tennessee. A relationship between increasing shading and disease incidence of cercospora leaf spot of big leaf hydrangea cultivars was investigated.

Results

Resistant cultivars are recommended to production managers of the mid-south that have experienced disease outbreaks, with a projected economic impact of $350,000. New cultural management strategies for Cercospora leaf spot based on placement in the landscape have been developed with a predicted economic impact of $110,000. (M. Windham)

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Pathogens and Nematodes Affecting Plants
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

Outcome #15

1. Outcome Measures

A Culinary Herb for Plant Disease Protection.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The purpose of this research is to identify new bioactive natural products that can serve as environmentally-friendly plant protection products with little or no impact on human health. Many natural products have a relatively short shelf life.

What has been done

In laboratory studies, we screened volatile and nonvolatile components of epazote for activiy against a plant pathogen (Sclerotinia sclerotiorum) that is notoriously difficult to control. We found a low molecular weight antifungal compound that is heat stable.

Results

When the heat stable compound is identified, a chemical constituent of a culinary and medicinal herb that has the potential to be an environmentally-friendly, fungicide with low toxicity and a long shelf will be available for sustainable production. (Gwinn, Chen, Ownley)

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
212	Pathogens and Nematodes Affecting Plants
216	Integrated Pest Management Systems

Outcome #16

1. Outcome Measures
Biological Control Agents Enhance Broccoli Yield.

2. Associated Institution Types

•1862 Research

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Management options, using reduced or pesticide-free inputs for control of Pythium and Rhizoctonia diseases in broccoli are limited.

What has been done

In field tests, we evaluated several biological control agents, with pesticide-free broccoli seed or thiram -treated seed, and compared their effect on disease, growth, and yield with thiram-treated seed and a standard fungicide (PCNB) drench.

Results

We identified one treatment, Beauveria bassiana applied to seed without thiram, planted into transplant mix pre-treated with bioactive Monarda (beebalm) herbage, that resulted in significantly larger broccoli yields than the conventional fungicide seed and drench treatments. (Ownley, Gwinn, Canaday)

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
216	Integrated Pest Management Systems
212	Pathogens and Nematodes Affecting Plants

Outcome #17

1. Outcome Measures

Increased Vegetable Crop Revenue.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Tennesee producers have a constant need for new revenue streams to replace income lost to out-of-state producers and to diversify their farming operations.

What has been done

We evaluated new varieties of vegetable crops, crop protection chemicals, fertility programs, irrigation systems, frost protection systems, new production methods, biodegradable plastic mulches and marketing systems for vegetable crops.

Results

These vegetable initiative programs and demonstrations helped increase revenues from commercial vegetable crops by more than $11 million over the previous year. A total of 92 new producers started production in 2006. Assuming some residual effect after two years from increased production of early adopters and the entry of late adopters, we might estimate $11M (2006) * 40% = 4.4M (Wills)

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
204	Plant Product Quality and Utility (Preharvest)

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

A research responsible for our spun-bond fabric program has retired, ending this program component.

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

1. Evaluation Studies Planned

- After Only (post program)
- Before-After (before and after program)
- During (during program)

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}

Program #12

V(A). Planned Program (Summary)

1. Name of the Planned Program

Human Development

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
802	Human Development and Family Well-Being	100%	100%	100%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

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

Year: 2008	Extension		Research	
	1862	1890	1862	1890
Plan	14.5	2.5	0.0	0.0
Actual	23.0	2.0	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
389804	117446	0	0
1862 Matching	1890 Matching	1862 Matching	1890 Matching
1506863	117446	0	0
1862 All Other	1890 All Other	1862 All Other	1890 All Other
337006	0	0	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

This program involved professionals, parents, child care providers, older adults, and community leaders. The target audiences were child care providers, adolescents, and parents who are divorced or incarcerated. The following was used to help the target audience gain awareness: Displays, exhibits, community events, newspaper articles, radio programs, TV shows and newsletters. In addition, fact sheets and resource lists for parents, teachers and professionals were created and dissiminated. Child Care Provider training involved over 10,000 annual contacts. Parenting classes targeting parenting and co-parenting outcomes reached all areas of the state. Extension FCS Agents provided Parenting Apart: Effective Co-Parenting, an information and skills-based program that utilized lecture, class discussion, videos, and handouts to inform parents about the potential effects of divorce on their children and provide them with strategies for minimizing those effects.

2. Brief description of the target audience

The target audiences for this planned program was 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, UT Extension is the only provider of this instruction.

V(E). Planned Program (Outputs)

1. Standard output measures

Target for the number of persons (contacts) reached through direct and indirect contact methods

Year	Direct Contacts Adults Target	Indirect Contacts Adults Target	Direct Contacts Youth Target	Indirect Contacts Youth Target
Plan	5000	10000	0	0
2008	10467	529754	0	0

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

Patent Applications Submitted

Year	Target
Plan:	0
2008 :	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

	Extension	Research	Total
Plan	0	0	
2008	1	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

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

Year	Target	Actual
2008	10	75

Output #2

Output Measure

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

Year	Target	Actual
2008	200	1081

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O No.	OUTCOME NAME
1	Book by Book: Number of participants who had a knowledge gain of at least 15% from pre-test to post-test.
2	Book by Book: Number of child care providers who now offer a writing/drawing center in their classroom.
3	Book by Book: Number of childcare providers who now report asking open-ended questions while reading books.
4	Book by Book: Number of childcare providers and parents who report that they now provide books for infants and toddlers at eye-level and within their reach.
5	Book by Book: Number of childcare providers and parents who report providing a special place for children to read and write which is in their reach.
6	Book by Book: Number of childcare providers and parents who report visiting the library more than before this program.
7	Parenting Skills for Incarcerated Inmates: Number of inmates who acquired knowledge about the importance of effective communication required to build parent/child relationships.
8	Parenting Skills for Incarcerated Inmates: Number of inmates who demonstrated their knowledge of positive parent/child relationships by writing to their child.
9	Love At First Sight: Number of parents and childcare providers who report using suggested guidance techniques more often.
10	Parenting Skills for Incarcerated Inmates: Number of inmates who now have an ongojng relationship with their children and demonstrate the need not to violae the law.
11	Love At First Sight: Number of parents and child care providers who report yelling less at children.
12	Love At First Sight: Number of parents and child care providers who report putting down or blaming their child less.
13	Love At First Sight: Number of parents and child care providers who report talking, singing and playing more with their children than before the program.
14	Divorcing Parents: Number of paremts who plan to decrease exposure of their children to parental conflict.
15	Helping At-Risk Families Succeed

Outcome #1

1. Outcome Measures

Book by Book: Number of participants who had a knowledge gain of at least 15% from pre-test to post-test.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	600	73

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

Book by Book: Number of child care providers who now offer a writing/drawing center in their classroom.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	600	93

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

Book by Book: Number of childcare providers who now report asking open-ended questions while reading books.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	600	125

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

Book by Book: Number of childcare providers and parents who report that they now provide books for infants and toddlers at eye-level and within their reach.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	600	93

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

Book by Book: Number of childcare providers and parents who report providing a special place for children to read and write which is in their reach.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	600	93

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Book by Book: Number of childcare providers and parents who report visiting the library more than before this program.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	600	256

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #7

1. Outcome Measures
Parenting Skills for Incarcerated Inmates: Number of inmates who acquired knowledge about the importance of effective communication required to build parent/child relationships.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	25	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Parenting Skills for Incarcerated Inmates: Number of inmates who demonstrated their knowledge of positive parent/child relationships by writing to their child.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	25	14

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Love At First Sight: Number of parents and childcare providers who report using suggested guidance techniques more often.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	600	77

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 #10

1. Outcome Measures

Parenting Skills for Incarcerated Inmates: Number of inmates who now have an ongojng relationship with their children and demonstrate the need not to violae the law.

2. Associated Institution Types

•1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	25	14

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 #11

1. Outcome Measures

Love At First Sight: Number of parents and child care providers who report yelling less at children.

2. Associated Institution Types

•1862 Extension
•1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	600	82

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 #12

1. Outcome Measures

Love At First Sight: Number of parents and child care providers who report putting down or blaming their child less.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	600	84

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 #13

1. Outcome Measures

Love At First Sight: 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
- 1890 Extension

3a. Outcome Type:
Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	600	89

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 #14

1. Outcome Measures
Divorcing Parents: Number of paremts who plan to decrease exposure of their children to parental conflict.

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:
Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	300	2770

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 #15

1. Outcome Measures

Helping At-Risk Families Succeed

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2008	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Many courts are requiring parents whose children have been removed to state custody to complete a parent education program. In addition, some agencies will refer parents to classes who are at-risk for having their children removed. Juvenile courts are requiring some parents whose children are in trouble with the law to attend parenting classes as well.

What has been done

Agents received training and curricula to work with different types of at-risk families. Agents reported 1427 direct contacts with court-ordered parents through 170 group meetings and 124 in-office or on-site visits.

Results

In self-report surveys of class participants, the following outcomes were noted: 88 of 101 (87%) parents/caregivers report an increase in use of appropriate child guidance techniques. 59 of 67 (88%) parents/caregivers report feeling better about their abilities as parents.

4. Associated Knowledge Areas

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

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Public Policy changes
- Government Regulations

Brief Explanation

In 2008, Extension expanded parenting programs to court-ordered parents and relatives as caregivers in response to changing judicial orders and family demographics.

Many courts are requiring parents whose children have been removed to state custody to complete a parent education program. In addition, some agencies will refer parents to classes who are at-risk for having their children removed. Juvenile courts are requiring some parents whose children are in trouble with the law to attend parenting classes as well.

In addition, Extension worked with relative caregivers. They face not only ambiguous legal status in caring for these children, but they face difficulties in transitioning from their roles as grandparents or other relatives to the role of parent. Children enter these relationships having experienced loss or rejection and often other types of trauma. Relatives may feel overwhelmed by the new responsibilities and fear that they will not be adequate for the task. Providing education and support for these surrogate parents helps ease their stress and provides a refresher or initial training in parenting for those who have never parented or who parented several years ago.

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

1. Evaluation Studies Planned

- Retrospective (post program)
- Before-After (before and after program)
- During (during program)

Evaluation Results

In self-report surveys of class participants, the following outcomes were noted:
•88 of 101 (87%) parents/caregivers report an increase in use of appropriate child guidance techniques. •59 of 67 (88%) parents/caregivers report feeling better about their abilities as parents.

Key Items of Evaluation