V(A). Planned Program (Summary)

Program # 15

1. Name of the Planned Program

Global Food Security and Hunger

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	0%	0%	2%	
133	Pollution Prevention and Mitigation	0%	0%	2%	
201	Plant Genome, Genetics, and Genetic Mechanisms	0%	0%	3%	
202	Plant Genetic Resources	0%	0%	4%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	0%	0%	7%	
204	Plant Product Quality and Utility (Preharvest)	0%	0%	2%	
205	Plant Management Systems	50%	50%	10%	
206	Basic Plant Biology	0%	0%	7%	
211	Insects, Mites, and Other Arthropods Affecting Plants	5%	5%	10%	
212	Pathogens and Nematodes Affecting Plants	5%	5%	18%	
213	Weeds Affecting Plants	0%	0%	2%	
215	Biological Control of Pests Affecting Plants	0%	0%	2%	
216	Integrated Pest Management Systems	0%	0%	6%	
301	Reproductive Performance of Animals	0%	0%	6%	
302	Nutrient Utilization in Animals	0%	0%	4%	
303	Genetic Improvement of Animals	0%	0%	3%	
304	Animal Genome	0%	0%	3%	
305	Animal Physiological Processes	0%	0%	6%	
306	Environmental Stress in Animals	0%	0%	3%	
601	Economics of Agricultural Production and Farm Management	40%	40%	0%	
	Total	100%	100%	100%	

V(C). Planned Program (Inputs)

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

Extension	Research

Year: 2010	1862	1890	1862	1890
Actual	27.0	3.0	110.8	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
515024	158472	2207538	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2149897	158472	13482015	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
0	0	1666432	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

This planned program represents Extension's efforts primarily in corn, soybeans, commercial fruits and vegetables. In FY 2010, Extension emphasized: conservation tillage; planting insect-tolerant crops; planting herbicide-tolerant crops; spraying crops with foliar fungicide to manage disease; and using recommended varieties (based on UT field trial results).

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

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

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

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

Surveillance of possible disease vectors is maintained throughout the insect season; suspected vectors are tested for appropriate viruses. Risk factor analysis test results are compared between sites where disease risk is high vs. those where disease risk is low. Mastitis susceptible and resistant dairy cows are used to identify potential genes, immune components, and other factors associated with and

responsible for mastitis resistance. A series of trials uses pigs to test various feeding regimens and feed additives to determine effects on the number of antibiotic resistant foodborne pathogens occurring in those animals and their environment. Additional studies are detecting the prevalence of antibiotic resistant bacteria associated with cattle and surrounding environments. These studies should help determine strategies to limit such foodborne risks.

2. Brief description of the target audience

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

The primary audience for the animal portion of this program was producers, veterinarians, and others associated with the animal industry. Tennessee cattle producers are primarily cow-calf operators.

A larger, additional audience is US and global food producers.

V(E). Planned Program (Outputs)

1. Standard output measures

2010	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Plan	{NO DATA	{NO DATA	{NO DATA	{NO DATA
Actual	0	0	0	0

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

Patent Applications Submitted

Year: 2010

Plan:

Actual: 2

Patents listed

Methods of Improving Nutritional Value of Plants, Armel, Gregory Russell (Knoxville, TN, US), Kopsell, Dean Adam (Knoxville, TN, US), Brosnan, James T. (Knoxville, TN, US), Horvath, Brandon J. (Knoxville, TN, US), Sorochan, John C. (Knoxville, TN, US)

Environmental Stress-inducible Promoter and its Application in Crops , Cheng, (Max) Zong-Ming (Knoxville, TN, US), Ye, Xia (Zhengzhou, CN)

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2010	Extension	Research	Total
Actual	13	93	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Exploitation of the strong resistance mechanism in epazote to the plant parasitic nematode, Meloidogyne incognita (Bernard).
  Not reporting on this Output for this Annual Report

Output #2

Output Measure

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

Year	Target	Actual
2010	{No Data Entered}	0

Output #3

Output Measure

- Release a new soybean variety tailored to Tennessee needs. (Pantalone)
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- We have discovered two native predators that are under review for their potential as biological control agents for the pest complex on black walnut that may preserve the economic value of the estimated 1.64 million black walnut trees with a value of $430 million annually in urban and forest environments. (Lambdin)

Year	Target	Actual
2010	{No Data Entered}	2

Output #5

Output Measure

- Weaning is stressful on the physiology of the pig. Supplementation of a pre-weaning diet with an omega-3 polyunsaturated fatty acid source had minimal influence on modifying this stress response. (Kattesh)

Year	Target	Actual
2010	{No Data Entered}	1

Output #6

Output Measure

- Demonstrated a positive nutritional impact of a common herbicide currently labeled for use on sweet corn. This has now become intellectual property as a U.S. provisional patent. (Kopsell)

Year	Target	Actual
2010	{No Data Entered}	1

Output #7

Output Measure

- Providing a high fiber supplement to beef calves tempers the animals' stress response due to weaning when fenceline or total separation is employed. (Kattesh)

Year	Target	Actual
2010	{No Data Entered}	1

Output #8

Output Measure

- Research demonstrated that whole-tree cages can enhance establishment of predatory beetles agains the Hemlock Woolly Adelgid to enhance the survival of eastern hemlock. (Grant and Wiggins)

Year	Target	Actual
2010	{No Data Entered}	1

Output #9

Output Measure

- Protocols have been developed for hydroponic production of off-season strawberries in low-tech polyethylene covered greenhouses. Trials have demonstrated successful season-long control of aphids, whiteflies, spider mites and thrips using predators/parasitoids. Current trials are evaluating the economical feasible of using IPM-biological control of greenhouse strawberry pests. (Deyton & Sams)

Year	Target	Actual
2010	{No Data Entered}	1

Output #10

Output Measure

- Development of a reproductive tract scoring system allows dairy producers and veterinarians to identify cows that are inefficient for artificial insemination programs and enable economic decisions to be soundly made. (Schrick and Edwards)

Year	Target	Actual
2010	{No Data Entered}	1

Output #11

Output Measure

- Demonstrated that the male management technique of double interspiking improves fertility in broiler breeder chickens. (Smith)

Year	Target	Actual
2010	{No Data Entered}	1

Output #12

Output Measure

- Results of genotype and allelic frequency evaluation suggest that the advantageous allele is less prevalent in herds of cattle which are less affected by fescue toxicosis than are spring-calving Angus cattle grazed on tall fescue. This may be a by-product of selection for longevity, fertility, and growth in cow-calf herds affected by FT. (Waller)

Year	Target	Actual
2010	{No Data Entered}	1

Output #13

Output Measure

- New wheat variety TN902 will increase yields by 5 bushels/acre, adding over 1 million bushels to Tennessee's wheat harvest, and more than $7 million in farmgate income. (West)

Year	Target	Actual
2010	{No Data Entered}	1

Output #14

Output Measure

- Since its inception in 2001, the Pigeon River Restoration Project has re-introduced 20 species of fish, including more than 28,000 individuals, into the Pigeon River. Five species have re-established reproducing populations, and successful recruitment has been observed in four additional species. (Wilson)

Year	Target	Actual
2010	{No Data Entered}	1

Output #15

Output Measure

- Some reports from other areas of the country have indicated that animal waste application, such as poultry manure, can reduce the incidence of nematode. Data from a three year study in TN indicate no effect on the nematode from waste application. Animal waste is better utilized on non-nitrogen fixing crops such as corn or cotton which need the additional nitrogen for maximum yields. (Tyler)

Year	Target	Actual
2010	{No Data Entered}	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Snap bean production economy (Canaday)
2	Molecular and Genomic Plant Defense Mechanisms (Chen)
3	Better Cattle Reproduction Using Biochemicals (Godkin)
4	Thousand Cankers disease on black walnut (Grant)
5	Cotton seeding rates (Gwathmey)
6	Helping Pigs Thrive After Weaning (Kojima)
7	Forest Protection in Great Smoky Mountains (Lambdin and Wiggins)
8	Corn production (Newman)
9	Genetic improvement of soybean yields (Pantalone)
10	Abandonment of Precision Agricultural Technology (Roberts)
11	Wheat: Number of acres utlized precision agriculture technologies for variable rate application of plant growth regulators, defoliants or pesticides.
12	Wheat: Number of producers adopted UT recommended resistance management strategies to control pests (weeds, insects, diseases).
13	Soybeans: Number of acres of soybeans scouted by a producer or independent crop consultant to help make crop management decisions.
14	Soybeans: Number of producers who adopted UT recommended resistance management strategies to control pests (weeds, insects and diseases).
15	Corn: Number of producers who reported harvesting higher corn yields and/or better quality crops using university trial results.
16	Corn: Percentage increase in corn yield by using recommended crop management strategies for insects, weeds or plant diseases (outcome expressed as a percentage increase).
17	Extension Producers $48.9 Million Economic Impact through Corn, Soybean, and Wheat Production Programs

Outcome #1

1. Outcome Measures

Snap bean production economy (Canaday)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In terms of planted acreage, snap beans are Tennessee?s number one vegetable crop. Farm receipts for this crop typically total over $9,000,000 per year.

What has been done
We tested alternate seed treatments.

Results
Instead of using untreated seed and muriate of potash, growers could potentially double their snap bean yield and gross returns if they used a seed treatment of trifloxystrobin + metalaxyl coupled with use of sulfate of potash.

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Molecular and Genomic Plant Defense Mechanisms (Chen)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
One of our major projects is focused on understanding the molecular and genomic basis of plant defense mechanisms against insects, which are constant threat to agricultural production.

What has been done
A number of critical defense genes have been isolated from various crops and model plants by my lab.

Results
These findings provide a knowledge base and novel molecular tools for genetic improvement of crops with enhanced insect resistance through genetic engineering and breeding.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Better Cattle Reproduction Using Biochemicals (Godkin)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Early embryonic mortality is the major cause of reproductive failure in domestic livestock. The maintenance of early pregnancy is dependent on signaling between the maternal reproductive tract and its occupant, the embryo. Lipid mediators are essential signaling molecules that regulate the estrous cycle and pregnancy.

What has been done
The goals of this research are to identify the function of these essential molecules, the enzymes that produce them, and the mechanisms by which they function. The results of this investigation will provide new knowledge concerning lipid mediator control of the estrous cycle and pregnancy that will be used to develop novel strategies to improve reproductive efficiency.

Results
Results demonstrate that specific PLA2 enzymes differentially regulate uterine and conceptus production of lipid mediators and suggest that regulation of PLA2 expression with specific PLA2 inhibitors and/or promoters may provide novel and robust strategies for fertility regulation.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
305	Animal Physiological Processes

Outcome #4

1. Outcome Measures

Thousand Cankers disease on black walnut (Grant)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
A new disease threat, thousand cankers disease (insect/pathogen complex), of black walnut was documented in four counties in eastern Tennessee in 2010 (first documentation in native range of black walnut).

What has been done
Researchers immediately began investigating this disease.

Results
Results prompted Tennessee Department of Agriculture to enact quarantines and buffer areas in affected counties to limit the spread and impact of this new disease and its vector into major walnut-producing areas of the eastern U.S. Biological and epidemiological research is underway to provide necessary information to develop an effective Best Management Plan for thousand cankers disease.

4. Associated Knowledge Areas

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

Outcome #5

1. Outcome Measures

Cotton seeding rates (Gwathmey)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The project's findings on optimal seeding rates influenced cotton producers' approach to planting in alternative row widths and patterns.

What has been done
Cotton produced equivalently high net returns at rates above 7.2 seeds per m2, except under certain non-irrigated conditions.

Results
These findings bear directly on the seeding rate decision by cotton producers in Tennessee and similar environments.

4. Associated Knowledge Areas

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

Outcome #6

1. Outcome Measures

Helping Pigs Thrive After Weaning (Kojima)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Weaning constitutes a tremendous stress on the pig resulting in weight loss and increased mortality.

What has been done
Experiments conducted in our laboratory have confirmed that a single intramuscular injection of SD33 prior to weaning improves feed intake and immune response in weaned pigs. Fecal shedding of Salmonella in challenged pigs was altered by SD33 treatment such that shedding ceased sooner in SD-33 pigs. The mechanism of action of SD33 was shown to include effects on key pathways involved in feed intake and perception of stress/anxiety.

Results
These findings are promising and may represent a management tool to combat postweaning declines in pig health and well-being, thereby increasing the profitability and sustainability of livestock operations and ensuring an adequate and low cost meat product for consumers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
301	Reproductive Performance of Animals
305	Animal Physiological Processes
306	Environmental Stress in Animals

Outcome #7

1. Outcome Measures

Forest Protection in Great Smoky Mountains (Lambdin and Wiggins)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Simultaneous releases of multiple predatory species of Hemlock Woolly Adelgid (HWA) at the same location may be more effective in reducing HWA populations than single species releases.

What has been done
Recovery of Ln and St on the same trees indicates that they can coexist and are compatible. This project demonstrates that by using tree cages, different species of predators of HWA can be established at the same location.

Results
The establishment of two predator species provides managers, property owners and government officials a means to control the exotic hemlock woolly adelgid to protect forest health and diminish any negative impact on the tourist industry that contributes over 14 million dollars to the local economy annually.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems
211	Insects, Mites, and Other Arthropods Affecting Plants
215	Biological Control of Pests Affecting Plants
216	Integrated Pest Management Systems

Outcome #8

1. Outcome Measures

Corn production (Newman)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
New fungicides are needed to lower application costs and provide choices to producers.

What has been done
Corn producers now have more than two new fungicides (Quadris and Headline) to apply to corn for gray leaf spot. Headline AMP, Quilt Xcel , Stratego YLD and the newest fungicide Avito have been added to the list of effective fungicides for gray leaf spot.

Results
As a result, prices paid by producers have decreased significantly. Crop rotation, use of tolerant hybrids and spraying of foliar fungicides have saved as much as 20-30 bushels per acre from diseases. This could mean an increase of 7-10 million bushels across the state.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Genetic improvement of soybean yields (Pantalone)

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
There is an ongoing need for better soybean varieties.

What has been done
Varieties and germplasm lines developed by our program are well utilized by prominent soybean breeders in industry, USDA, and other universities; moreover, both conventional and Roundup Ready varieties that we developed were commercially produced in Tennessee.

Results
University of Tennessee soybean genetics is estimated to have contributed over $7 million to producer revenue. The yield advantage of the soybean varieties for which we were awarded a U.S. Plant Utility Patent in 2010 have added more than $1 million to producer revenues, compared with average commercial varieties.

4. Associated Knowledge Areas

KA Code	Knowledge Area
201	Plant Genome, Genetics, and Genetic Mechanisms
202	Plant Genetic Resources
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants
204	Plant Product Quality and Utility (Preharvest)

Outcome #10

1. Outcome Measures

Abandonment of Precision Agricultural Technology (Roberts)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Adoption of precision agriculture technology has received considerable attention, but abandonment has received little.

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

Results
Results indicate that younger producers who farmed more cotton area, owned more of their cropland, planted larger amounts of non-cotton area, used a computer for farm management and used a Personal Digital Assistant (PDA) in the field were more likely to adopt grid soil sampling for cotton precision farming. Results also suggest that producers with more cotton area who owned livestock and adopted management zone soil sampling were more likely to abandon grid soil sampling, while those who used a PDA in the field, used grid soil sampling for more years and followed up grid soil sampling with variable-rate fertilizer application were less likely to abandon grid soil sampling for cotton production. For some farmers, grid soil sampling was abandoned for management zone soil sampling in the context of replacement discontinuance.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #11

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	5872

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #12

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	679

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #13

1. Outcome Measures

Soybeans: Number of acres of soybeans scouted by a producer or independent crop consultant to help make crop management decisions.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	413618

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #14

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	2436

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #15

1. Outcome Measures

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

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	727

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #16

1. Outcome Measures

Corn: Percentage increase in corn yield by using recommended crop management strategies for insects, weeds or plant diseases (outcome expressed as a percentage increase).

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

Outcome #17

1. Outcome Measures

Extension Producers $48.9 Million Economic Impact through Corn, Soybean, and Wheat Production Programs

2. Associated Institution Types

- 1862 Extension
- 1890 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Quantitative Target	Actual
2010	{No Data Entered}	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The two major issues for Tennessee corn, soybeans and whaet producers have been controlling costs of pests and selecting high-performing varieties.

What has been done
Extension agents and specialists conducted over 600 group meetings reaching more than 10,000 farmer contacts to teach best practices for crop production. Extensive variety testing programs were coordinated by Extension on-farm research trials.

Results
The total estimated economic impact of Extension's variety selection and pest management programs for corn, soybeans and wheat was $48.9 million in FY 2010.

4. Associated Knowledge Areas

KA Code	Knowledge Area
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

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

Brief Explanation

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

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

1. Evaluation Studies Planned

Evaluation Results

{No Data Entered}

Key Items of Evaluation

{No Data Entered}