

## Institutional Information Request Form

### Southern Region: Value of Extension Services and Experiment Stations

The Battelle Memorial Institute is working with the leadership of the *Association of Southern Region Extension Directors* and the *Southern Association of Agricultural Experiment Station Directors* in producing analysis and a high-profile report on the special value of extension and experiment stations in the development of the 21<sup>st</sup> Century agbioscience economy. Each of the land grant universities in the 13 state and 2 U.S. territory southern region is collaborating in performance of this important project.

For each of the land-grant institutions participating in this project, Battelle is requesting information, data, project examples, etc. that will help illustrate the value of experiment stations and extension services. Completion of this information request is an important step in the information gathering required for this project. We are requesting that at each institution, the Experiment Station Director and the Extension Director **jointly** complete each section to the best of your collective ability. Note that within this form, Agbiosciences includes all aspects of agricultural, environmental, and biological sciences; as well as forestry, fisheries, wildlife, agro-tourism, and recreation; which are within the purview of the experiment station and/or extension service. Also, if you have additional supporting documents, reports, statistical summaries, etc. that you believe would be helpful to this project please forward them to the consulting team at Battelle together with your completed form. The form is set-up using MS-Word tables so you can type directly into the table boxes.

Please return the completed form to Simon Tripp at Battelle via email to [tripps@battelle.org](mailto:tripps@battelle.org) If you have questions please direct them to Simon at:

Simon J. Tripp  
Senior Director  
Battelle Memorial Institute  
Technology Partnership Practice  
6 Jaycee Drive  
Pittsburgh, PA 15243  
412-276-1986  
Cell: 412-523-6895  
[tripps@battelle.org](mailto:tripps@battelle.org)

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## Section 1: Institutional Profile

<i>University Name</i>	University of Tennessee Institute of Agriculture
<i>Extension Service Director (name, phone, email)</i>	Tim Cross, 865-974-7114, tlcross@utk.edu
<i>Experiment Station Director (name, phone, email)</i>	William F. Brown, 865-974-7121, wfbrown@tennessee.edu

### Personnel

<i>Number of Personnel in Extension (FTE)</i>	782.7
<i>Number of Personnel in Experiment Station (FTE)</i>	413.6

*\* Please do not include student employees, graduate assistants or temporary personnel*



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## Section 2: Income/Revenue Sources

Income Source	2011 \$ Income Received by Extension	Funding Trend for Past 3 Years	2011 \$ Income Received by Experiment Stations	Funding Trend for Past 3 Years
Federal Formula Funds	\$9,708,260	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input checked="" type="checkbox"/> Decreasing	\$4,108,862	<input type="checkbox"/> Increasing <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Decreasing
State Appropriations	\$31,379,126	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input checked="" type="checkbox"/> Decreasing	\$25,635,108	<input type="checkbox"/> Increasing <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Decreasing
Local Government Appropriations (Counties, etc.)	\$6,484,669	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input checked="" type="checkbox"/> Decreasing	\$ --	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing
Federal Grants and Contracts	\$3,608,326	<input checked="" type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing	\$10,687,289	<input checked="" type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing
State Grants and Contracts	\$6,106,304	<input checked="" type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing	\$3,494,000	<input type="checkbox"/> Increasing <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Decreasing
Local Grants and Contracts	\$ --	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing	\$13,886	<input type="checkbox"/> Increasing <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Decreasing
Industrial Grants and Contracts, including grants and contracts from commodity groups	\$ --	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing	\$4,571,831	<input checked="" type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing
Foundation Grants and Contracts	\$ --	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing	\$ --	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing
All Other Grants and Contracts	\$1,120,879	<input checked="" type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing	\$ --	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing
Sales of Products and Services	\$3,903,097	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input checked="" type="checkbox"/> Decreasing	\$3,157,792	<input type="checkbox"/> Increasing <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Decreasing
Intellectual Property Revenues	\$ --	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing	\$48,669	<input type="checkbox"/> Increasing <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Decreasing
Gifts	\$1,459,911	<input type="checkbox"/> Increasing <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Decreasing	\$1,904,611	<input type="checkbox"/> Increasing <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Decreasing
Other	\$653,335	<input type="checkbox"/> Increasing <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Decreasing	\$80,952	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input type="checkbox"/> Decreasing
<b>TOTAL</b>	<b>\$64,423,907</b>	<input type="checkbox"/> Increasing <input type="checkbox"/> Stable <input checked="" type="checkbox"/> Decreasing	<b>\$53,703,000</b>	<input type="checkbox"/> Increasing <input checked="" type="checkbox"/> Stable <input type="checkbox"/> Decreasing

Are these income/revenue numbers based on a cash or accrual accounting basis? CASH

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## Income Trends:

During the past five years, what trends have been observed in the funding for extension and experiment station activities? What are key funding challenges? Where have the most notable funding declines or increases occurred?

From FY08 to FY11, state appropriations declined approximately 18%. Federal funding has decreased for Extension and has been stable for AgResearch. Grants and contracts have increased over the same time period. As public higher education increasingly relies on tuition and rapid tuition increases, units that do not receive tuition find it very challenging to provide salary increases, pay the increased costs of health insurance and other benefits, and meet the rising expenses of utilities and fuel.

## Section 3: Research and Extension Activities

### Key Initiatives, Institutes and Programs:

Please provide a description of FIVE key centers, institutes, programs or initiatives that are true signatures of experiment station and extension work at your institution. Here we are looking for descriptions of initiatives, centers, programs, etc. for which your university is internationally or nationally well-recognized as a leader.

1. Healthy Homes—UT Extension serves as the state's official training partner for the National Center for Healthy Housing's Essentials for Healthy Homes Practitioners' Course. The Essentials class is a nationally-recognized curriculum, bringing together professionals from a variety of fields, to examine the relationship between residential structures and human health. Since its designation as a training partner in late 2008, UT Extension has trained housing, health, and construction personnel from Tennessee and ten other states.
2. Plant Variety Development – Our crop breeding and genetics programs have developed new soybean cultivars and improved germplasm in corn. Improved soybean cultivars with increased yield, tolerance to pests, disease and environmental stress, and containing enhanced protein and fatty acid composition improve human and animal nutrition. Ornamental programs have primarily focused on dogwoods and resulted in the release of five cultivars highly resistant to powdery mildew and dogwood anthracnose.
3. Turfgrass – The turfgrass science research program is geared toward useful and practical issues that impact the turfgrass industry, specifically golf and sports turf. Emphases include management of turfgrass weeds, disease and pest resistance in both cool and warm season grasses, sustainable practices for the industry, and athletic field safety through a public/private partnership studying natural and synthetic turf.
4. Bio-based Economy -- The Center for Renewable Carbon consolidates the interdisciplinary efforts of the university, its peer institutions, and its government and private partners in the areas of bioenergy production and biomaterials processing. The center's major initiatives focus on conversion of biomass to fuel, biomass supply systems, and the resulting value-added chemicals and materials. By using cellulosic materials and marginal lands, we strive to avoid impacting the food supply or food chain, and to replace petroleum-based products with cellulosic sources while limiting environmental impacts.
5. Reproductive Efficiency in Beef and Dairy Cattle – We have developed a media additive for cattle embryo transfer that has been sublicensed to a leading supplier. By enhancing embryo survivability, and also creating strategies for addressing heat stress, cattle producers are more competitive and efficient.

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## Special Research and Extension Infrastructure

Please provide a description of FIVE special assets or infrastructure investments that support agbioscience and related development at your institution. Examples might include pilot plant facilities, unique scientific research infrastructure, biosecurity facilities, camps, etc.

1. A new 13,000 sq. ft. lodge at the Clyde Austin 4-H Center provides sleeping rooms and modern meeting room space to support both summer camping programs and year-round meetings, retreats and other community events.

2. Biomass Innovation Park – This public/private partnership houses a demonstration-scale cellulosic ethanol bio-refinery dedicated to converting both agricultural residue and bioenergy crops to ethanol. In conjunction with its private partner, the university is focusing on developing integrated biomass supply chain solutions and strategic partnerships to support the biofuel, biochemical and bio-power industries.

3. Little River Animal and Environmental Unit – This new 529 acre dairy cow facility emphasizes Holstein milk production and associated animal research in nutrition, disease prevention, and animal health. Three years of baseline environmental survey data was collected prior to the construction and opening of the dairy. This data, in conjunction with continuing soil and water studies, will be utilized to study the interactions between animal agriculture and the environment.

4. Bioenergy, Science and Technology (BEST) Building – A new 5,500 sq. ft. Bioenergy, Science and Technology building offers a state-of-the-art laboratory environment for bioenergy and bio-products research and development. The BEST building supports an array of interdisciplinary faculty and scientists whose focus is developing alternative energy resources and related value-added co-products from cellulosic biomass.

5. Center for Safer Athletic Fields – This public/private partnership's goal is to improve athletic field performance and safety by comparing natural grass playing surfaces to synthetic surfaces. The center features 60 scaled-down athletic research fields aimed at providing solutions for sports field managers nationwide – from professional-level athletic fields to surfaces used by schools, public parks, and other recreational spaces.

## Most Notable Assets, Centers, Programs or Initiatives by Category

For each of the areas of focus listed below, please provide what you consider to be the top TWO most notable strengths (programs, assets and infrastructure, centers, etc.) of your institution:

### *Plant Sciences, Crop Science, Plant Genetics and Agronomy*

1. The Tennessee Master Gardener Program has over 2,000 active members in 46 counties across Tennessee. State-wide there are approximately 2,000 active Master Gardeners in 46 counties. UT Extension Master Gardener volunteers provide over 130,000 hours of service annually. Those volunteer service hours are equivalent to approximately 87 agent positions, a \$2,538,000 saving for Tennessee. For every hour an agent spends training a volunteer, 12.5 hours of Extension Master Gardener service are contributed back to the community. Extension Master Gardeners directly contacted over 29,700 Tennesseans helping them to make better gardening decisions, and managed over 34 school and community gardens in 2011. More information can be accessed at <http://mastergardener.tennessee.edu/>

2. Plant Variety Development using Genomics and Biotechnology – We use both tradition and molecular approaches to incorporate desirable traits into agronomic crops. These traits include increasing yield,

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detoxifying herbicides, aiding plant defense mechanisms against insects, and increasing nutritive value.

## *Animal Sciences, Animal Health, Livestock*

1. The Master Beef Producer Program (MBP) has conducted over 300 local sessions across the state that involved 9,070 producers from 91 of Tennessee's 95 counties. There were 43 sessions taught that involved 929 producers from 42 Tennessee counties during 2011. Data collected through surveying program participants indicates that the economic impact of implementing what they learned would range from \$1,000 to \$5,000 of increased annual income if they made changes to their operation as a result of what they learned in the program.

2. Beef and Forage Center – This multi-disciplinary effort (plant and animal science; forestry, wildlife, and fisheries; biosystems engineering and soil science; water quality) aims at improved forage management, enhanced environmental quality, and beef production, with collaboration between research, extension, producers and industry.

## *Food Science, Food Product Development, Advanced Nutrition and Health Products*

1. The Domestic Kitchen Food Safety training course provided by the Food Science and Technology Department is offered to individuals wishing to manufacture non-potentially hazardous foods in their home kitchen. The Food Safety Certification Course is taught to food handlers working with at-risk populations such as the elderly, immunocompromised, and children.

2. Protein-Based Product Development – One of our labs continues research on developing protein-based ingredients to alter food texture and rheological properties, and for the use of proteins as carriers for flavors or hydrophobic drugs.

## *Food Safety and Biosecurity*

1. UT Extension, working with the UT Center for Agriculture and Food Security and Preparedness, is delivering Department of Homeland Security funded courses for the Food and Agriculture Sector. One of the courses focuses on the security issues related to food transportation and importation and the necessity to share information between industry, food regulatory agencies and law enforcement. The other course introduces the use of a standardized system for non-federal jurisdictions to utilize resources (human responders) in the event of an all-hazards animal and agricultural disaster. The courses have been delivered in 28 states, plus 2 territories and to several tribal nations.

2. Food Microbiology and Safety – We've contributed to pre- and post-harvest food safety, including the prevention and control of animal disease and infections that can pass to humans. Programs include effective alternatives to antibiotic use in livestock, lowering mastitis with the TN quality milk initiative, and a ground-breaking study on the safe handling of grocery deli meats.

## *Industrial Bioeconomy, Biofuels, Biobased Chemicals, Biobased Materials and Fibers*

1. The University of Tennessee/Genera Energy and DuPont Danisco Cellulosic Ethanol constructed and are operating one of the nation's first cellulosic ethanol demonstration plants and the only one dedicated to converting both agricultural residue and bioenergy crops to fuel ethanol. University of Tennessee Extension is providing leadership for educational programming with farmers on contracting, producing, and harvesting switchgrass for biomass. Sixty-one farmers in a 10-county area are growing 5,100 total acres of switchgrass for biofuels production and research development. These cooperating farmers are an integral part of the Biofuels Initiative. Farmers received three-year contracts with various payment levels. Some farmers whose contract expired in 2010 accepted a one year extension of their contracts on 678 acres. The aggregate impact of these contracts is \$7,119,080 in gross farm revenue.

2. Multi-Disciplinary/Multi-Institutional Support for the Bioeconomy – Our regional Sun Grant Center,

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Center for Renewable Carbon, and the Integrated Biomass Supply Systems Partnership are bringing together the players and technologies for biobased fuels/chemicals and materials, new biobased sources (grasses, crops and trees), and the requisite policies and logistical issues for a bio-based economy.

## *Environmental Sciences, Natural Resources, Sustainability*

1. Tennessee Tree improvement Program – Initiated in 1959, this research program focuses on improvements in disease and pest resistance of hardwood and coniferous species using traditional breeding and testing methodologies coupled with advances in clonal propagation. Partners include TN Division of Forestry, USDA Forest Service, and other natural resources agencies, including the Great Smoky Mountains National Park.

2. Water and Soil Protection – Our multi-faceted approach to protecting watersheds includes the emerging Stormwater Management, Assistance, Research, and Training (SMART) Center, modernization of domestic wastewater treatment regulations in Tennessee (and associated training), and research into livestock impact on pond and river ecosystems and fauna.

## *Agritourism and Recreational Hunting and Fishing*

1. The Center for Profitable Agriculture provides educational programs and services in value-added agriculture and agri-tourism across the state. The Center makes an average of over 5,000 direct contacts per year through educational presentations, consultations and events.

2. National Field Trial Championships – The Ames Plantation Research and Education Center annually hosts the national championships for hunting bird dogs consisting of the winners from over 70 qualifying events in the US and Canada. Faculty at the 18,000 acre Ames facility also conduct research in the areas of deer, turkey and general wildlife management. These management programs incorporate select interaction with hunters through Ames' hunting club.

## *Family Development*

1. Co-Parenting is a fee-based educational program designed for divorcing parents. The program has demonstrated significant impacts and annually creates approximately \$100,000 dollars which is split equally between the state FCS Department and the County conducting the program. Approximately 3,000 parents receive the education each year.

2. The state of Tennessee requires that all newly-hired childcare teachers and Directors receive two hours of pre-service training during their first 30 days of employment. Over 10,000 teachers annually participate in the program developed and taught by UT Extension faculty. Impact data based on a six month follow-up survey shows positive changes in teacher behavior and an increased rate of facilitating developmentally appropriate activities.

## *Youth Development*

1. UT Extension operates three 4-H centers across the state, providing summer camping and year-round educational experiences. The Tennessee 4-H camping program is designed to develop sound philosophies, attitudes, skills and value judgments in youth. The 4-H Centers are funded by user fees and provide an economic impact to the communities where they are located by employing staff and purchasing equipment, food and supplies with a local annual impact of more than \$2 million per location. In 2011, 4,680 youth participated in the summer camping program, while an additional 8,378 youth participated in year-round science and nature education programs. All three 4-H centers are fully accredited by the American Camp Association.

2. The Tennessee 4-H Performing Arts Troupe is a group of vivacious high school teens who love to sing

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and dance. Members are selected by auditions and travel the state performing a variety of themed shows for conferences, conventions and other public events. This group of youth ambassadors uses their talent to tell the 4-H story and highlight the history of our state through song and dance. They create a favorable image for the Tennessee 4-H program and its mission of positive youth development. The Troupe is volunteer-led with members bearing the expense of participation.

## *Community and Economic Development*

1. The Financial Planning, Marketing and Stress Management Help Available from the MANAGE Program is designed specifically to help Tennessee farm families carefully evaluate their individual situation and assist them in improving their quality of life. The MANAGE program is conducted by University of Tennessee Extension. Over 15,000 Tennessee farm families have participated in the intensive farm and financial planning phase of MANAGE. Farmers across Tennessee have benefited from the MANAGE program over the past few years. During personal interviews and through statewide surveys, these farmers have repeatedly expressed their positive personal opinions about MANAGE. More information about the MANAGE program can be accessed at <http://economics.ag.utk.edu/mang.html>

2. The Creating a Rural Entrepreneurial System in Tennessee (CREST) program helps each community understand the impact and importance of small business development to the long-term sustainable development of their local economies. CREST also provided a framework to identify components that should be in place in the community to support small business development and entrepreneurship. Through the CREST Committee, an effective organization focused on small business and entrepreneurship development was initiated in each pilot community.

## *Other, including multi-focus:*

1. A comprehensive planning and reporting tool has been created to enable agents and specialists to track impacts and outcomes for priority programs at the county and state level. The real-time, online database also tracks training and workshop registrations, performance reviews, and county finances. Several other states are currently using the program evaluation module to assess impacts for their educational programs, using validated instruments.

2. Organic Research Farm -- For developing best practices for organic production, this facility includes 90 total acres, 10 certified organic acres, seven high tunnels, and a greenhouse, dedicated to conservation tillage, high-tunnel production, variety trials, cover crop evaluation, and assessment and encouragement of native bees. This training program has recently been named one of the six best in the nation.

## **Intellectual Property**

	2009	2010	2011
<i># of Invention Disclosures</i>	23	16	24
<i># of Patents Applied For</i>	5	9	12
<i># of Patents Awarded</i>	3	4	3
<i># of Licenses Executed</i>	3*	2*	2*
<i># of Business Start-Ups</i>	1*	1*	1*
<i># of Plant Variety Protection Certificates Applied For</i>	<i>Not tracked</i>	<i>Not tracked</i>	<i>Not tracked</i>
<i># of Plant Variety Protection Certificates Awarded**</i>	1	2	1
<i>\$ Value of Income received from Plant</i>	\$54K	\$108K	\$49K



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<i>Variety/Germplasm Development</i>			
<i>\$ Value of Income received from all other Intellectual Property</i>	<i>\$243K*</i>	<i>\$310K*</i>	<i>\$279K*</i>

\*Based on pro-rated UTIA percentage of UT patents and patent apps.

\*\* Soybean; includes utility and plant patents

## Company Spin-Offs and Commercialization

Please provide examples of any start-up companies located in your state or the southern region that resulted from research discoveries, innovations or technologies developed at your institution in the past 10 years:

1. Genera Energy – Delivering integrated biomass supply chain solutions with strategic partners to support the emerging biofuels, biopower and biomaterials industries.
2. MycoGenomix (Stewart) – Insect resistance mechanisms to protect crop plants.
3. Creative Agricultural Technologies, LLC (Windham/Trigiano) – licensing new dogwood varieties.

## High Impact Innovations and Technology Development

Please provide FIVE examples of innovations or technology developments that have had a substantial impact on the field of agbioscience and/or associated agbio industries in the past 10 years. Examples might include crop varieties with enhanced yield characteristics, new processes or technologies introduced that significantly enhance productivity in industry, etc.

1. Statistical Process Control (SPC) technology, developed internally, is used in the wood processing industry to reduce wastes and production costs.
2. The Milan Research and Education Center pioneered no-till methodologies for crop production, and continues to lead in this globally important area.
3. RUSLE2 soil erosion modeling technology is the gold standard for conservation and construction planning, widely used by NRCS and other state, federal, and private entities.
4. UTIA has introduced numerous widely-adopted and economically important soybean varieties and dogwood cultivars.
5. The Beneficial Insects Lab breeds beneficial insects for protection of endangered hemlocks in the eastern US, with the US Forest Service as a primary adopter.

## Additional comments or items of note regarding experiment station and extension impacts:

Extension educational programs in 4-H youth development, agriculture and natural resources, family and consumer sciences, and resource development produce substantial returns to the state. Using research, questionnaires, observations and sales records, an economic impact was estimated at more than \$537 million from July 1, 2010 through June 30, 2011 for statewide educational programs.

## Section 4: Extension Service Programs

**Statistics:** please provide basic metrics and statistical information for extension:

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Metric	Number
<i>Number of county/parish offices</i>	95
<i>Number of multi-county/multi-parish regional offices</i>	3
<i>Number of major 4H camps</i>	3
<i>Number of 4H participants</i>	306,571
<i>Number of contacts with clients recorded by extension for the most recently completed year (include professional and volunteer contacts)</i>	5.6 million
<i>Number of volunteers for the most recently completed year and number of hours volunteered</i>	15,651 volunteers 258,958 hours

**Please provide selected examples of notable/high impact projects or programs of extension that you would like considered for inclusion within the Battelle report. Please give consideration to including both rural and urban programs.**

*Business Development Programs/ Impacts*

N/A

*Community Development Programs/ Impacts*

N/A

*Family and Consumer Science Programs/ Impacts*

1. The UT Extension Tennessee Saves program teaches personal savings and financial management. Fifty percent of participants increased their savings or investment. In addition, 33% reduced debt an average of \$208 per month, for a total estimated debt reduction of more than \$1.1 million.

2. UT Extension FCS educators implemented community nutrition educational programs to address the obesity crisis in all 95 Tennessee counties. There were 4,286,969 educational contacts through exhibits, newspaper articles, radio and TV programs. An additional 54,000 participants were reached in 2,605 face-to-face meetings. Impact data was collected using a behavior checklist and a random follow-up survey. The behaviors measured are the healthy lifestyle practices essential in achieving and maintaining healthy weight and preventing chronic disease. Participants increased positive behaviors in six key areas.

*4-H and Other Youth Development Programs/ Impacts*

1. 4-H workforce preparation programs give Tennessee young people the tools, experience and confidence necessary to thrive in a high-performance, high-skill employment environment. Key indicators of workplace success include setting goals, communicating and leading others. In 2011 Extension staff made more than 335,300 educational contacts with youth to help them acquire new skills and work toward specific goals. For example, in a survey of more than 7,259 participants, 73 percent report they can now share their ideas through writing.

2. In 2011, over 19,000 Tennessee 4-H members contributed 70,616 hours of service to their communities. Their service was valued at \$1,508,357 and impacted the lives of over 200,000 individuals in the state.

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Other high impact/notable Extension programs

N/A

Additional comments or items of note regarding extension:

N/A

**What diagnostic or other service facilities are operated by extension? What is the annual volume of business in number of clients and dollars?**

Soil, Plant, and Pest Center – soil testing, forage and grain analysis, plant tissue analysis, distance diagnostics. Approximately 9000 soil sample clientele, 700 forage analysis clientele, 900 plant tissue/disease diagnostics clientele per year. Total sample receipts, \$30K; Homeowners saved approximate \$200K in fertilizer costs; hay and pasture producers saved almost \$1M by soil testing. Approximately \$500K total budget annually.

## Section 5: Off-Campus Experiment and Extension Stations, Research and Extension Farms, and Outlying Research and Extension Centers

Please provide a listing of your off-campus agricultural experiment and extension station locations, including those near the main campus but not on campus, and other key research and extension locations across the state where faculty conduct research and/or extension activities, together with key characteristics or focus areas of each. *Note: please cut and paste table as needed to create enough entry places for all of your experiment station sites.*

### Station 1

Station name	Ames Plantation
Location (zip code)	38039
Size (acres), including owned and long-term leased land	18,400
Key focus area(s) (e.g. poultry, crop demonstration, etc.)	Forestry & Wildlife; Row Crops, Angus Beef.
Notable or unique characteristics or assets	12,000 acres forestry & wildlife. National Championship for Field Trialing Birddogs.
Number of personnel (FTEs)	10

### Station 2

Station name	Dairy Research and Education Center
Location (zip code)	37091
Size (acres), including owned and long-term leased land	615

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<i>Key focus area(s) (e.g. poultry, crop demonstration, etc.)</i>	Dairy; conventional and Forage based production. Native Warm Season Grass and Grazing Trials: Native Warm Season Grasses and Annuals. Waste Management/Nutrient Management Focused Studies. Large Animal Composting Trial.
<i>Notable or unique characteristics or assets</i>	Historic Jersey Herd (from 1929 beginnings).
<i>Number of personnel (FTEs)</i>	8

## Station 3

<i>Station name</i>	<b>Forest Resources Center</b>
<i>Location (zip code)</i>	37830
<i>Size (acres), including owned and long-term leased land</i>	12,000+ acres in three locations: 2,260 acres in Oak Ridge, TN; 8000+ acres in Morgan/Scott counties; and 874 acres near Tullahoma, TN.
<i>Key focus area(s) (e.g. poultry, crop demonstration, etc.)</i>	Natural Resources (Forestry, Wildlife & Fisheries), Plant Sciences, Entomology and Plant Pathology, Biosystems Engineering, Ecology, and Ornamental Horticulture.
<i>Notable or unique characteristics or assets</i>	Three units: the Oak Ridge Forest, the Cumberland Forest (Morgan and Scott counties), and the Highland Rim Forest near Tullahoma, which provide a wealth of natural resources for research, education and demonstration. The Arboretum project, located on the Oak Ridge Forest, offers unique opportunities for public/community outreach, targeted plant sciences/natural resources research, teaching and demonstration.
<i>Number of personnel (FTEs)</i>	8

## Station 4

<i>Station name</i>	<b>Highland Rim Research and Education Center</b>
<i>Location (zip code)</i>	37172
<i>Size (acres), including owned and long-term leased land</i>	615
<i>Key focus area(s) (e.g. poultry, crop demonstration, etc.)</i>	Tobacco (dark fire cured, dark air cured, and burley), agronomic crops, and beef cattle.
<i>Notable or unique characteristics or assets</i>	Beef Cattle: Commodity Feed Storage Facilities, modern cattle handling facilities, 16 grazing paddocks; several larger pastures. Tobacco: Several tobacco curing barns and air curing structures. Crops and forages: Linear-move, overhead, and trickle irrigation systems.
<i>Number of personnel (FTEs)</i>	13

## Station 5

<i>Station name</i>	<b>East TN Research and Education Center</b>
<i>Location (zip code)</i>	37920
<i>Size (acres), including owned and long-term leased land</i>	1,968

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<i>Key focus area(s) (e.g. poultry, crop demonstration, etc.)</i>	Turfgrass management; soybean, corn and wheat breeding; switchgrass production and processing; organic vegetable crops; season extension of vegetable crops with high tunnels; collection of rainwater for irrigation; plant diseases; weed management and control; row crop and forage variety testing; reproductive management in beef and dairy cattle; warm-season grasses; milk quality; effect of cow comfort on milk production; nutrient management and environmental stewardship; study of the role of amphibians in the transfer of diseases; bacterial pathogenesis; antibiotic resistance.
<i>Notable or unique characteristics or assets</i>	Known for its comprehensive and diverse research programs in agriculture. Home of Center for Athletic Field Safety. Home of Lindsay B. Young Beneficial Insects Laboratory. Received national Top 6 ranking of land-grant universities for research, teaching and outreach programs in organic agriculture. Site of unique and novel research facility to study the interaction of animal agriculture and the environment. With the close proximity to the UT campus, ETREC also serves as a field laboratory in support of the CASNR and CVM teaching programs, including an internship program that provides on-farm housing and hands-on experiential learning for students.
<i>Number of personnel (FTEs)</i>	32

## Station 6

<i>Station name</i>	<b>Middle TN Research and Education Center</b>
<i>Location (zip code)</i>	38358
<i>Size (acres), including owned and long-term leased land</i>	1265 acres
<i>Key focus area(s) (e.g. poultry, crop demonstration, etc.)</i>	Dairy production; beef cow/calf production; Central Bull Test Evaluation program; equine demonstration program; large animal composting; small grain variety trials; corn and small grain silage variety trials; native warm-season grass forage production and grazing trials; fruits (blueberries, grapes and peaches) for field day demonstration.
<i>Notable or unique characteristics or assets</i>	Centrally located within the state; unique diversity that mimics the state's agricultural industries; houses both the state Beef Cattle Specialist and Equine Specialist.
<i>Number of personnel (FTEs)</i>	12

## Station 7

<i>Station name</i>	<b>Milan Research and Education Center</b>
<i>Location (zip code)</i>	38358
<i>Size (acres), including owned and long-term leased land</i>	496 ac/owned; 388 ac/leased=884 acres of which are 650 tillable.
<i>Key focus area(s) (e.g. poultry, crop demonstration, etc.)</i>	An array of agronomic research with a focus on no-till crop production; research has been initiated focusing on production switchgrass for use as a biofuel; projects are currently investigating production of corn, cotton, soybeans, wheat, grain sorghum & switchgrass; well equipped with equipment for conducting small plot planting, maintenance, and

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	harvesting; full size equipment equipped with precision agricultural technologies.
<i>Notable or unique characteristics or assets</i>	The West Tennessee Agricultural Museum is located on the site and has thousands of implements and tools used by early settlers of West Tennessee. Events: Milan No-Till Crop Production Field Day (biannual), Fall Folklore Jamboree (annual).
<i>Number of personnel (FTEs)</i>	12

## Station 8

<i>Station name</i>	<b>Plateau Research and Education Center</b>
<i>Location (zip code)</i>	38571
<i>Size (acres), including owned and long-term leased land</i>	2100
<i>Key focus area(s) (e.g. poultry, crop demonstration, etc.)</i>	Fruits & Vegetables, Beef Cattle, Ornamentals, Greenhouse Tomato Production.
<i>Notable or unique characteristics or assets</i>	Cooler climate at approx. 1800 ft elevation. Demonstration gardens.
<i>Number of personnel (FTEs)</i>	12

## Station 9

<i>Station name</i>	<b>Greenville Research and Education Center</b>
<i>Location (zip code)</i>	37743
<i>Size (acres), including owned and long-term leased land</i>	500 acres owned + 300 acres of leased property.
<i>Key focus area(s) (e.g. poultry, crop demonstration, etc.)</i>	Tobacco, forage production, and cattle research.
<i>Notable or unique characteristics or assets</i>	Tobacco, forage production.
<i>Number of personnel (FTEs)</i>	11

## Station 10

<i>Station name</i>	<b>West Tennessee Research and Education Center</b>
<i>Location (zip code)</i>	38301
<i>Size (acres), including owned and long-term leased land</i>	
<i>Key focus area(s) (e.g. poultry, crop demonstration, etc.)</i>	Agronomic and horticultural crops, with emphasis on corn, cotton, soybeans, wheat, ornamentals, vegetables and turf grasses.
<i>Notable or unique characteristics or assets</i>	Summer Celebration.
<i>Number of personnel (FTEs)</i>	13

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Additional comments or items of note regarding off-campus experiment and extension stations, county offices, etc.:

N/A

## Section 6: Industry Partnerships

Please provide a description of FIVE notable partnerships that your experiment station and/or extension service has with industry. Examples might include a joint engineering center with an agricultural equipment manufacturer, plant breeding or transgenics programs with seed companies, bioprocess development with chemical or biofuels companies, food product development with food manufacturing companies, etc.

Provide details on companies, groups of companies, commodity groups etc. worked with, key results achieved and thoughts on benefits provided.

1. Genera & Tennera – public/private partnerships with objective of making ethanol from biomass to reduce dependency on foreign oil.
2. UnitedHealthcare – healthy lifestyles for youth.
3. First Tennessee Bank – financial education.
4. AstroTurf – Center for Athletic Field Safety.
5. Commodity partnerships with Cotton Incorporated, the Soybean Board, and Altria.

What areas of R&D at your institution do you believe hold the most promise for increasing industry engagement in the next five years?

1. Biofuels and bio-based economy.
2. Plant biology.
3. Food product development and safety.

What agriculture, forestry, fisheries or wildlife and natural resource-related industries do you expect to see grow in the southern region during the next five years?

1. Biofuels and bio-based economy.
2. Natural gas extraction.

Additional comments or items of note regarding industry partnerships:

N/A

## Section 7: Regional Cross-Institutional & Governmental Partnerships

Please provide a description of FIVE projects, initiatives, centers or programs, etc. that your experiment station and/or extension service is engaged in together with other institutions in the southern region.

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Examples might include joint initiatives in biofuels development, food safety, biosecurity, rural economic development, etc.

1. The Money Crunch program – teaches young employees, aged 18 to 24, how to budget, build wealth, plan for their goals, and save money for investment. Joint with University of Kentucky, University of Florida, Kansas State University, and Mississippi State University. The program is funded by the Financial Industry Regulatory Authority (FINRA).
2. Southeastern Regional Sun Grant Center – one of five regional centers that are part of a national network of land-grant universities and federally funded laboratories working together to further establish a biobased economy.
3. Joint tobacco breeding and management program with University of Kentucky.
4. National Bobwhite Conservation Initiative – in partnership with Forest Service and other US agencies.
5. Processing and Logistics of Biomass – multistate project (extending outside southern region) with DOE and USDA.

What federal agencies do you partner with on major joint projects and programs? Please list the top 3 federal initiatives you are engaged with.

1. Integrated Biomass Supply Systems Coordinated Agricultural Project (CAP) with USDA/NIFA.
2. Family and community service programs are offered through a partnership with the Department of Defense to serve the families of soldiers from Fort Campbell. These programs help families adjust to the deployment of soldiers, manage finances wisely, and provide effective parenting during the deployment of a spouse.
3. RUSLE2 soil erosion model – a computer model containing both empirical and process-based science that predicts erosion by rainfall and runoff. The USDA-Agricultural Research Service (ARS) is the lead agency for developing the RUSLE2 model.

What state agencies do you partner with on major joint projects and programs? Please list the top 3 state agency initiatives you are engaged with.

1. Department of Agriculture
2. Department of Human Services
3. Department of Health

What do you believe are some of the unique assets of the southern region that make it particularly well-suited to leadership in the 21<sup>st</sup> Century agbioscience economy?

1. Forestry resources
2. moderate climate and extended growing season
3. central location for distribution and supply chains

Additional comments or items of note regarding potential or existing partnerships with other institutions across the southern region:

University of Tennessee Extension and University of Kentucky Extension have an on-going partnership



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where Extension tobacco specialists have joint UT/UK appointments and work in both Tennessee and Kentucky. Both a burley and a dark fire specialist have worked in this arrangement for both UT and UK Extension for several years.

## Section 8: Education and Human Capital Development

### Student Population

<i>Number of students graduated in most recent year with Bachelor's degrees in related field of study</i>	247
<i>Number of students graduated in most recent year with Master's degrees in related field of study</i>	46
<i>Number of students graduated in most recent year with Doctorate degrees in related field of study</i>	9
<i>Number of students graduated in most recent year with Associates or other less than baccalaureate qualifications in related field of study</i>	0

### Education and Training Programs

In a science and knowledge-driven economy, skilled human capital is a critically important asset for our states. Please provide details pertaining to education and skills development in the sections below:

New or innovative education programs or degree programs developed (for example: bioprocessing or biorefinery operator training, biosecurity training, education programs in new fields such as functional foods, nutraceuticals, etc.)

1. Organic Production Internships – After just five years in existence, the Organic Crop Unit at the University of Tennessee has been ranked among the six best programs in the nation for teaching students how to grow crops that meet U.S. Department of Agriculture organic standards (Knoxville News Sentinel).
2. Construction Science Program -- This program supplements students' classroom instruction with real-world lessons by connecting them with regional industry leaders. Students attend local chapter meetings of the Associated General Contractors of America, Associated Builders and Contractors, and the Construction Specifications Institute. The statewide construction industry supports the program by providing adjunct instructors, endowments, and a scholarship.

### *Continuing education programs or training for producers or industry*

Tennessee's Pesticide Safety Education Program (PSEP) is a program that was developed to train commercial and private pesticide applicators. New workers commonly lack necessary training which is essential for them to be aware of pesticide safety related matters. Tennessee's PSEP program provides training for both commercial, private pesticide applicators as well as training workshops for applicators who want to become licensed within the state. Due to the frequency of changes in laws, regulations, pesticide labels and environmental concerns, pesticide applicators are encouraged to attend educational workshops, conferences and meetings. The certification cycle is a three year cycle and during the past three years, the PSEP program has provided training for more than 20,000 pesticide applicators located across the state.

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## *Professional Certification Programs*

N/A

*Leadership training, including civic, commodity, government, youth, etc.*

N/A

*Entrepreneur training and other special training or education initiatives*

N/A

*National defense, including National Guard, training or educational initiatives*

N/A

*K-12 specific educational programs and initiatives*

Youth Pork Quality Assurance (YPQA) advisor training and certification.

*Additional comments or items of note regarding education and training:*

N/A

## **Section 9: Into the Future**

### **What key challenges does your institution face in the future:**

Top 5 key challenges for the Experiment Station in your state

1. Limited state budget.
2. Economically and environmentally-sustainable production and conversion of biomass to biofuel.
3. Alignment of existing and emerging sources of revenue with our land grant mission and client base.
4. Balancing fundamental research endeavors with traditional applied field programs.
5. Development of enhanced and sustained linkages with non-traditional private industry partners without compromising our public institutional mission.

Top 5 key challenges for the Extension Service in your state

1. Maintaining support for base or traditional programs while responding to emerging issues and needs.
2. Staffing to meet needs at the state and local level with decreasing appropriations.
3. Increasing responsibility and liability for volunteers, especially those that work with minors.
4. Transition in funding for higher education from appropriations to tuition and fees.
5. Rapid advances in information technology, requiring continual investment in equipment and support.

### **What emerging opportunities or trends do you see impacting your institution:**

Top 5 emerging opportunities and trends for the Experiment Station

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1. Large-scale, cross-disciplinary research initiatives
2. Linkages with private industry partners
3. Commercialization of technologies
4. Biobased economy
5. Genomics

Top 5 emerging opportunities and trends for the Extension Service

1. Increasing urbanization, including a loss of farmland.
2. Advancing technology in all aspects of Tennesseans' lives.
3. Rising rate of obesity for adults and children.
4. Increasing population and diversity.
5. Increasing concern for environmental sustainability.

**For the southern region overall, what do you see as the top five challenges/issues moving forward**

1. Maintaining agricultural competitiveness and profitability.
2. Protecting natural resources and the environment while growing jobs and the economy.
3. Improving health and reducing the incidence of obesity.
4. Supporting the growth of rural communities.
5. Enhancing education, including K-12, and increasing the number of college graduates.

**What are the top five differentiating factors of the southern region in agriculture, agbiosciences, community/family/youth development, etc. What makes the region unique or provides key comparative advantages.**

1. Large number of farms, geographically dispersed, with marginal land that can be devoted to biomass.
2. Communities that are low cost of living, offering stable and affordable work force, low cost higher education, traditional family values.
3. Close proximity to much of the nation's population base, providing many marketing opportunities.
4. Climate that supports production of a very wide range of crops.
5. Relatively abundant water supplies, large base of forestry and wood products.

## Section 10: Interview Suggestions

Battelle would like to interview some key stakeholders (outside of the land-grant institutions) across the southern region to discuss their perspective on the importance of extension and agricultural research. Please provide the names and contact information for three individuals who you would suggest for interviewing in your state:

<i>Name</i>	<i>Title</i>	<i>Organization</i>	<i>Telephone</i>	<i>Email</i>
Julius Johnson	Commissioner	Department of Agriculture	615-837-5100	Julius.Johnson@tn.gov
Joe Huffine	Manager, Member Services	Tennessee Farmers	615-793-8011	jhuffine@ourcoop.com

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		Cooperative		
Richard Dobbs	Director, Food Stamp/EBT Program	Department of Human Services	615-313-5531	richarddobbs@state.tn.us

## Section 11: Additional Comments

Please provide any additional comments, information, data, case-studies, impact assessment results, etc. that you feel may be useful or relevant for inclusion in this project and resulting report:

N/A
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