2014 University of Arkansas Combined Research and Extension Annual Report of Accomplishments and Results

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I. Report Overview

1. Executive Summary

University of Arkansas (UA) Division of Agriculture faculty, staff and facilities are located on five university campuses, five regional Research and Extension Centers, six Research Stations, three Extension Centers, and in 75 counties. Unlike most states today, the UA Division of Agriculture remains committed to this statewide infrastructure with a presence in all 75 Arkansas counties; ensuring that researchers and Extension educators are readily available to address the science and business of agriculture and the broader needs of families and the communities we serve.

Consistent with the land grant mission, the UA Division of Agriculture research and Extension faculty have a long history of providing leadership in the development and dissemination of innovative practices and emerging technology. Division researchers conduct basic and applied research for Arkansas producers, businesses, communities and families. During FY2014, Division of Agriculture research efforts resulted in the submission of 16 patent applications. Division Extension educators delivered research-based education through 1,927,937 educational contacts with Arkansans. Extension educators employed diverse educational methods statewide including: 37,196 educational classes, 23,504 landowner visits, 63,455 individual consultations, 957 school enrichment programs, 3,089 demonstrations, 2,520 field days/tours/camps, and 373 4-H enrichment programs. In order to be responsive to the changing needs of our clientele, in 2014, the Division also launched a new website that revised and revamped the content, the look and the accessibility of the Division and Cooperative Extension Service websites.

During 2014, the Division also delivered timely and responsive distance education webinars through the National Center for Agricultural Law on emerging issues including: the 2014 Farm Bill; Animal Welfare Statutes; county of Origin Labeling; Farm & Ranch Leases; Aquaculture/The Lacey Act; the Food Safety Modernization Act; Agritourism; and Right to Farm Statutes. Extension educational programming for Arkansas clientele is also available 24/7/365 through web-based instruction at the Extension online course website http://courses.uaex.edu. Family and consumer science and agriculture and natural resource online Extension education was delivered to and completed by 7,542 participants in FY2014 through 142 course offerings.

The focus of work conducted by Division of Agriculture continues to be guided annually by grass-roots, community-based input from a diverse range of Arkansas citizens. The UA Division of Agriculture formally engaged a large pool of stakeholders (including individual clientele, producers, schools, partner agencies and organizations, state government officials, community leaders, underserved groups, and legislators) in the design and development of the 2011-2015 Strategic Plan. Based on broad stakeholder feedback, the Division identified five emphasis areas to focus our efforts that include:

- Agricultural Production and Processing;
- Environment, Energy and Climate;
- Access to Safe and Nutritious Food;
- Increasing Opportunities for Families and Youth; and
- Economic and Community Development.

These five emphasis areas help to provide guidance for Division research and Extension programs and help to support integrated research/extension efforts in these areas.

With NIFA's change in Planned Program title requirements, the UA Division of Agriculture also

chose to make significant changes in our NIFA plan of work and annual report to align planned efforts with these strategic emphasis areas.

2014 Division of Agriculture Planned Program Impact Highlights

Agricultural Production & Processing

Agriculture contributes more than $20 billion per year to the Arkansas economy, and 1 of 6 jobs. Our continued success in agriculture relies on the abundant resources in the state, including good soils, abundant water, favorable climate, and hard-working people.

Challenges to agriculture increased in 2014, with lower commodity prices, a new pest in grain sorghum, continued high input costs, and several "misinformation" events from non-scientific sources.

In 2013, Arkansas had about 44,600 farms on 13.8 million acres and another 19 million acres in managed forests. The state ranked 16th in agricultural cash receipts of $9.8 billion in 2012. Of this amount, crop production totaled $4.8 billion and livestock/poultry $4.6 billion. The public value of our agricultural and forest lands also enhanced the tourism and travel potential of the state through natural beauty, diversity of plant and animal life, and rural charm.

Nationally, Arkansas is 2nd in poultry production and among the top 25 states in production of beef cows, hogs, pigs, cattle, calves and meat goats. Poultry production is concentrated in the northwest section of the state, but during 2014 a major new area in north central and northeast Arkansas was opened to poultry production. Cattle are raised in every county, with a January 1, 2015 inventory of 1.6 million head. Horses continue to increase in popularity with 60,000 households having horses.

The Division of Agriculture assists livestock and poultry production with research and Extension programs focused on enhancement of well-being and animal handling methods to minimize stressors in food animals, determination of the impact of common stressors (castration, parasite load, disease, etc.) that aid in development of on-farm best management practices, improvement of food safety while maintaining product quality characteristics, improvement of environmental sustainability (reduction of greenhouse gasses, and nitrogen cycling/use); input efficiency of production, enhancement of reproductive performance, animal and poultry health, and reduction of feed/forage needs and costs.

A major emphasis in cattle production efficiency in Arkansas has been the education about and adoption of extended forage systems, including 300 Days of Grazing. In 2014, 37 demonstrations were conducted on farms in 18 counties in Arkansas. Farms that incorporated forage brassicas (turnips, rape, and hybrid brassica) saved $2.50 to $3.60 per day on feed costs over a 75-80 day feeding period and cut feed costs by 50% and 67%, respectively, by using brassica forage compared to their traditional fall feeding program. Producers that used single strand electric fence wire to strip-feed hay saved over $200 in hay value during the feeding period.

Nationally, Arkansas ranks 1st in rice production; 4th in cotton; 5th in grain sorghum; 9th in soybean; 14th in corn; and 20th in wheat production. The Division of Agriculture conducts extensive research and Extension programs to assist these industries and producers keep up to date and competitive. Our agronomic programs emphasize utilizations of new varieties in rice, soybeans and wheat; adoption of relevant best management practices, IPM and environmental quality practices.

More than 20 soybean varieties have been released from the Division's soybean breeding program in the past 10 years. Several conventional varieties (Osage, UA 5612, UA 5213C) and a newly released Roundup Ready cultivar (UA 5414RR) are of interest to growers seeking maximum profit per acre, while specialty varieties have been licensed to the edamame and other parts of the food soybean industry. A new rice variety, RoyJ, performed extremely well in 2014 with better quality and equal yields to hybrid rice in the state.

Commercial Horticulture encompasses the production of fruits, vegetables, turf, and ornamentals. Arkansas ranks in the top 25 states in production of at least 15 horticulture crops. The blackberry breeding program is recognized worldwide, with eighteen varieties released to date, and planted throughout the US and in other countries. Total plants produced and sold to growers and home gardeners for 2012-2014 as reported by nurseries licensed to produce the Arkansas-developed blackberries was over three million

plants. The potential crop area for these plants was over 1700 acres and wholesale fruit value of over $90 million annually. This production includes both the summer-fruiting floricane types and the innovative primocane-fruiting type, extending the production and marketing season for this high-value crop.

Local foods were a very common theme during 2014, and horticulture, backyard poultry, and beekeeping programs were very important in supporting the creation of many farmer's markets and local food hubs during the year. Beekeeping also had a big year in 2014 with 929 new beekeepers taught in 10 state short courses. This effort created new beekeeping clubs in the state, now up to 20 active clubs. The program also assisted our studies on the role of neonicotinoids in pollinator health by developing the Bee Aware program to voluntarily mark hive locations with standardized flags so that pesticide applicators could avoid them.

Our neonicotinoid work resulted in a major regional journal article and many Extension presentations showing that these seed treatments do not transfer to pollen or nectar to expose pollinators, however a low but detectable level of these products was detected on wildflowers around some fields. This movement off field was believed to be a result of wind-blown talc added to seed to keep in flowing during planting and our scientists are now working on a new solution to replace talc. Overall the collaborative research in Arkansas, Mississippi and Tennessee showed no detectable impact of the neonicotinoids on honeybees in crop areas. It is likely that honeybee declines reported in the media have a very complex etiology, especially for hives being moved between states which greatly stress bees.

Division scientists were again very active in integrated pest management (IPM) efforts during 2014, as pest management in agriculture becomes increasingly complex and challenging. A new pest, the sugarcane aphid in grain sorghum, was first detected by Division entomologists in June and rapidly developed in most sorghum fields. We helped farmers stay in front of the rapidly increasing problem, securing a special label to use the one known effective insecticide and advising on its correct use. A few growers did not get the message and suffered total loss of fields, but early intervention protected the majority of the crop with good success.

Water quality and water quantity continued to be critical areas of emphasis in agriculture production during 2014. Edge-of-field water quality data from Discovery Farm fields in the state showed very low movement of nitrogen and phosphorus. These early results were shared at the state and regional level with stakeholders and regulators. The Gulf Hypoxia Task Force was hosted in Arkansas and toured a Discovery Farm in the Delta Crop region. Irrigation efficiency was emphasized in a major effort to teach growers proper use of computerized hole sizing software with poly pipe in furrow irrigated systems. Follow-up demonstrations showed an average water savings of 22% using this simple tool.

The Division of Agriculture continued to host some of the most modern and effective diagnostic services for little or no cost to help improve production. A new and major effort to understand the current status of nematodes in row crops was initiated in 2014 and funded by the local soybean check-off. This survey project collected and assessed hundreds of soil samples from the state and will show the makeup of nematode species and races in Arkansas crops.

Division biological and agricultural engineers also further refined or released a number of useful "APPS" for grower use during 2014. These included Corn Advisor, Cotton Advisor, Crop Enterprise Budgets, Manure Valuator and Hort Plants. Installations for these apps by users were more than 8200. Division agricultural and biological engineers also launched a new Cloud-GIS based tool called FTTCloud that identifies crop fields according to the genetic herbicide technology used so that applicators can more easily prevent applications of the wrong herbicide and minimize potential for drift injury. This new tool is of great interest to the crop production industry.

Most consumers of agricultural products are far removed from production and the abundance of internet "information" can complicate their understanding of the challenges and benefits of our modern science-based food, feed and fiber systems. During 2014, Division educators developed a modular online course on biotechnology crops using corn as the model and targeted to high school and adult lay audiences. These educators also initiated a second, more advanced course using soybeans as the model crop. Both courses will be marketed during 2015 for use by the public, schools, and community colleges. Another blended educational effort was the Arkansas Soybean Science Challenge project, funded through the Arkansas Soybean Promotion Board. The project targeted high-school science students and included

a five-hour online course, face-to-face lab instruction, a virtual field trip broadcast, incentive awards for high-school student initiated research, an ADE-approved online in-service training for teachers, a Pinterest site, and other online educational resources, reaching 485 Arkansas students and public and private schools across Arkansas.

Gardening remains a huge pastime in Arkansas.The Arkansas Master Gardener program remains one of the largest and most vibrant in the nation. In 2014, a major emphasis was on developing new leaders and volunteers to secure the future of the program. We developed a model leadership training course that developed 160 new MG leaders who then utilized their new knowledge in their home counties. As a result, Master Gardener volunteer hours increased to a total of 284,221 hours during the year with many new community projects.

Environment, Energy and Climate

Arkansas has tremendous soil, water and air resources that provide a multitude of beneficial uses. These resources support a highly productive, efficient agricultural system that annually accounts for $20 billion of value-added to the Arkansas economy. Yet, Arkansas still remains the "Natural State," as its scenic beauty attracts many outdoor enthusiasts and generates over $5.9 billion in tourism expenditures annually.

Managing Arkansas's natural resources to protect and sustain these multiple beneficial uses for future generations is not without its challenges. Air and water quality concerns have evoked lawsuits, new state and federal regulations, as well as voluntary natural resource conservation programs, such as USDA-NRCS' and Mississippi Healthy River Basin Initiative (MRBI). Large-scale modeling studies of the Mississippi River basin point to agriculture as the leading source of excessive nutrients that cause hypoxia in the Gulf of Mexico. The State Assembly commissioned ANRC to update the State Water Plan while the Gulf of Mexico Hypoxia Task Force, consisting of 5 federal agencies and 13 states, held their Annual Spring Meeting in Little Rock in May 2014. The Division also jointly produces a regional newsletter entitled "Confluence" to provide information to the agricultural public on nutrient reduction and water quality protection efforts within the 13 states participating in the Gulf of Mexico Hypoxia Task Force. Other sectors of society, such as municipalities and urban areas also face nonpoint source water issues. Municipalities and urban areas are also required to address storm water management issues and provide education on reducing the impact of storm water on runoff water quality. Municipalities in three Arkansas counties have contracted with Extension to provide storm water education, providing research-based and unbiased information to Arkansans to assist with voluntary efforts to address nonpoint source water quality issues. In 2014, the State of Arkansas developed a process to update the State Water Plan, a comprehensive plan for addressing both water quantity and quality concerns.

Monitoring water quality and nutrient levels on a tributary to the Buffalo National River was assigned to an environmental task force in late 2013 by the Arkansas Governor's office and a subcommittee of the Arkansas General Assembly. This action was in response to public interest in a federally-permitted swine farm in the Big Creek Watershed. The Big Creek Research & Extension Team was formed in fall 2013 and received $340,000 from the governor's office to initiate the environmental study and monitor potential environmental impacts of the swine operation. Members of this team, including the team leadership, include Division of Agriculture research and Extension faculty and staff.

Efforts to reconcile competing agricultural and environmental interests are often hampered by a lack of definitive best practices. The Division of Agriculture has created a multidisciplinary team approach to discovery, demonstration and promotion of agricultural/environmental best practices. The Center for Agricultural and Rural Sustainability (CARS), the Arkansas Water Resources Center and the Environmental Task Force represent team efforts that range from basic discovery to economic consequences of implementing best practices.

Agricultural production and processing sustainability has been a focus of the Division of Agriculture for many years. Evidence of this is the Division's hosting of the Center for Agricultural and Rural Sustainability (CARS), a nationally known center of excellence. Faculty associated with the Center have pioneered life cycle analysis of cropping practices, studied alternative production and marketing systems, organic

agriculture, phytoremediation, alternative residue and water management, and trace gas emissions. In 2013, CARS was awarded a $3 million grant by the Walmart Foundation to improve fresh strawberry production in the U.S. Since then, CARS faculty have conducted research on the processing of various strawberry products to ensure retention of anthocyanins, which are attributed to the vivid red color of strawberries. Findings included strict oxygen exclusion during berry processing that appears to be a viable technology to improve anthocyanin and color stability.

CARS faculty and staff also led the selection and coordination of projects that demonstrated success across economic, environmental, and social metrics of sustainability, with a view to additional grower engagement to fill gaps in regions or technologies. Several NSSI projects focused on climate change or energy issues, including three projects in California investigating alternatives to methyl bromide (considered a greenhouse gas pollutant) and nine other projects (in Arkansas, Arizona, Kansas, Mississippi, Minnesota, Nebraska, Texas) focused on increasing regional strawberry production, which would reduce energy used in transportation.

The Division of Agriculture's Nitrogen Soil Test for Rice (N-STaR) was merely a research tool just a few years ago. In 2014, roughly 4,500 N-STaR samples were processed for determining the optimal nitrogen (N) rate for rice on both silt loam soils and clay soils. For many fields, N applications were reduced without sacrificing yield, thus reducing potential greenhouse gas (GHG) emissions and reducing potential N losses to watersheds.

Access to Safe and Nutritious Food

Food Safety

The Division of Agriculture continues to have a strong emphasis on Food Safety with efforts in both basic and applied research and supporting extension efforts for youth, the public and the food industry. Research efforts are focused mostly on gaining a better understanding of the ecology of food pathogens, improving food processing systems to minimize food pathogens and improving detection systems for Listeria, Salmonella, EColi and other major food pathogens. An example of current research is the development of forestry derived antimicrobials. Essential oils from pine by-products in combination with bacteriophages are being used to combat antibiotic resistant Staphylococcus Aureus. Success of this project would generate value-added forestry products from part of the biomass that is currently either left to rot or simply underutilized. The market potential for these byproducts could also be substantial for the State of Arkansas.

Arkansas has a large food industry with a need for food safety education of its workforce. These food safety educational programs help food processing companies remain nationally competitive and prevent foodborne illness. One such program is the Better Process Control School which has certified over 3,500 food processing employees since its inception in 1973. The University of Arkansas Division of Agriculture also offers restaurant managers, employees and food handlers the opportunity to take classes and an exam to become a Certified Food Protection Manager. In FY2014, 97 food industry employees received certification in Better Process Control, 471 foodservice managers and associates took a ServSafe class from the Division of Agriculture with a 73% pass rate to become a Certified Food Protection Manager. Improvements in restaurant and food service food safety have the potential to save Arkansas money and time by way of reducing cases of foodborne illnesses.

Food Processing Innovation

The State of Arkansas has a large food manufacturing sector that needs a qualified workforce. To meet this need, Division of Agriculture faculty have developed programs addressing the needs of the industry. Of particular importance is the development of culinary training for research & development (R&D) personnel working in the poultry industry. The curriculum developed has allowed numerous employees to achieve the status of Certified Culinary Scientist. This experience is meant to enable the food technologist to understand what the R & D chef wants to ensure that the chef's vision and taste are translated to the production plant floor. The Division of Agriculture also contributes to the state's economic development by providing assistance to entrepreneurs. The Arkansas Food Innovation Center assists

small food processing companies and entrepreneurs by providing necessary education and services such as: product development assistance; sample production; FDA process approval (FDA form 2541a); measurement of pH and water activity (Aw); provision of nutritional labels; development of food labels; delivery of food related workshops; and other forms of technical and business assistance, much of which is available through a dedicated website for entrepreneurs. The Center program generally assists 15-25 entrepreneurs each year, as well as a number of non-profit organizations. The efforts of the program and making the Division of Agriculture's food pilot processing plant available to entrepreneurs has resulted in five different start-up food companies launching food products in FY14. Over the past several years, several food companies have emerged with the assistance of the program.

Division of Agriculture faculty also conduct innovative research in food processing. Research topics included improving the quality of rice and improving rice processes, expanding the utilization of soybeans and its co-products, assessing the health benefits associated with processed specialty crops and improving the sensory quality of processed foods. For example, the efficiency of on-farm rice drying was investigated on Arkansas farms. Results of the investigation found wide discrepancies in drying efficiencies of on-farm driers. Division of Agriculture faculty developed equations to predict thermal energy use based on ambient air temperature and the amount of water removed from the rice. The use of these tools will improve the logistical operation of on-farm driers, maximize energy efficiency, minimize costs to farmers and improve their bottom line.

In other research projects, Division of Agriculture faculty are identifying rice and soybean peptides with significant health promotion and cancer inhibiting properties. In one study, researchers are working towards creating a viable process to produce dietary conjugated linoleic acid (CLA)-rich soy oils commercially. CLAs have been shown in studies to confer great human health benefits in reducing the clinical indicators of obesity-related diseases, improving immune function and promoting weight loss in obese persons. The CLA-rich soy oil developed would allow consumers to obtain the clinically effective daily intake to combat obesity-related diseases.

Nutritious Food, Food Security and Childhood Obesity

Arkansans face challenges when it comes to obesity and food insecurity. Arkansas has the third highest poverty rate in the nation, with one in four children living in poverty. Food security is defined as access at all times to enough nutritional foods for an active and healthy lifestyle. Arkansans in many areas of the state have limited access to nutritious and affordable food. The Division of Agriculture Cooperative Extension Service's Supplemental Nutrition Assistance Program - Education (SNAP-Ed) and Expanded Food and Nutrition Education Program (EFNEP) were delivered in every Arkansas county in FY2014. They provided Arkansas's most vulnerable families and youth with hands-on opportunities to address food security challenges. SNAP-Ed programs were conducted at 563 locations throughout Arkansas including schools, Head Starts, senior centers, food banks and pantries, shelters, DHS offices, WIC offices and grocery stores. Lessons focused on: making healthy choices within a limited budget, learning how to read food labels, cook, grocery shop and increase physical activity.

Extension program evaluations identified some of the significant impacts of these programs. For example, 65% of EFNEP adult program graduates more often planned meals in advance, 1037 EFNEP and SNAP-Ed adult graduates ran out of food before the end of the month less often. With a focus on practical food preparation, cooking, tasting, and shopping, the Division of Agriculture Extension programming is having a measurable impact on reducing food insecurity in Arkansas.

Research within the Division of Agriculture focuses on various aspects of adult and children health. For example, researchers are conducting joint research with Arkansas Children's Hospital Research Institute to assess factors that place children at risk for obesity and social marketing messages about food. In addition, professors at the University of Arkansas are conducting research in the areas of obesity and diabetes prevention in order to help reduce the incidence of these diseases within the state and nationally.

Increasing Opportunities for Families and Youth

The Division of Agriculture's Cooperative Extension Service offers research-based educational

programs in Family Economics, Health and Aging, Marriage Parenting and Family Life, Leadership Development, and 4-H Youth Development. As a result of intensive programming in these areas, program participants gained knowledge based on educational lessons, experienced changes in behavior, enhanced skills, and adopted new research-based practices learned from Division of Agriculture sponsored Research and Extension programs

Individuals who participated in family economics educational programs gained the knowledge and skills they need to increase financial security and build wealth. Extension's personal finance educational programs give Arkansans the knowledge and skills they need to build financial security. Program participants learned the basics of financial management for spending, saving, credit management, and retirement and estate planning. They developed skills such as creating a spending plan, checking a credit report, shopping smartly, setting financial goals, etc. County FCS Agents conducted educational outreach across the state including programs, such as: Navigating Your Financial Journey (basic financial management); Your Farm, Your Legacy (estate planning seminar); and Get Real - Here's the Deal (youth personal finance simulation), just to name a few of the many topics and educational opportunities offered. More than 7,000 Arkansans participated in Cooperative Extension Service family and consumer economics programs.

A key to happiness in family life is learning how to be an emotionally healthy individual, a good partner, and an effective parent. The Division of Agriculture Cooperative Extension Service provided in-person and web-based educational resources and training in the areas of personal well-being, couple relationships, and parenting. Extension educators trained 1,419 people in our personal well-being programs and 1,271 of them indicated their knowledge of personal well-being increased and 1,267 of them committed to change at least one behavior or practice to improve their well-being. Educators successfully trained 84 people in our marriage and couple relationship programs and 555 people in our parenting programs.

Child Care Provider Education programs were delivered through Extension's statewide network. Our programs, supported through $475,000 in external funding, are available in multiple formats (e.g., face-to-face, online, and self-guided) to accommodate different learning styles and work schedules. The RAND Institute, in a review of benefits and savings of early childhood intervention programs, calculated that for every dollar invested in such programs, there is an estimated return of $2.50 to $4.00. That means that the return on investment within the state of Arkansas for our child care professional training programs is between $1.19 and $1.90 million. In 2014, 15,874 child care professionals successfully completed 45,565 hours of training. As a result of the training, 98% of participants indicated their knowledge of effective child care practices increased and 96% of participants did something new to be a better child care professional.

In the areas of Health and Aging, Extension faculty dedicated more than 17,000 hours to improving Arkansans' health in 2014. Extension exercise programs reached 44,595 Arkansans with sessions to increase fitness. This program is supported by a strong base of over 800 volunteers. More than 2,100 people learned the health impact of environmental risks, such as mold and carbon monoxide, increased their knowledge of health and medication literacy, or learned principles for successful aging through special programs.

The Arkansas Extension Homemakers Council and the Division of Agriculture Cooperative Extension Service are partners in providing education to families throughout Arkansas. The Arkansas Extension Homemakers Council's mission is to empower individuals and families to improve their lives through continuing education, leadership development, and community service. The organization is one of the largest nonprofit volunteer groups in the state with a membership of 4,400 and over 350 clubs. A total of 13.778 Extension Homemakers served as volunteers, contributing a total of 683,568 hours of time.

In 2014, 143,879 young people in Arkansas's 75 counties were reached through some aspect of the Arkansas 4-H youth development program. More than 700 4-H Clubs across Arkansas involved young people in hands-on education and service learning opportunities that enhanced their life skills, including decision making, problem solving, critical thinking, communications, service learning, and healthy lifestyle choices. In 2014, the 4-H program focused on three initiative areas: Healthy Living, 4-H Science and Citizenship Leadership. Impact programs were delivered in each of the areas (Yoga for Kids, ATV Safety,

Robotics, Shooting Sports, Citizenship/Leadership Camp, One Day of Service Voter Education, and Civic Engagement activities). Out of 9,529 youth in 4-H science, engineering and technology programs 91% indicated interest, engagement and positive attitudes toward science, 87% applied science skills and abilities in their daily lives and 50% of 8-12 graders used science to better their communities. One thousand seven hundred adults volunteered 14,616 hours of service in delivering science-based programs contributing effort with a value of $329,590.80.

Volunteer leaders are essential in the delivery and execution of programs with community clubs, project clubs, spin clubs, service learning and special interest activities. During 2014, 19,123 volunteers contributed 354,534 hours of time, which was valued at $7,849,382.76.

Economic and Community Development.

Business resource support provided by the Division of Agriculture is delivered through the following programs: entrepreneurial development for both youth and adults; specially tailored programs for Hispanic audiences; and programs for agricultural businesses identified with Agri-tourism, cottage food production and farmers' markets. Other business-centered Extension education and program support is delivered through the Arkansas Procurement Assistance Center (APAC) and annual Income Tax Schools for accountants and professional tax preparers. These programs are focused to the needs of both established and start-up business professionals in ethnically and economically diverse communities.

Entrepreneurial development efforts are focused on the potential within the Latino community, individuals interested in downtown revitalization, e-commerce opportunities and 4-H youth interested in starting a business. These programs have a broad youth and adult audience and involve a youth teaching/youth mentoring program. Program participants develop business plans, learn about rules and regulations governing small business, experience the application of new technologies, explore financing options, and learn financial management and accounting principles.

Community and economic development programming through APAC's procurement assistance counseling continues to produce significant value for Arkansans. In 2014, approximately $29 million in contract value was secured by Arkansas' 500 client businesses. The federal formula for economic activity related to jobs credited this program with producing more than 650 jobs in Arkansas. Since 1993, APAC has produced more than $1.3 billion in contract revenue for businesses in the state. The most recent five-year program review reflects a return on investment of 142 to 1.

UA Division of Agriculture community development efforts are targeted to strengthen and build local capacity for both economic well-being today and prepared resiliency for dealing with future issues. Programs included visioning, strategic planning, and strategies for effective economic development. These programs are based on multi-state collaborative efforts including: established and reported commonly used metrics for the Southern Region; program outcome aggregation at the regional level; and shared investment in the Southern Rural Development Center and the Program Leadership Network.

Public Policy education is the newest formal component of the Division's Community and Economic Development effort. The Division of Agriculture's Public Policy Center houses the core capacity for this effort and includes both Extension and research responsibilities. The base effort is centered in statewide issue elections and the public understanding of ballot measures whether proposed by the legislative process or public referendum. Citizens are engaged through in-depth analysis of issues which is policy-neutral and without the language of advocacy. Educational materials and program components are developed in collaboration with the National Center for Agriculture Law and the UA Center for Agriculture and Rural Sustainability.

Policy research and education remain important program components, in terms of training county agents to deal with controversial issues, developing unbiased policy representative educational materials and educating the public regarding complex ballot questions and policy issues. In 2014, the Division's Public Policy Center began the research and material development and distribution effort for the 2014 statewide ballot. The Center also supported education efforts regarding local ballot initiatives and controversial policy issues conducted by county Extension agents statewide.

The impact of the Division of Agriculture on leadership development in Arkansas communities has

been evident since the early days of the 20th century through county Extension agent mentoring of farmers and rural people. Leadership program support is currently accomplished through both local and statewide leadership training seminars and fellowships. This system engages resources of the UA Division of Agriculture at every level. Leadership efforts span the program emphasis areas and demographics of Extension clientele. LeadAR, our core leadership program, is connected to an international network of leadership programs (IPAL) and alumni of the LeadAR program are connected through the International Leadership Association Conference (ILAC). The LeadAR program has proven effective in educating a diverse pool of leaders from the public, non-profit and private sectors. The network of trained leaders now counts over 430 graduates as LeadAR alumni.

The efforts of Division of Agriculture research scientists and Extension educators in the five identified focus areas described in this Report of Accomplishments have continued to contribute to the discovery of new knowledge, the dissemination of needed educational programs and the well-being of Arkansans and their communities in 2014.

Total Actual Amount of professional FTEs/SYs for this State

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	350.0	0.0	469.0	0.0
Actual	353.3	0.0	615.0	0.0

II. Merit Review Process

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

- Internal University Panel
- External University Panel
- External Non-University Panel
- Combined External and Internal University Panel
- Expert Peer Review

2. Brief Explanation

Programs went through a three-tiered review process:

1. Stakeholder program identification and review
2. Administrative approval and review
3. External review

Stakeholder Program Identification and Review

Stakeholder input into program identification and review was derived from both formal and informal means for all program areas. Public comment on current and future Extension and research programs was obtained from county and community meetings, commodity and community associations, commodity check-off boards, state legislative committees and open public forms concerning specific issues. Open public meetings, field days and county and regional production meetings provided forums for stakeholder input open to under-served or under-represented individuals, groups or organizations.

For Extension, county councils and advisory groups met during the summer of 2014 (at a minimum) to provide input, feedback and/or review of program implementation, redirection, or newly identified needs. Members of these groups were invited to participate in programs, field days, special tours, workshops and conferences throughout the year and for the duration of the program. All reviews of research and Extension programs included a stakeholder member or members of the community or industry most influenced by the program area. Open public forums were held to address specific issues of importance to the stakeholder community or industry.

Administrative Approval and Review

Identified planned program areas for research and Extension activities were administratively reviewed and approved by the Director of the Agricultural Experiment Station and/or Cooperative Extension Service, as appropriate, within the context of the Division of Agriculture's Strategic Plan and the specific needs identified by stakeholder groups. Smith-Lever, Hatch, McIntire-Stennis, Animal Health and regional research projects were administratively reviewed and approved by the subject matter department head and the director of the Arkansas Agricultural Station. All research projects were reviewed by three outside scientists prior to submission to the respective subject matter department head and the experiment station.

External Review

Merit review is conducted as part of the Division of Agriculture's on-going program review process. The reviews have been department or programmatic and cut across departments. Reviews are scheduled on a five to seven-year cycle and conducted concurrently for research, Extension and instruction. All reviews have been conducted by a team of recognized outside research, Extension and teaching professionals balanced to reflect the programmatic needs and diversity. All reviews include one or more stakeholders. The actual review process involves a period of self-study, followed by program assessment and bench marking. The review team evaluates the programs' effectiveness relative to the stated mission and goals of the department or program as well as the needs of stakeholders. Following the outside review teams' written evaluation, the department or program prepares a response to the review. The Division of Agriculture and University administration then meet with the department or program faculty one more time to develop a plan for implementing changes. As a result, annual progress is reported to Division and University administration.

III. Stakeholder Input

1. Actions taken to seek stakeholder input that encouraged their participation

- Targeted invitation to traditional stakeholder groups
- Targeted invitation to non-traditional stakeholder groups
- Targeted invitation to traditional stakeholder individuals
- Targeted invitation to non-traditional stakeholder individuals
- Survey of traditional stakeholder individuals
- Survey specifically with non-traditional groups
- Survey specifically with non-traditional individuals
- Survey of selected individuals from the general public
- Other (County Extension Council and program advisory committee planning meetings.)

Brief explanation.

The University of Arkansas Division of Agriculture has utilized both formal and informal mechanisms for ensuring the planned programs address areas of strategic importance to the

state. Each planned program was based on the needs identified in a series of regional and statewide listening sessions with current and potential stakeholders representing the diversity of the population in the regions and state. Single issue meetings were held as needed to address emerging issues and to craft additional program responses if needed to promptly address the problem.

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
- Use Internal Focus Groups
- Needs Assessments
- Use Surveys

Brief explanation.

In 2014, the University of Arkansas Division of Agriculture sought input from diverse stakeholder groups. Stakeholders serve on county councils, advisory committees, and boards that advise and oversee the work of the Division. Individuals and stakeholder groups were identified by Arkansas Experiment Station faculty and administrators and by asking county Extension staffs to identify individuals in their local communities who were representative of one or more of the following fifteen stakeholder categories: county services (e.g., DHS, Food Bank or Pantry); financial sector (e.g., banks, agricultural lending, investments); faith-based sector (e.g., church, youth minister); education (public, private, vocational); commercial sector (e.g., chambers of commerce, industry); health (e.g., hospital, public health, doctor); agricultural production; agricultural businesses; county Extension council; 4-H program (e.g., leader, teen, alumni, foundation); government official (e.g., county, city); Extension homemaker; natural resources (e.g., wildlife, forestry, conservation); media (e.g., radio, newspaper, television); and youth services (e.g., community center, youth organizations). In addition to these criteria, Extension agents were also asked to identify individuals within the fifteen categories who were representative of the gender, racial, ethnic, and socioeconomic demographic make-up of the counties.

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
- Meeting with traditional Stakeholder individuals
- Survey of traditional Stakeholder individuals
- Meeting specifically with non-traditional groups
- Survey specifically with non-traditional groups
- Meeting specifically with non-traditional individuals
- Meeting with invited selected individuals from the general public
- Survey of selected individuals from the general public
- Other (Meeting with regulatory groups, state agencies, & commodity prom)

Brief explanation.

During the summer of 2014, Extension faculty met with county council members and program sub-committees to identify local needs for the program planning year beginning October

first. County profiles developed by state faculty were utilized to examine the diversity of needs and to understand the changing demographics within each county. Stakeholder-developed materials, such as the Farm Bureau policy development process was used to identify research needs. Several priority-setting activities were scheduled during 2014 with specific commodity and stakeholder groups to seek input on the research planning process.

In addition to the standard methods of obtaining stakeholder input described above, in 2010, the University of Arkansas Division of Agriculture updated its strategic plan. The 2011-2015 strategic plan for the Division included input from internal and external stakeholders statewide. A total of 780 internal and external stakeholders participated in these processes. Specific surveys were conducted with individuals representing underserved or under-represented groups, women in agriculture and small farm operation producers.

3. A statement of how the input will be considered

- To Identify Emerging Issues
- Redirect Extension Programs
- Redirect Research Programs
- In the Action Plans
- To Set Priorities
- Other (Strategic Planning)

Brief explanation.

Research and Extension faculty and scientists met with UA Division of Agriculture administration to discuss stakeholder needs solicited at meetings throughout the year. Identified needs were integrated into the Extension and research planning process to ensure program relevance. Several departments and many of our institutes and centers maintain external advisory boards that provide direct feedback to the unit on the specific research or educational program. Stakeholder representatives served on most policy-setting groups or program reviews to ensure that the public has a voice in the decision-making process and in program evaluation. Special meetings were held as needed to address major issues impacting any stakeholder group. Stakeholder input remains vital to ensuring program relevance, and each year programs are adjusted to address identified needs.

Brief Explanation of what you learned from your Stakeholders

Stakeholders want to be involved. Due to the size and scope of the University of Arkansas Division of Agriculture, reporting all specific stakeholder feedback would exceed the space allocation for this item. Stakeholders participate in establishing annual Cooperative Extension program priorities for each of the 75 counties in Arkansas. Stakeholders are also involved in identification of research needs and priorities.

During the statewide listening sessions in support of our new five-year strategic plan, 172 policy makers and key community and state organizational leaders considered critical and emerging needs within our state, and the role of the Division in addressing those needs. This group voiced their concerns about population changes across the state and challenges facing communities in a competitive economy. We heard comments concerning the different issues Arkansans must struggle with every day, including maintaining a competitive edge in agriculture and childhood health and obesity.

The following emphasis areas were identified for 2011-2015:

- Agricultural Production and Processing
- Environment, Energy and Climate
- Access to Safe and Nutritious Food
- Increasing Opportunities for Families and Youth
- Economic and Community Development

The Division's 2011-2015 Strategic Plan outlines the specific objectives for each area and is based on what we learned from our stakeholders.

IV. Expenditure Summary

1. Total Actual Formula dollars Allocated (prepopulated from C-REEMS)			
Extension		Research	
Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
5953555	0	4335498	0

2. Totaled Actual dollars from Planned Programs Inputs				
	Extension		Research	
	Smith-Lever 3b & 3c	1890 Extension	Hatch	Evans-Allen
Actual Formula	5852118	0	2796738	0
Actual Matching	5953555	0	57528757	0
Actual All Other	43127832	0	8010607	0
Total Actual Expended	54933505	0	68336102	0

3. Amount of Above Actual Formula Dollars Expended which comes from Carryover funds from previous				
Carryover	4607078	0	0	0

V. Planned Program Table of Content

S. No.	PROGRAM NAME
1	Agricultural Production & Processing
2	Environment, Energy & Climate
3	Access to Safe & Nutritious Food
4	Increasing Opportunities for Families & Youth
5	Economic & Community Development

V(A). Planned Program (Summary)

Program # 1

1. Name of the Planned Program

Agricultural Production & Processing

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
101	Appraisal of Soil Resources	4%		1%	
102	Soil, Plant, Water, Nutrient Relationships	9%		4%	
111	Conservation and Efficient Use of Water	4%		1%	
112	Watershed Protection and Management	4%		4%	
201	Plant Genome, Genetics, and Genetic Mechanisms	4%		19%	
204	Plant Product Quality and Utility (Preharvest)	6%		4%	
205	Plant Management Systems	10%		2%	
206	Basic Plant Biology	10%		1%	
211	Insects, Mites, and Other Arthropods Affecting Plants	1%		2%	
212	Diseases and Nematodes Affecting Plants	1%		14%	
213	Weeds Affecting Plants	7%		7%	
216	Integrated Pest Management Systems	20%		5%	
301	Reproductive Performance of Animals	2%		2%	
302	Nutrient Utilization in Animals	2%		6%	
303	Genetic Improvement of Animals	2%		6%	
306	Environmental Stress in Animals	4%		4%	
307	Animal Management Systems	2%		4%	
311	Animal Diseases	3%		9%	
601	Economics of Agricultural Production and Farm Management	4%		3%	
722	Zoonotic Diseases and Parasites Affecting Humans	1%		2%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	119.3	0.0	266.0	0.0
Actual Paid	110.2	0.0	361.9	0.0
Actual Volunteer	16.1	0.0	16.0	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**
2248161	0	1668734	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2287129	0	34978687	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
16568072	0	3498169	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

In the area of **Efficient Production & Processing**, THE U OF A DIVISION OF AGRICULTURE HAS:
• Developed and delivered efficient, sustainable agricultural production and processing best management practices.
• Discovered and promoted adoption of breakthrough science--based technologies.
• Analyzed and explained the impact of issues affecting Arkansas agricultural production and processing.

In the area of **Competitive Marketing**, THE U OF A DIVISION OF AGRICULTURE HAS:
• Analyzed global and local commodity and product market opportunities and constraints.
• Identified and addressed the needs of diverse agricultural enterprises related to marketing supply chains.
• Analyzed and explained the impact of issues affecting Arkansas plant and animal product markets.
• Helped producers and processors take advantage of market opportunities.

In the area of **Public Appreciation and Understanding of Agriculture**, THE U OF A DIVISION OF AGRICULTURE HAS:
• Increased public awareness of Arkansas agriculture's economic and environmental benefits.
• Taught the science behind agriculture through youth and adult education programs.
• Recruited and retained agricultural and forestry professionals and leaders.
• Analyzed and communicated science--based information about sustainable agriculture issues to the public.

2. Brief description of the target audience

Target audiences for the Agricultural Production & Processing planned program include:
Agricultural food crop growers/producers
Livestock/poultry producers
Commercial poultry producers
Commercial poultry company personnel
Aquaculture producers
Non-farm private landowners
Agricultural consultants
Agribusiness/allied Industry personnel
Horticulture production and service business personnel
Local, state and federal agency personnel
Master gardeners
Community leaders
Policy and decision makers
Low-income families with children
Low-income older adults
Hispanic/Latino families
African-American families
Single women
First responder emergency personnel
Research funders
General Public
Policy makers (US and international agricultural water resource managers),
Supply chain managers (consumer package good manufacturers and biotech companies)

3. How was eXtension used?

Multistate and integrated research and extension activities contributed by Arkansas scientists and educators to eXtension during 2014 featured feral hogs, bee management, fire ants, phosphorus management, grape cultivars, catfish budgets, pork production carbon footprint mitigation, cotton variety information, and Discovery Farms. Jon Zawislak had a feature article on eXtension Nov 5 2014 on managing small hive beetles in honeybee production http://www.extension.org/pages/60425/managing-small-hive-beetles#.VQe2D9LF-VM .

Division and UA engineers lead an effort to measure and mitigate the carbon footprint for US swine operations. Much of the information is distributed via eXtension. An example is a recent article on Life-Cycle Modeling for the Pork Industry by Dr. Matlock along with a video on integrated resource management (http://www.extension.org/pages/64822/life-cycle-assessment-modeling-for-the-pork-industry#.VQe2dtLF-VM .

In addition, water quality and irrigation programs use eXtension as an informational resource.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	553597	312335	246	3772

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

Patent Applications Submitted

Year: 2014

Actual: 13

Patents listed

Methods of Increasing Resistance of Crop Plants to Heat Stress and
Selecting Crop Plants with Increased Resistance to Heat Stress. PCT/US2014/025923. Inventors: Pereira, Andy / Venkategowda, Ramegowda.

Nectarine Tree named 'BOWDEN'. US 13/998,198. Inventor:Clark, John

Nectarine tree named 'AMOORE SWEET? . US13/998,201 Inventor: Clark, John

Peach Tree Named 'SOUVENIRS'. US13/998,203 Inventor:Clark, John

Blackberry Plant named 'A-1960'. US13/998,724 Inventors: Clark, John / Moore, James

Blackberry named APF-122. US 13/999,390. Inventors: Clark, John / Thompson, Ellen / Aguas-Alvarado, Mario

Conjugated Linoleic Acid Rich Vegetable Oil Production from Linoleic Rich Oils by Heterogeneous Catalysis. Inventors: Proctor, Andrew / Shah, Utkarsh. EP 13195571.8.

Blackberry Plant named 'APF-153-T'US 14/120,553. Inventor: Clark, John

System and Process for Quantfying Potentially Mineralizable Nitrogen for Agricultural Crop Production. US 14/209,245. Inventors: Roberts, Trenton / Norman, Richard / Slaton, Nathan / Wilson, Charles.

Method, Vectors, Cells, Seeds and Kits for Stacking Genes into a Single Genomic Site. US 61/933,646. Inventor:Srivastava, Vibha

Process of Purifying Gamma-Tocols From Rice Bran Oil Deodorizer Distillate . US 61/935,065. Inventor: Howard, Luke

Antibody Guided Vaccines and Methods of Use for Generation of Rapid Mature Immune Responses. US 62/008,178. Inventors: Bielke, Lisa / Hargis, Billy / Berghman, Luc

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	76	239	315

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # of agronomic production education meetings related to food production

Year	Actual
2014	406

Output #2

Output Measure

- # of demonstrations/on-farm research related to food crop production

Year	Actual
2014	660

Output #3

Output Measure

- # of farm visits related to food crop production

Year	Actual
2014	5158

Output #4

Output Measure

- # of row crop field days related to food production

Year	Actual
2014	28

Output #5

Output Measure

- # of educational meetings, demonstrations, field days, site visits, and other group events held to educate commercial and consumer clientele in fruit, nut, and vegetable production

Year	Actual
2014	101

Output #6

Output Measure

- # of clientele contacts from educational classes, workshops, group discussions, one-on-one, on farm demonstration interventions, demonstrations, and other educational methods related to food crop production.

Year	Actual
2014	20462

Output #7

Output Measure

- # of livestock or poultry related educational programs, workshops, educational meetings and/or field days.

Year	Actual
2014	479

Output #8

Output Measure

- # of clientele attending livestock or poultry related educational programs (field days, workshops, etc.)

Year	Actual
2014	10548

Output #9

Output Measure

- # of producers receiving livestock or poultry related educational materials (newsletters, fact sheets, etc.)

Year	Actual
2014	24227

Output #10

Output Measure

- # of livestock or poultry related farm visits or one-on-one consultations with producers.

Year	Actual
2014	7083

Output #11

Output Measure

- # of clientele trained on agricultural biosecurity.

Year	Actual
2014	7475

Output #12

Output Measure

- # of requested consultations related to exotic animal disease concerns.

Year	Actual
2014	350

Output #13

Output Measure

- # of hits to the CES Website regarding avian and livestock biosecurity.

Year	Actual
2014	352

Output #14

Output Measure

- # of farm visits or one-on-one consultations with clientele related to biosecurity.

Year	Actual
2014	964

Output #15

Output Measure

- # attending alternative agricultural systems related education classes, workshops, demonstrations, group discussions, and other educational events.

Year	Actual
2014	1846

Output #16

Output Measure

- # of alternative agricultural systems related demonstrations (e.g., demonstration study farm, food plots, etc.)

Year	Actual
2014	58

Output #17

Output Measure

- # of educational classes, tours, field days, and workshops related to pest management.

Year	Actual
2014	535

Output #18

Output Measure

- # of education meetings, demonstrations, and field days related to the production of non-food agronomic and horticulture crops.

Year	Actual
2014	31

Output #19

Output Measure

- # of clientele participating in educational events related to non-food agronomic and horticulture crop production.

Year	Actual
2014	3327

Output #20

Output Measure

- # of installations of mobile native ANR APPS by users

Year	Actual
2014	8306

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	# of clientele (non-duplicated) who use the DD50 program for improved rice production.
2	# of clientele that utilize SOYVA to assist with variety selection.
3	# of livestock producers who increased knowledge related to livestock production management practices.
4	# of livestock producers who initiated or improved their record keeping.
5	# of poultry producers who adopted new practices or technology.
6	# of livestock producers who changed an existing management practice or adopted a new practice.
7	# of growers/producers reporting knowledge gained about the need for biosecurity.
8	# of growers/producers reporting intent to adopt new biosecurity practices for animal production facilities.
9	# of diagnostic plant pest samples submitted.
10	# of diagnostic nematode samples submitted.
11	# of Asian Soybean Rust positive samples.
12	# of samples submitted for exotic animal diseases testing.
13	# of clientele who reported knowledge gained about speciality food related products.
14	# of clientele who initiated specialty food-related enterprises.
15	# of plant varieties developed.
16	# of pesticide applicator training participants certified or re-certified by passing commercial pesticide certification exams.
17	# of producers who gained knowledge in crop production and management.

18	# of Master Gardener participants trained, certified and re-certified.

Outcome #1

1. Outcome Measures

# of clientele (non-duplicated) who use the DD50 program for improved rice production.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	575

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Arkansas farmers produce more than 45 percent of the rice grown in the United States under dynamic production conditions that differ from those in other rice growing areas. Because of their prominence in this crop, Arkansas rice farmers depend on an Arkansas variety development program that provides a progression of improved varieties to meet the challenges of changing conditions in their fields and in the marketplace for rice.

What has been done
We conduct intensive conventional breeding methods supplemented by molecular marker detection to develop improved, adapted rice cultivars for Arkansas and Mid-South producers. Field development and testing of germplasm takes place on four experiment stations with different environments. The breeding program is heavily supported by all rice growers in the state thru funding from the check-off program.

Results
New cultivars from the Arkansas rice breeding program were grown on 19 percent of rice acreage during 2014. In 1980, the average rough rice yield in Arkansas was only 4,110 lbs/acre compared to 7515 lbs/acre in 2014. We estimate that 60 percent of this 3405 lbs/acre yield increase was due to newer Arkansas varieties developed during that period. The current value of this increase is about $370.00 per acre, or about $546 million in extra dollars for the Arkansas rice crop in 2014. Current new varieties contributed an estimated $103 million of that extra value in 2014.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
201	Plant Genome, Genetics, and Genetic Mechanisms
205	Plant Management Systems

Outcome #2

1. Outcome Measures

# of clientele that utilize SOYVA to assist with variety selection.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Herbicide-resistant weeds are a growing problem in the world production of agriculture. These problematic weeds must be contained so that we can continue to be profitable. Managing these weeds and decreasing the soil seedbank is crucial to lessening the selection intensity placed on herbicides that are currently in use. In Australia where herbicide resistance in ryegrass exist to all known herbicide modes of action, growers are having to turn to nonchemical means of increasing weed management diversity and assisting with the battle against herbicide resistance. Some of the strategies used in Australian wheat production may have a benefit to Arkansas soybean growers if proven effective in our current production systems.

What has been done
The retention of Palmer amaranth and waterhemp seeds on these weeds at soybean harvest was measured over the last two years in Arkansas as well as many of the major producing soybean states in the U.S. Additionally, an experiment was setup in an Arkansas soybean production field to test whether narrow-windrow burning of soybean chaff could be a viable management tool in decreasing the return of weed seed to the soil seedbank. A narrow-windrow plate was attached to the back of a combine to concentrate all chaff into rows for burning. Average soybean biomass

amounts for each burn were obtained so that they could be correlated with the amount of heat seen within the narrow windrows. Weed seed were placed within these burning windrows so that the effect of the heat could be tested in a field setting.

Results
Our recent research has demonstrated that more than 99% of Palmer amaranth and tall waterhemp seeds are retained on the weeds at soybean harvest, meaning that these seed enter the combine and are mostly likely returned to the soil seedbank. This practice allows for the spread of resistant seed, a phenomenon that is non-logical and one in which we need to prevent. When narrow windrows are used to concentrate soybean chaff and weed seed, our findings indicate that there is sufficient heat during the burn to kill all weed seed present in the chaff, including Palmer amaranth, barnyardgrass, johnsongrass, and pitted morningglory. By eliminating the return of these seed to the soil seedbank, weed populations will be lessened in future years which should improve herbicide performance and decrease the presence of resistant weeds infesting these fields.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
201	Plant Genome, Genetics, and Genetic Mechanisms
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems

Outcome #3

1. Outcome Measures

# of livestock producers who increased knowledge related to livestock production management practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	15494

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Native warm-season grasses (NWSG) are tall-growing bunch grasses grown for livestock forage and wildlife cover. Typical native grasses grown in Arkansas include big bluestem, little bluestem, switchgrass, and indiangrass. These grasses were grazed by bison and elk in pre-settlement days and were later grazed by free-ranging livestock. Over time, they were mostly grazed out in Arkansas and replaced by more grazing tolerant species like fescue and bermudagrass. Native grasses have several advantages as low-cost forages that provide good summer forage. However, current establishment recommendations are not adequate to produce grazeable stands within an economically viable time frame for producers.

What has been done

Three sites were chosen, (in cooperation with the University of Tennessee and USDA/NRCS Conservation Innovation Grant), to establish native warm season grass demonstrations using the best-available methods and recommendations. The sites were planted in May and June 2014 at the University of Arkansas Livestock and Forestry Research Station at Batesville, on a farm near Drasco in Cleburne County, and on a farm near Conway in Faulkner County.

Results

By using the best available recommendations and methods, stands of 90% or greater were established at all locations by October (one growing season). The resulting set of recommendations developed through this demonstration will serve as a standard for producers with interest in planting native grasses for use as forage and for wildlife. By following improved establishment recommendations producers can reduce establishment time from 3 years to one year and, based on research results, would gain an extra $600 to $1000 per acre in forage production value from these forages.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management

Outcome #4

1. **Outcome Measures**

# of livestock producers who initiated or improved their record keeping.

Not Reporting on this Outcome Measure

Outcome #5

1. **Outcome Measures**

# of poultry producers who adopted new practices or technology.

2. **Associated Institution Types**

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
As use of antibiotics becomes less acceptable in poultry production, optimizing input variables such as drinking water quality has become a crucial component for reducing disease stressors that significantly impact bird performance, particularly for high yielding strains that have little tolerance for stressors. Since each farm can have unique challenges, it is crucial to provide information and tools that allows water systems to be thoroughly and properly analyzed to pinpoint problem areas. Our water quality lab provides technical expertise as well as tools for identifying water quality challenges that can cost commercial poultry production tens of millions in Arkansas, the USA and the world.

What has been done
We created a water diagnostic kit utilized by farmers and company personnel to quickly and properly gather appropriate samples. Samples are analyzed, and specific information is provided on what challenges are present and how they can be economically addressed. Identification of different stressor-sitations allowed us to conduct targeted research and field demonstrations, as well as evaluate new technologies for effectiveness under different field situations.

Results
Results were shared with specific industries and their personnel in order to correct the many different problems associated with water quality issues. Methods included publications, presentations and direct contact. Over 2600 poultry operations were assisted in 2014. Estimates from industry of performance averaged $250/flock resulting in more than $1,000,000 in direct performance value to poultry producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
311	Animal Diseases

Outcome #6

1. Outcome Measures

# of livestock producers who changed an existing management practice or adopted a new practice.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4718

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Livestock producers face many challenges, but escalating costs of feed, fertilizer, and fuel caused serious problems for producers in Arkansas and throughout the country. Feeding expenses, both hay and supplements, are the biggest single cost of livestock production. With strategic planning based on the 300 Days Grazing approach, that feeding period was reduced significantly.

What has been done
Educational programs were combined with on-farm demonstrations of eight key management practices. The management practices were 1) stockpiling fescue, 2) stockpiling bermudagrass, 3) growing legumes, 4) growing summer annual forage, 5) growing winter annual forage, 6) improving grazing management, 7) reducing hay losses in storage, and 8) reducing hay losses during feeding. On the Livestock and Forestry Research Station, a cow herd was managed using the same practices to verify program recommendations and strategies. This combined approach using the same forage and livestock management practices on a production scale simultaneously

across multiple environments, producer farms, and a research station is unlike any other in the country.

Results
In 2014, 37 demonstrations were conducted on farms in 18 counties in Arkansas. Farms that incorporated forage brassicas (turnips, rape, and hybrid brassica) saved $2.50 to $3.60 per day on feed costs over a 75-80 day feeding period and cut feed costs by 50% and 67% respectively by using brassica forage compared to their traditional fall feeding program. Producers that used single strand electric fence wire to "strip-feed" hay saved over $200 in hay value during the feeding period.

4. Associated Knowledge Areas

KA Code	Knowledge Area
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
301	Reproductive Performance of Animals
302	Nutrient Utilization in Animals
303	Genetic Improvement of Animals
307	Animal Management Systems
311	Animal Diseases
601	Economics of Agricultural Production and Farm Management

Outcome #7

1. Outcome Measures

# of growers/producers reporting knowledge gained about the need for biosecurity.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	6816

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Poultry is the leading industry of Arkansas animal agriculture providing over 40,000 jobs and 40% of the total cash receipts. Arkansas broilers are the largest segment of the poultry industry with the state ranked 2nd in production nationally. The impact to the economy of the state of Arkansas from an uncontrolled outbreak of disease such as Avian Influenza or Exotic Newcastle disease would be devastating. In 2014, an outbreak of H5N8 High Pathogenic Avian Influenza was noted in British Columbia, Canada; and later found in small flocks in Idaho, Oregon, Washington and California Areas in these states are currently either under quarantine or recently released from quarantine and surveillance. Several countries have embargoed poultry and/or poultry products from the USA until the AI is under control. This costs the poultry industry tens of millions in lost revenue. The increase in keeping of hobby and small flock poultry is a tremendous concern to the poultry industry of Arkansas and other states. This concern drives the need for more biosecurity education.

What has been done

We teach biosecurity and poultry health to commercial growers as well as hobbyists. Efforts included farm visits, workshops, short courses, DVDs, and publications. A new grant from USDA/APHIS allowed us to conduct a targeted education effort at backyard poultry producers as well as survey for diseases and biosecurity knowledge of growers in the state. it also initiated a new web-based course for small growers to complete online at their convenience. Growers earn a certificate of completion after taking the course and it will be offered to other states as well.

Results

Results indicated that hobby growers vary greatly in knowledge of poultry health and biosecurity but clearly there is a great need for more education. The survey did not reveal any exotic diseases of concern in 2014. The online course was started and content and format were constructed with release planned for later in 2015. Feedback at events on the possibility of an online course was overwhelmingly positive.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants
311	Animal Diseases
722	Zoonotic Diseases and Parasites Affecting Humans

Outcome #8

1. Outcome Measures

# of growers/producers reporting intent to adopt new biosecurity practices for animal production facilities.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1541

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

# of diagnostic plant pest samples submitted.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	2779

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The sugarcane aphid, historically a minor pest of sugarcane, began infesting grain sorghum in Texas, Louisiana, Oklahoma, and Mississippi in 2013. While the reasons for this switch in host plants are not fully resolved, sugarcane aphid infestations in sorghum resulted in economic losses. Yield losses of up to 100% were possible when heavy infestations occurred early in plant development; for an 80 acre field that was expected to yield 88 bushels per acre at a hypothetical cash price of $4.88 per bushel, this would have meant a loss in revenue of $34,355. Grain losses of up to 50% were reported if the sticky excrement of the aphids was present in the grain head and interfered with mechanical harvest. In 2014 the range of the sugarcane aphid rapidly expanded to include eight additional states, including Arkansas. The 12 affected states represented approximately 90% of the total sorghum acreage in the U.S. (2014 Acreage Report, National Agricultural Statistics Service). In 2014, 165,000 acres of sorghum were harvested in Arkansas, with an average yield of 88 bushels per acre (2015 Arkansas Grain Sorghum Quick Facts, Dr. Jason Kelley and Kevin Lawson, U.A. Division of Agriculture).

What has been done

U.A. Division of Agriculture Extension specialists and county agents monitored grain sorghum fields to ensure early detection of sugarcane aphid upon its expected arrival in Arkansas. Because the insecticides labeled for use in sorghum were not effective at controlling sugarcane aphid, a Section 18 emergency label exemption was prepared for Transform® WG, one of the few insecticides that had effectively controlled sugarcane aphid in 2013. Field experiments were conducted at the Rohwer Research Station in southeastern AR to determine the efficacy of insecticides and application methods (e.g., tank mixes, spray adjuvants) for control of sugarcane aphid. Updates, management recommendations, and the conditions of the Section 18 exemption were disseminated to growers, consultants, and county Extension personnel through: the Arkansas Row Crops blog; two newsletter articles; statements in popular press articles that appeared in local and regional media outlets at least 19 times; presentations at six county IPM meetings; a field day at the Rohwer Research Station; and an in-service training session for county Extension agents.

Results

Extension specialists and county agents confirmed the presence of the sugarcane aphid in Arkansas on June 27, 2014. A Section 18 label exemption for Transform® was granted on July 2, 2014, giving producers a viable control option. Field experiments demonstrated that feeding by sugarcane aphids can reduce yields by up to 60% during grain filling. In addition, several insecticides that are not currently labeled in soybean were shown to provide effective control of sugarcane aphid. A section 18 emergency label exemption will be sought in 2015 for the insecticides Transform® and Centric® based on the results of field experiments conducted in Arkansas and surrounding states.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Diseases and Nematodes Affecting Plants
213	Weeds Affecting Plants

Outcome #10

1. Outcome Measures

# of diagnostic nematode samples submitted.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	539

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Cotton is an important agronomic crop in the southern U.S. with an estimated annual value of about $6 billion. In Arkansas, as in most of the southern states, 3-5 percent of the total cotton crop is lost to root-knot and reniform nematodes annually. The root-knot nematode is found throughout the US Cotton Belt, and can also attack soybean, corn, and many vegetable crops. Reniform nematodes are confined to the eastern and mid-southern states. Nematode management is difficult in cotton because no highly resistant cultivars are available that are adapted to the region. Additionally, in 2010 the most commonly-used and effective chemical nematicide, aldicarb, was voluntarily withdrawn from use by the manufacturer due to environmental and human safety concerns. Failure to manage either nematode can result in yield losses of 15-20% in some fields, and currently the only options for mitigating nematode losses are crop rotation which is minimally effective on root know due to its wide host range, and preplant soil fumigation with the nematicide 1,3-dichloropropene, which is very expensive and environmentally unattractive if used on a field-wide basis.

What has been done
Since 2001 a team of researchers from Arkansas, South Carolina, and Louisiana have been exploring the application of precision farming technology to a more efficient strategy for nematode control in cotton. This approach, termed the Site-specific Nematicide Placement Strategy (SNP) utilizes soil texture maps of individual fields to target sampling efforts and site-specific delivery of 1,3-dichloropropene only in areas where a significant improvement in yield due to nematode control is expected. The efforts of this team have resulted in a total of $2.25 million in extramural competitive grant funds, and the approach is nearly ready to be deployed widely at a grower level. Across the southern region, the SNP approach has resulted in a reduction of 30-50% of the amount of 1,3-dichloropropene needed to maintain cotton yields at a comparable rate with field-

wide fumigation, resulting in considerable savings to the grower and a much more attractive environmental profile.

Results
This work will radically change the strategies that are now being used by cotton growers across the US Cotton Belt for managing nematodes with a resulting savings of 30-50% of the current expenditures for soil fumigation. Reducing the quantity of soil fumigant by the same level will also result in a considerably more environmentally attractive approach to root-knot and reniform nematode management in cotton. These economic and environmental benefits should improve the long term sustainability of cotton production in the United States.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Diseases and Nematodes Affecting Plants

Outcome #11

1. Outcome Measures

# of Asian Soybean Rust positive samples.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	6

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Two rust diseases, southern rust of corn and soybean rust, were again observed in 2014 in Arkansas. Both can be devastating under the right conditions, causing up to 50% yield loss. Soybean rust arrived too late in the season to be problematic whereas southern rust of corn did occur early enough, but weather conditions did not favor disease development. One of the best practices to manage these diseases is an early warning system.

What has been done
Since 2012 we have alerted growers to these two rust diseases as they are first detected in the state through blog articles, text messages and our website. We conduct extensive scouting and

field monitoring to assure early detection. Since other diseases can be mistaken for these, our monitoring assures correct identification and reduces false warnings, and we train growers and consultants at the same time to recognize symptoms and signs.

Results
The major result of this program has been to minimize unnecessary fungicide applications in corn and soybean. Without the early warning system, preventative treatment of corn and soybean acreage in the state would cost as much as $96 million, and increase the risk of fungicide resistance. In 2014, we detected southern rust of corn in early July and alerted growers with corn acreage still at risk from yield loss, if the disease had developed. As a result, we sprayed 535,000 acres of corn in a timely manner. Control plots in different areas indicated a yield loss of 10% where not treated using the early warning recommendations, an average value of more than $43.00 net savings per acre.

4. Associated Knowledge Areas

KA Code	Knowledge Area
212	Diseases and Nematodes Affecting Plants

Outcome #12

1. Outcome Measures

# of samples submitted for exotic animal diseases testing.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	10

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Animal control officers have long been tasked with determining health and well-being of animals. Many of these individuals do not possess the health and well-being knowledge of the various farm animal species. There is a need for expanded training sessions for Arkansas animal control officers.

What has been done
An animal handling and control workshop was designed to provide learning opportunities for animal control officers in Arkansas. The objective was to determine health and well-being knowledge gained for farm animals by animal control officers. There were 5 species of livestock presented: dairy and beef cattle, horse, goats, and sheep. All sessions included healthy behavior, unhealthy symptoms, proper movement, and handling of each species. To determine knowledge prior to the workshop, a pre-test was administered to each participant. An identical post-test was given to participants at the completion of the workshop.

Results
Following training, participants increased their dairy knowledge by 54%; beef knowledge was increased 25%; horse knowledge increased by 50%; and goats and sheep knowledge increased by 50% and 45%, respectively. Overall, participants showed a 54% increase in livestock knowledge. The hands on discussion allowed participants the opportunity to ask questions more freely. Given the verbal feedback from the participants, it seems the hands-on training was the major factor contributing to the increase in knowledge.

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

# of clientele who reported knowledge gained about speciality food related products.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	183

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The increasing interest in local food and home agriculture has resulted in a natural interest in beekeeping statewide. Along with backyard poultry, beekeeping has become very commonplace in rural and urban Arkansas. While beekeeping can be relatively straightforward, there is a wealth of misinformation available to stakeholders in the state and inexperience can lead to some unpleasant episodes when working with bees. It is also true that many people have become more interested after hearing reports of honeybee decline and the potential impact on food crops nationwide. Regardless, beekeeping can be managed safely and is a very productive and enjoyable enterprise that can provide honey, extra income, and science education in a small space.

What has been done

Given the increasing number of Arkansans interested in local foods, gardening and outdoor activities, we developed a comprehensive beekeeping short course for public audiences with little experience and limited knowledge. The course provides education on honeybee biology, working with bees, bee hive types and construction, hive management, honeybee and pollinator health, a beekeeping calendar, keeping bees in urban areas, feeding bees, harvesting honey, and how to organize or join a local beekeeping club. The course also explains the laws and regulations enforced by the State Plant Board that apply to beekeeping. Graduates of the course are expected to be able to begin limited beekeeping and manage simple hive systems as well as understand how to find information and continue their education about bees and pollinators. In 2014, we taught the course at 10 locations across the state including Fayetteville, Fort Smith, North Little Rock, Conway, Crossett, Lonoke, Nashville, Little Rock, Bentonville and Pinnacle Mountain State Park (youth course).

Results

We taught 929 beekeeping students in the 10 short courses during 2014 as follows: Fayetteville (January) 212 attendees; Fort Smith (February) 226 attendees; North Little Rock (February) 78 attendees; Conway (April) 156 attendees; Crossett (August) 35 attendees; Lonoke (September) 37 attendees; Nashville (October) 78 attendees; Little Rock (November) 81 attendees; Bentonville (December) 93 attendees; and Pinnacle Mountain State Park (semester course for youth) 6 children, 5 parents. All students left the course with enthusiasm for bees and several have established hives around the state for future honey production. A number have reported sharing their knowledge with neighbors and friends, who have contacted us about attending short courses during 2015. This effort has also helped reinforce and invigorate existing, or led to creation of new, beekeeping clubs numbering 20 in every area of the state at the end of 2014. We plan to continue this program in 2015 and subsequent years as demand for beekeeping knowledge and interest in apiculture increases.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
601	Economics of Agricultural Production and Farm Management

Outcome #14

1. Outcome Measures

of clientele who initiated specialty food-related enterprises.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	68

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Local Food Systems are increasingly being examined for their ability to effectively deliver locally grown products to consumers and as viable marketing channels to expand producers marketing opportunities. Additionally, advocates across the food value chain are interested in understanding the ability to use and/or leverage these systems to secure safe, dependable, regionally produced food products and expand business activity.

What has been done
In 2014 the University of Arkansas Division of Agriculture (UA) faculty, directly engaged in several related projects to enhance the use, operation and efficiency of local food systems. The allied activities are linked and leveraged through the MarketMaker Program and direct marketing resources/trainings. UA Faculty successfully developed a food safety self-assessment to help farmers evaluate their on farm food safety processes and record keeping. The self-assessment is being used by a number of direct marketing farmers to enhance the safety of their products. Additionally, the assessment tool is being used by school procurement specialist to guide food safety discussions to enhance farm to school efforts. The Activities included continued outreach on the development and use of farmers markets as well as promotion of the markets through the MarketMaker portal. The UA hosted the annual meeting of the Arkansas Farmers Market Association where state branding program, Arkansas Grown; farm to school; value added processing resources; and food safety protocols were highlighted. Additionally, efforts were undertaken to build a collaboration to explore the development of a food hub in the Central Arkansas area.

Results
The farm-to-school project identified enhanced food transactions and outreach interventions in three selected elementary schools. MarketMaker to identify the farmer that is currently featured by the program, Arkansas Grow Healthy Study, to promote farm to school efforts across the state. MarketMaker also promoted direct marketing farms and markets listing over 60 percent of the state's markets and 150 individual direct marketing growers. We hosted the 2015 Arkansas Farmers Market Association where 70 attendees were able to learn about regulatory updates and resources to enhance farmer markets. A session focused on the use and development of brands including the use of the states branding program to promote their products. We created a partnership to plan for the development of a Regional Food Innovation Center that will host a certified kitchen, processing facility, education programs, small business training, support for marketing products, and other services to build capacity for local food systems development in Central Arkansas. The collaborative was awarded (one of twenty-six awarded nationally) a Local Foods/Local Places Planning grant and will start planning strategically for the infrastructure project in early 2015.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
204	Plant Product Quality and Utility (Preharvest)
205	Plant Management Systems
307	Animal Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #15

1. Outcome Measures

# of plant varieties developed.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Improved varieties of crops are a key component of success for growers including those that produce fruit. Adapted fruit blackberry varieties insure dependable yields of high quality products for growers and provide consumers with an enjoyable product for a healthy diet. The University of Arkansas has been improving blackberries since the beginning of the breeding effort in 1964. Blackberry remains as a key crop in the expansion of options of healthy fruits and vegetables available to American consumers. Blackberry is one of the newer fruits found routinely now on retail market shelves. The supply of blackberries has increased to the point that this fruit can be found year-around in many markets. The primary reason that blackberries are a more common item of retail commerce is the development of improved varieties that can be shipped to distant markets. Additional breeding and genetic improvement is increasing grower options for varieties and is a key for this industry to continue to expand.

What has been done

Eighteen varieties have been released from this breeding effort, and have been planted throughout the US and in other countries.

Results

Total plants produced and sold to growers and home gardeners for 2012-2014 as reported by nurseries licensed to produce the Arkansas-developed blackberries was over three million plants. Of the plants reported sold from 2012-2014, the potential crop area was over 1700 acres and wholesale fruit value of over $90 million annually. This production includes both the summer-fruiting floricane types and the innovative primocane-fruiting type, extending the production and marketing season for this high-value crop.

4. Associated Knowledge Areas

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

Outcome #16

1. Outcome Measures

# of pesticide applicator training participants certified or re-certified by passing commercial pesticide certification exams.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1081

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Pest management is a very broad area encompassing agriculture, urban situations, public health concerns, trade issues, etc. The Environmental Protection Agency (EPA) requires that pesticides be used properly and judiciously. The Agency also requires that most individuals and businesses that apply pesticides receive proper and recurrent training on the proper use of pest control products. The pesticide safety education program in Arkansas is the primary way that pesticide applicators are instructed on the proper and safe use of pesticides.

What has been done
We conducted 24 certification trainings during 2014 to reach the private, commercial, and non-commercial pesticide applicators. These trainings are held in conjunction with the Arkansas State Plant Board who awards certification. In addition we updated the many educational materials used to keep applicators up to date and proficient.

Results
We trained 1,081 Commercial and Non-Commercial applicators in 2014 while county extension agents trained an additional 4000 private applicators. We revised and launched our new webpages on the extension website, and was proved with those interested in training for certification. We helped coordinate the Arkansas Abandoned Pesticide Collection effort which has removed over 1.5 million pounds of pesticides in the past few years. This program has also provided about $195,000 in educational equipment to counties for pesticide education since 2010. Previous grower pesticide use surveys have indicated that approximately 50% of the respondents have changed their pesticide practices as a result of attending a PAT session. The most common changes listed were increased use of protective gear, reading the label more closely, and more attention paid to calibration. Approximately 85% of survey respondents rated the re-certification sessions as good to excellent.

4. Associated Knowledge Areas

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

Outcome #17

1. Outcome Measures

of producers who gained knowledge in crop production and management.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	8163

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Arkansas agricultural sector continues to experience serious economic, production, and marketing challenges, due to ongoing global financial instability and damaging weather events. Additional uncertainty surrounds U.S. fiscal and monetary policy and regulations. The implementation of the 2014 farm bill, considered by some to have the most complex farm bill program provisions ever written, will take time and a sustained research and educational effort to implement. Farmers who choose wrong within the new farm bill may suffer considerable loss of opportunity over time.

What has been done
In 2014, we partnered with USDA's Farm Service Agency and an array of farm organizations to provide practical education on base reallocation; Price Loss Coverage (PLC); Agricultural Risk Coverage (ARC); supplemental coverage; (SCO) and Stacked Income Protection Plan for Producers of Upland Cotton (STAX); the Dairy Margin Protection Program (MPP-Dairy); Livestock Gross Margin (LGM-Dairy) insurance; and buy-up decisions under NAP. We conducted 22 major farm bill/outlook meetings and helped coordinate 15 other farm bill/outlook meetings.

Results
We hosted 2,022 growers and related farm personnel at our primary education meetings, and over 1,000 at other meetings we assisted or coordinated. There were 75 educational farm bill presentations and feedback from attendees was overwhelmingly positive. Most growers concerns were on base reallocation, PLC and ARC and all growers surveyed asked for additional information and training. This farm bill is very complex and growers are extremely concerned about making the right choices over the next five years, it may literally mean the difference

between staying in business for some producers.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
205	Plant Management Systems
601	Economics of Agricultural Production and Farm Management

Outcome #18

1. Outcome Measures

# of Master Gardener participants trained, certified and re-certified.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1867

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Master Gardener program continues to be a strong and vital program in Arkansas with continued interest in becoming a MG volunteer. A strong, viable program is about more than just horticulture education, but managing people, projects and impact. As the program continues to grow,(65 county based programs and 3600 volunteers) we need continual management training and strong leadership.

What has been done
We used our state advisory board (County 76) and funds raised at the state convention to initiate more leadership training and improve participation. We offered discounted registration fees as well. We hosted a two-day training event for leaders on topics including money management, mentoring, project partnerships, social media and recruitment. We asked attendees to take what they learned back to their counties and implement it. We also conducted five advanced master gardener trainings, hosted the state conference in Texarkana, and sponsored a MG day at

Garvan Gardens.

Results

We noted 160 Master Gardeners and agents at the leader training, 500 attendees at the state conference and 450 at the MG day at Garvan Gardens. Evaluations indicated very high regard for the usefulness of the material presented at all of the events. The state MG Conference in Texarkana showed an estimated economic impact of $125,000 to the local economy. From the leadership training, several counties have implemented changes in their programs and developed tools to use in recruiting new Master Gardeners as well as growing new leaders. We have also seen a rise in membership in our state advisory board. With the on-line reporting system, we are now able to track hours by county, by project and have excellent data. Master Gardeners reported 181,371 volunteer hours and 102,850 education hours for a total volunteer commitment of 284,221 hours. The garden blog has also had a strong following with over 737 people signed up as followers receiving each blog post through their email plus 642 via facebook, and 56,560 views in 2014.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
205	Plant Management Systems

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Natural Disasters (drought, weather extremes, etc.)
- Economy
- Public Policy changes
- Government Regulations
- Other (New insect pest outbreak)

Brief Explanation

The year started with extensive flooding and cool weather, affecting crop production and hampering attendance at meetings and events. The new Farm Bill and lower commodity prices greatly affected educational and certain research directions. Potential policy and regulations aimed at banning neonicotinoid insecticides created new challenges to our pest management research and education outcomes and direction of effort. A new insect, the sugarcane aphid, heavily influenced research and education emphasis during 2014 as this pest damaged grain sorghum in the state for the first time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Eighteen blackberry varieties have been released to date, with success best evidenced by worldwide acceptance planting more than 3 million plants. Feedback has been very positive on performance of novel thornless and fruiting primocane varieties.
We conducted a livestock handling and control workshop for animal control officers. A

pre-test and post-test showed increased dairy knowledge of 54%; beef 25%; horse 50%; goats 50%; and sheep 45%. The hands-on training method was highly rated by all participants.
New cultivars from the Arkansas rice breeding program were grown on 19 percent of rice acreage during 2014. Since 1980, rice yield has increased by 3405 lbs/acre, at least 60% of that due to newer Arkansas varieties. The annual value of this increase was $546 million in 2014. This program continues to garner strong annual funding support from the rice check-off, good evidence of success.
High feed costs in previous years resulted in intense interest and demand for hands-on help with extended grazing systems. In 2014, 37 demonstrations were conducted in 18 counties, showing feed cost savings of 50-67%. Informal surveys of producers indicated strong interest in increased adoption.
A new grant-funded effort to provide targeted biosecurity and poultry health education to commercial and hobby poultry growers was initiated in 2014. Results of the initial survey of hobby growers showed a great variation in science-based knowledge of poultry health and biosecurity principles. Feedback on the possibility of online instruction was overwhelmingly positive.
A new aphid pest in grain sorghum during 2014 demonstrated success of Extension response to an emergency. Division recommendations were adopted on over 90% of the acreage during July and August with a net result of saving much of the crop, as untreated fields lost up to 100% of yield. Growers requested more work on this problem and a new grant from the corn and sorghum check-off was awarded.
Hobby beekeeping grew rapidly in 2014, with 929 new students taught in 10 short courses across the state. Beekeeping clubs increased to 20 and feedback from was for more and more training. Adoption of beekeeping principles has led to an upsurge in urban beekeepers. This effort was highlighted in media articles and on television during the year.
Specialists trained 1,081 commercial pesticide applicators in 2014 while county extension agents trained another 4000 private applicators. Previous surveys indicated 50% of respondents changed their pesticide practices as a result of these sessions, including increased use of protective gear, reading the label more closely, and more attention to calibration. Approximately 85% of survey respondents rated the re-certification sessions as good to excellent.
We hosted 2,022 growers and related farm personnel at primary Farm Bill education meetings, with another 1,000 at secondary meetings. Survey feedback on the quality and usefulness of these meetings was overwhelmingly positive. Most respondents expressed concerns about base reallocation, PLC and ARC and all growers surveyed asked for additional information and training.

Key Items of Evaluation

Success in the current local foods arena were evidenced by worldwide recognition of our small fruit breeding program, as well as state efforts to address rapidly increasing interests in hobby poultry and beekeeping. Evidence of effective response programming was exemplified by knowledge gains in animal well-being by animal control officers, intense interest in extended grazing systems, remarkable success in managing a new insect pest of grain sorghum, and a massive effort to educate growers on the most complex farm bill in history. Finally, sustained success was noted for our long term rice breeding and pesticide education programs, both enjoying widespread annual support from producers and applicators.

V(A). Planned Program (Summary)

Program # 2

1. Name of the Planned Program

Environment, Energy & Climate

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
102	Soil, Plant, Water, Nutrient Relationships	12%		14%	
111	Conservation and Efficient Use of Water	10%		4%	
112	Watershed Protection and Management	10%		7%	
123	Management and Sustainability of Forest Resources	5%		5%	
124	Urban Forestry	2%		2%	
125	Agroforestry	2%		4%	
131	Alternative Uses of Land	5%		3%	
132	Weather and Climate	0%		3%	
133	Pollution Prevention and Mitigation	5%		3%	
135	Aquatic and Terrestrial Wildlife	5%		4%	
141	Air Resource Protection and Management	2%		1%	
201	Plant Genome, Genetics, and Genetic Mechanisms	5%		2%	
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants	5%		22%	
204	Plant Product Quality and Utility (Preharvest)	7%		5%	
206	Basic Plant Biology	0%		2%	
211	Insects, Mites, and Other Arthropods Affecting Plants	8%		6%	
306	Environmental Stress in Animals	5%		2%	
402	Engineering Systems and Equipment	2%		3%	
511	New and Improved Non-Food Products and Processes	5%		5%	
605	Natural Resource and Environmental Economics	5%		3%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	18.3	0.0	25.0	0.0
Actual Paid	15.8	0.0	164.0	0.0
Actual Volunteer	1.1	0.0	2.6	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**
306616	0	717891	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
311931	0	14304984	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
2259642	0	2611402	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Sustaining water resources is important to all Arkansans and all citizens have a responsibility to help protect both the quality of soils, waters and watersheds. Amid nonpoint source pollution concerns, agricultural producers in Arkansas are facing increasing pressure to reduce sediment and nutrients from leaving their farms. Livestock producers are under increasing regulation to manage animal manure applied to pasture while row crop agriculture in Arkansas is facing dwindling groundwater supplies. Large-scale modeling studies of the Mississippi River basin point to agriculture as the leading source of excessive nutrients that cause hypoxia in the Gulf of Mexico. The State Assembly commissioned ANRC to update the State Water Plan while the Gulf of Mexico Hypoxia Task Force, consisting of 5 federal agencies and 13 states, held their Annual Spring Meeting in Little Rock in May 2014. Others sectors of society such as municipalities and urban areas also face nonpoint source water including municipalities and urban areas are required to address storm water management issues and provide education on reducing the impact of storm water on runoff water quality. Municipalities in 3 Counties have contracted with Extension to provide the Storm water education, providing research-based and unbiased information to Arkansans to assist with voluntary efforts to address nonpoint source water quality issues. In 2014, the State of Arkansas developed a process to update the State Water plan, a comprehensive plan for addressing both water quantity and quality concerns. Further, Arkansas hosted the Gulf of Mexico Hypoxia Task Force meeting in Little Rock.
The University of Arkansas Division of Agriculture delivered the following educational programs:
Arkansas Discovery Farms are real, working farms that allow the monitoring and documentation of water resource parameters related to environmental issues including: 1) edge-of-field monitoring of runoff quality and quantity, 2) irrigation water use, soil health and 3) other selected indicators of environmental impact on natural resources. Discovery Farms is a long-term monitoring, demonstration and educational effort that works with producers to implement conservation practices and monitor their impact. Currently, we have 9 Discovery Farms representing the major livestock and row crop production systems.
We continue to provide state certification training to nutrient applicators and nutrient management planners. This year we conducted three continuing ed. sessions for certified nutrient management

planners and two for nutrient applicators. We also provide education to livestock producers on the value and how to best implement nutrient management plans.
We work very closely with the Arkansas Conservation Partnership to promote voluntary conservation programs through educational efforts such as the distribution of an e-mail newsletter, Conservation Corner (> 2000 Subscribers) and the water sustainability website for clientele in Arkansas. Additionally, we jointly produce a regional newsletter entitled Confluence (> 2000 subscribers) to provide information to the agricultural public on nutrient reduction and water quality protection efforts within the 13 states participating in the Gulf of Mexico Hypoxia Task Force . We also have developed a regional website to provide conservation information across these 13 states.
We received a grant ($189,000) from EPA via ANRC to develop the Arkansas Watershed Steward program, a training program to educate citizens who want to be involved in addressing local water quality concerns. Products that have come out of this project are a 158 page publication, The Arkansas Watershed Steward Program and materials for use in a one-day workshop format. We conducted 8 one-day workshops in the NPS priority watersheds.
Storm water Management- Municipalities in three Counties have contracted with Extension to provide their EPA-required education to citizens or their cities.

2. Brief description of the target audience

Youth
Agri Business
Row Crop Agricultural Producers
Consultants
Forest Landowner Groups
Forest Industry
Loggers
Natural Resource Professionals
Landowners
Educators
Agency personnel
Livestock producers
Watershed and other Not-for-profit organizations
General public
Researchers
Policy makers
Research funding personnel and agencies
Renewable liquid transportation fuel producers

3. How was eXtension used?

The eXtension website was used to (1) augment feral hog control programming and (2) respond to public requests for information about nuisance wildlife. The "Dealing with Wildlife" webpage on the UA Cooperative Extension Service website has a significant number of links to eXtension's wildlife damage website.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	63262	32806	4138	525

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

Patent Applications Submitted

Year: 2014

Actual: 1

Patents listed

Methods of Increasing Resistance of Crop Plants to Heat Stress and Selecting Crop Plants with Increased Resistance to Heat Stress. US PCT/US2014/025923. Inventors: Pereira, Andy / Venkategowda, Ramegowda.

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	52	89	128

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of educational programs and events held related to Environment, Energy & Climate.

Year	Actual
2014	145

Output #2

Output Measure

- Number of field days related to Environment, Energy & Climate.

Year	Actual
2014	23

Output #3

Output Measure

- Number of educational materials, curricula, newsletters, web-based modules and fact sheets developed, produced and delivered related to Environment, Energy & Climate.

Year	Actual
2014	78

Output #4

Output Measure

- Number of locations for bioenergy crop demonstrations.
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Number of research-based, non-refereed publications published related to Environment, Energy & Climate.

Year	Actual
2014	87

Output #6

Output Measure

- Number of research-based scientific presentations at scientific or professional meetings related to Environment, Energy & Climate.

Year	Actual
2014	112

Output #7

Output Measure

- Number of research projects on biomass crops conducted in Arkansas.

Year	Actual
2014	1

Output #8

Output Measure

- Number of research projects on biofuels performance and emissions conducted in Arkansas.

Year	Actual
2014	1

Output #9

Output Measure

- Funded research amounts (in dollars) related to Environment, Energy & Climate.

Year	Actual
2014	1327000

Output #10

Output Measure

- Number of current year Environment, Energy & Climate relevant research programs.

Year	Actual
2014	19

Output #11

Output Measure

- Number of current year Environment, Energy & Climate relevant educational programs.

Year	Actual
2014	95

Output #12

Output Measure

- Number of clientele who attended educational programs.

Year	Actual
2014	1519

Output #13

Output Measure

- Number of clientele who received educational material.

Year	Actual
2014	1482

Output #14

Output Measure

- Number of on-site, farm visits or one-on-one consultations

Year	Actual
2014	38

Output #15

Output Measure

- Number of educational programs, workshops, educational meetings or field days

Year	Actual
2014	52

Output #16

Output Measure

- Number of on-farm/on-site demonstrations and applied research trials

Year	Actual
2014	7

Output #17

Output Measure

- Number of demonstrations of new wildlife foodplot concept

Year	Actual
2014	1

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of individuals adopting one practice from the recommended list of energy conserving practices.
2	Number of energy audits conducted.
3	Number of graduate students working on bioenergy projects or biofuels labs.
4	Life cycle inventory methodology and data for row crops for greenhouse gases.
5	Number of N-StaR samples processed.
6	Number of new assessment and management tools developed, including models and measurements of greenhouse gas emmisions
7	Number of current year citations of climate related publications.
8	Number of program participants who indicate a change in behavior, based on lessons learned during Environment, Energy & Climate programs.
9	Number of participants (both youth and adult) indicating new knowledge gained as a result of Environment, Energy & Climate programs.
10	Number of program participants indicating new knowledge of water quality and conservation best management practices
11	Number of producers who changed or adopted new production and/or conservation management practices or technologies
12	Number of program participants indicating the adoption or implementation of new water quality and conservation best management practices.
13	Number of clientele reporting increased knowledge of best water quality and nutrient management practices
14	Number of clientele who increased knowledge of best water conservation practices
15	Number of acres where best water conservation practices used
16	Number of acres where best water quality and nutrient management practices used
17	Number of clientele reporting increased knowledge of best storm water quality and management practices

18	Number reporting increased knowledge of woodlands management
19	Number of validations of Soil Test recommendations on-farm/on-site
20	Number of clients who increased knowledge of best poultry housing indoor air quality practices
21	Number of studies on new soil amendments for improved plant growth
22	Number of research studies on methane gas emissions from rice
23	Number of clientele increasing knowledge of new wildlife foodplot concept

Outcome #1

1. Outcome Measures

Number of individuals adopting one practice from the recommended list of energy conserving practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management

123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation
605	Natural Resource and Environmental Economics

Outcome #2

1. Outcome Measures

Number of energy audits conducted.

Not Reporting on this Outcome Measure

Outcome #3

1. Outcome Measures

Number of graduate students working on bioenergy projects or biofuels labs.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Use of conventional fossil fuels is problematic because of uncertain future supplies, uncertain costs of these fuels, concentration of major fuel supplies in parts of the world which are politically unstable, and the cumulative effects of the release of carbon from the consumption of these resources. Biomass represents a renewable fuel source that can be harvested annually from available solar energy with minimal net carbon release. Algae growth can potentially capture many times more energy (per year per acre) than any other energy crop. Algae can also utilize nutrients from wastewater or from natural waters containing excess nutrients. Algae growth provides biological treatment and water quality improvement of the influent flow. Hence, algae production represents a potentially sustainable energy source.

What has been done
Biological and Agricultural Engineers are investigating systems to produce algae using wastewater from swine production to yield biomass feedstock for biofuel production. The system

grows attached periphytic algae in an open flow-way with a continual stream of the inlet swine effluent. Experiments conducted at the UA Swine Grower Unit,Savoy Arkansas used undiluted swine effluent at varied flow rates and surging modes in an attempt to identify optimal growth conditions.

Results

The algae flow way at Savoy is a premier algae research facility to test inland, freshwater periphytic algal productivity at mid-latitudes. The technology employed is scalable to larger areas that would be needed to produce enough biomass to feed large-scale biofuel refineries. The research will quantify the productivity of the systems and fine-tune production strategies. Research results will provide data needed to perform objective economic analyses of the life cycle costs and environmental impacts of the proposed technology.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
511	New and Improved Non-Food Products and Processes

Outcome #4

1. Outcome Measures

Life cycle inventory methodology and data for row crops for greenhouse gases.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

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
112	Watershed Protection and Management

Outcome #5

1. Outcome Measures

Number of N-StaR samples processed.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4500

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Arkansas rice producers have relied on soil test recommendations for applying Nitrogen to the crop which are based on response curves from limited test sites. Scientists have been seeking a site specific-test for making N recommendations in rice. N-StaR is a unique, field specific test which identifies the available N from soil samples submitted to the University of Arkansas N-STaR Soil Testing Lab. Recommendations from N-STaR may reduce N rate recommendations significantly without sacrificing yield, thus saving money and potentially reducing N losses to the environment.

What has been done
The Division of Agriculture's soil fertility team were the first to identify a novel method of soil testing and analysis to customize N recommendations on silt loam soils of Arkansas. A series of laboratory experiments and field trials led to the development of N-STaR (Nitrogen-Soil Test for Rice), a field-specific soil N test for rice in Arkansas. N-STaR is a soil-based N test that quantifies the N that will become available to rice during the growing season. Using a steam distillation procedure and analyzing an 18? deep soil sample (in contrast with a typical 4? sample), researchers were able to accurately predict the N needs of rice produced on silt loam soils 89% of

the time. N-STaR samples submitted by rice growers ensure proper N recommendations to achieve optimum rice yields on a field-specific basis. N-STaR recommendations should optimize rice yields on all fields, but yields can be increased substantially where native soil N is very high or very low. N-STaR has been available for rice produced on silt loam soils in Arkansas for the 2012 rice crop. N-STaR for clayey soils was on a limited release in 2014 and is now available for all soils in Arkansas.

Results
N-STaR has been adopted quickly by Arkansas rice producers. In 2012, 2500 N-STaR samples were submitted for analysis. The number of N-STaR samples has increased to 3300 in 2013 and 4500 in 2014, but each year these samples are coming from new areas which significantly increases the scope of N-STaR?s impact on Arkansas rice production. ?More than half of the N-STaR recommendations have called for reduced N rates, making the program an economic and environmentally sustainable practice,? says Roberts.
The success of N-STaR technology in rice has led researchers to explore similar programs targeting wheat and corn in Arkansas.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships

Outcome #6

1. Outcome Measures

Number of new assessment and management tools developed, including models and measurements of greenhouse gas emmisions

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Number of current year citations of climate related publications.

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual

2014 17

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Sustainable energy developed by biochemical deconstruction of feedstocks into sugars, then fermented to biobased fuels or chemicals, requires pretreatment of biomass prior to enzymatic hydrolysis. Two approaches are: 1) plant secondary metabolites are extracted prior to pretreatment and tested for antimicrobial and antioxidant properties. In addition of providing a value-added slipstream, the extraction of secondarymetabolites could decrease the toxicity of pretreatment hydrolyzates, and 2) biomass pretreatment, specifically, determining which of the pretreated-generated compound(s) inhibit enzymatichydrolysis. These inhibitory compounds include, but are not limited to, furfural, acetic acid and formic acid, and lignin-derived phenolic compounds, and oligomers. The listed inhibitory compounds inhibit the sugar release step, which, in turn, impedes the conversion of biomass into biofuels or other biobased products. Understanding how to release the sugars from biomass, without producing the plethora of inhibitory compounds, is critical for maximizing biofuel and biobased production yields.

What has been done

Sweetgum and loblolly pine have been tested for inhibitory activity of food safety related microorganisms and inhibition of low density lipoprotein oxidation. Our long-term goal is to develop extraction procedures that enable the production of value-added slipstreams. In terms of pretreatment hydrolyzate characterization, our group is studying herbaceous (switchgrass), agricultural residue (rice straw), and wood (poplar, pine and sweetgum) biomass. We pretreat in dilute acid or hot water and enzymatically hydrolyze the biomass, calculate the sugar recovery, and track the release of inhibitory compounds. We are determining the effect of these inhibitory compounds on the enzymatic hydrolysis system, namely, endo-cellulase, exo-cellulase and β-glucosidase. Our long-term goal is to determine which compounds are key players in causing inhibition to the enzymatic system, and through pretreatment processing conditions minimize their release.

Results

The payoff is quite important in the sense, that the creation of value-added slip streams, the increase of sugar release and decrease of inhibitory compound concentration(s) will set the stage for better use of our biomass resources. In other words, more biobased fuels or chemicals will be produced from a said amount of feedstock.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
123	Management and Sustainability of Forest Resources
204	Plant Product Quality and Utility (Preharvest)
511	New and Improved Non-Food Products and Processes
605	Natural Resource and Environmental Economics

Outcome #8

1. Outcome Measures

Number of program participants who indicate a change in behavior, based on lessons learned during Environment, Energy & Climate programs.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	624

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Division of Agriculture scientists received funds from Arkansas Governor Mike Beebe to conduct an in-depth case-study of a newly permitted hog farm in the Buffalo National River watershed.

What has been done
A multidisciplinary team is assessing the impacts of the operation of the C&H Farm at Mt. Judea, Newton County, on sustainable on-farm nutrient management, Big Creek, and Buffalo Rivers. The research project is evaluating the sustainable management of nutrients from the C&H Farm operation.
The study includes the following major tasks:
a.Monitor the fate and transport of nutrients and bacteria from land-applied swine effluent to pastures.
b.Assess the impact of farming operations (effluent holding ponds and land-application of effluent) on the quality of critical water features on and surrounding the farm including springs, ephemeral streams, creeks and ground water.
c.Determine the effectiveness and sustainability of alternative manure management techniques including solid separation that may enhance transport and export of nutrients out of the watershed.

Results
A total of 455 water, 460 soil, 62 manure slurry, and 25 forage samples have been collected and analyzed for a suite of constituents by the Big Creek Project since its inception in September, 2013. Despite the large number of samples collected and analyzed, a longer monitoring period is needed to reliably determine if operation of the C&H Farm is or is not having an impact on Big Creek water quality. Scientific consensus suggests that a minimum of five years of monitoring is

needed.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation
141	Air Resource Protection and Management

Outcome #9

1. Outcome Measures

Number of participants (both youth and adult) indicating new knowledge gained as a result of Environment, Energy & Climate programs.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1441

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Under State legislation passed in 1999, all individuals referring to themselves as foresters and providing assistance to private forest landowners must be registered with the AR State Board of Registered Foresters. Statewide, there are approximately 490 registered foresters. Each must complete eight hours of continuing education a year to remain registered.

What has been done
The Arkansas Forest Resources Center Registered Forester Education program works to fulfill these educational requirements of foresters in particular and all other professionals in general. The program also delivers education to other professionals including attorneys, accountants, natural resource managers, county agents, landowners and other Extension professionals.

Each year UA State and county faculty members, working with the AR State Board of Registration for Foresters and the Society of American Foresters, coordinate several conferences targeting the continuing education needs of registered foresters. In FY2014, 3 Registered Foresters Workshops were held and attended by 420 registered foresters from Arkansas and surrounding States and reached more than 90% of all foresters registered with the AR State Board of Registration for Foresters. The number of forest acres managed by these foresters was reported to be over 180,932 acres.

Results
Although the specific topics in each of the three conferences varied, on-site surveys indicate that 65% or 273 participants gained new knowledge as a result of attending the conference.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation
204	Plant Product Quality and Utility (Preharvest)
511	New and Improved Non-Food Products and Processes
605	Natural Resource and Environmental Economics

Outcome #10

1. Outcome Measures

Number of program participants indicating new knowledge of water quality and conservation best management practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	651

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
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation
511	New and Improved Non-Food Products and Processes

Outcome #11

1. Outcome Measures

Number of producers who changed or adopted new production and/or conservation management practices or technologies

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Crop residue burning is an inexpensive and effective method to remove excess residues to control weeds and pests, facilitate planting and sometimes double crop in the southern region of the United States, including the state of Arkansas. However, it contributes to emissions of air pollutants, for example, particulates, carbon monoxide and others, impacting air quality and public health. Since no permit is required to conduct field burning in Arkansas, neither the magnitude of residue burning as a crop residue management method, nor the contribution to air quality is fully understood.

What has been done

This study aims to derive emissions using remote sensing-based techniques to quantify burned area and active fire activities with high temporal resolution in the state. A variety of available satellite-based products have been compared. The crop-specific emissions will be calculated using the high resolution crop data layer maps from USDA. Meanwhile, a state-wide producer survey is on-going to reveal the current crop residue management practices and reasons of the practices. With sufficient sample size, the survey results can potentially be compared with results from remote sensing-based method.

Results
Results of this research will contribute to the temporal and spatial estimation of emissions associated with crop residue burning. A development of the emission estimation will allow air quality modeling research to reveal the relative contribution of residue burning to air quality and potential improvement of any emission reductions.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation
141	Air Resource Protection and Management
511	New and Improved Non-Food Products and Processes
605	Natural Resource and Environmental Economics

Outcome #12

1. Outcome Measures

Number of program participants indicating the adoption or implementation of new water quality and conservation best management practices.

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	25

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The State of Arkansas adopted effects-based water quality standards in 2012 to protect Beaver Lake from accelerated eutrophication. The standards state that the growing season geometric mean chlorophyll-a (chl-a) concentration shall not be greater than 8 µg/L and that the annual average secchi transparency (ST) shall not be less than 1.1 m in Beaver Lake near Hickory Creek. These standards were adopted based on the recommendation of a working group that used a weight of evidence approach to derive the standard recommendations. However, an important missing component of the standard development process, and the adopted numeric standards, was the frequency and duration at which these standards must be met in Beaver Lake at Hickory Creek.

What has been done
In collaboration with Dr. Thad Scott of the University of Arkansas System Division of Agriculture, we developed a single recommendation and list of separate considerations that could be used by the State of Arkansas in developing an assessment plan for the eutrophication standards in Beaver Lake. We utilized the methodology from the original standard development to re-create their analysis and quantify the risk of exceeding the water quality standards in Beaver Lake at Hickory Creek. The final report outlined this specific recommendation and other considerations in detail.

Results
The Beaver Watershed Alliance, who funded the study, forwarded our final report to the Arkansas Department of Environmental Quality (ADEQ). ADEQ is considering our recommendation in the development of the official state assessment methodology for the eutrophication standards on Beaver Lake and will be proposing this to the US Environmental Protection Agency for final approval.

4. Associated Knowledge Areas

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

Outcome #13

1. Outcome Measures

Number of clientele reporting increased knowledge of best water quality and nutrient management practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	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
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #14

1. Outcome Measures

Number of clientele who increased knowledge of best water conservation practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	182

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
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

Outcome #15

1. Outcome Measures

Number of acres where best water conservation practices used

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	752

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

111	Conservation and Efficient Use of Water
112	Watershed Protection and Management

Outcome #16

1. Outcome Measures

Number of acres where best water quality and nutrient management practices used

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	700

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
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #17

1. Outcome Measures

Number of clientele reporting increased knowledge of best storm water quality and management practices

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	965

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
133	Pollution Prevention and Mitigation

Outcome #18

1. Outcome Measures

Number reporting increased knowledge of woodlands management

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	52

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The number of farms, ranches, and forest lands managed by women has increased dramatically over the past few decades. Many of the women owning woodlands are unfamiliar with good forest management practices and the marketing strategies.

What has been done
The UA Arkansas Forest Resources developed a Women Owning Woodlands Program beginning in 2009. During FY14, 32 forest landowners including 25 women, attended a workshop and woodland tour held in March 2014. Landowners participated in a workshop led by Landowner Legacy Communication, a family operated education organization, during which they learned how to develop a communications plan, identify topics and strategies important to successful intergenerational planning, and the basics of a land transfer plan.

Results
Evaluation results suggest that participants' understanding of the need to family meetings related to asset transfers increased by 41%; the understanding of the importance of ground rules in family meetings increased by 38%, and recognition of the importance of family communication increased by 42%. Participants also toured a family forest with the tour during which they learned about the importance of forest management planning, prescribed fire, and hunting leases. Several couples including mothers and daughters attended the one-day workshop. A daughter who brought her mother with her to the workshop, wrote that her mother developed a better understanding of forest stewardship and the necessity of planning, both for the forest and for intergenerational land transfer, as a result of attending the workshop.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation
511	New and Improved Non-Food Products and Processes

605 Natural Resource and Environmental Economics

Outcome #19

1. Outcome Measures

Number of validations of Soil Test recommendations on-farm/on-site

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	16

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Soil samples are collected by farmers and consultants, submitted to a soil-test laboratory for analysis and the report along with fertilizer recommendations is sent back to the client. Soil chemical analyses have been used as the basis for phosphorus (P), potassium (K) and micronutrient recommendations for nearly 100 years and this process represents the best possible science and technology for estimating fertilizer needs to ensure crop nutrient requirements are met. Unfortunately, the accuracy of interpretation of soil analyses and eventually the fertilizer recommendations have seldom been validated.

What has been done
Our ongoing research sought to validate the accuracy of existing P and K fertilizer recommendations for irrigated soybean. Sixteen field trials were established in 2013 and 2014 and six composite soil samples were collected from each site to determine the recommended P and K rates. Each trial contained six P and K fertilizer treatments which included a no P or K treatment, the recommended rates of P and K rates, and alternate combinations of P and K to examine the accuracy of the rate calibration.

Results
The trial yield results showed that existing fertilizer recommendations based on soil-test P and K accurately predicted crop response to P fertilization in 75% and 78% of the trials when significance was interpreted as significant at the 0.10 level and results were weighted across soil-test categories (e.g., suboptimal, medium and optimal or greater fertility). The accuracy of the implemented K recommendations improved to 84% when the level of significance was reduced to 0.25, but did not change for P. For both nutrients, the accuracy of the recommendations varied among the three fertility categories. Accuracy was lowest (25-33% at the 0.10 significance level)

for soils that had suboptimal fertility levels indicating that the soil-test values that define the existing fertility levels need to be redefined to improve accuracy

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
111	Conservation and Efficient Use of Water
112	Watershed Protection and Management
123	Management and Sustainability of Forest Resources
133	Pollution Prevention and Mitigation

Outcome #20

1. Outcome Measures

Number of clients who increased knowledge of best poultry housing indoor air quality practices

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	100

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
141	Air Resource Protection and Management

Outcome #21

1. Outcome Measures

Number of studies on new soil amendments for improved plant growth

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Biochar has the potential to turn waste products generated in important agricultural sectors in Arkansas (e.g. poultry litter and pine wood waste) into beneficial soil amendments. Biochar, the charcoal product of anaerobic thermal decomposition of biomass, has shown promise as a soil amendment in tropical soils, but results of biochar research on crop growth and nutrient availability have varied in temperate zone soils. Feedstock used to produce biochar, biochar production conditions and final product characteristics, rates of biochar application, and soils have all varied across research studies, adding to the confusion about how biochar impacts the agroecosystem. For producers to benefit from biochar amendments to soil, there needs to be better understanding of when and how biochar can be beneficial.

What has been done
Laboratory, greenhouse, and field experiments were conducted to investigate potential mechanisms for biochar impacts on plant growth and crop production and soil properties. A laboratory experiment investigated the relationship between soil water potential and water content across a wide range of moisture conditions with one of two types of biochar (poultry litter or pine wood) mixed into soil at rates equal to 0, 5, and 10 Mg ha-1. A greenhouse experiment investigated mycorrhizal infection, soil nutrient availability, and corn (Zea mays L.) growth in the presence of poultry litter biochar (0, 5, and 10 Mg ha-1) and nitrogen (N) and phosphorus (P) fertilizer (0, half, and full rates). A field experiment focused on soil biological and chemical properties and corn yield under field conditions in the first growing season after biochar addition (0, 5, and 10 Mg ha-1) and nitrogen (N) fertilization (0, half, and full rates).

Results
In both the greenhouse and field experiments, biochar improved plant characteristics. In the greenhouse, there was a more extensive root system and greater aboveground biomass with the highest rate of biochar used in the study (10 Mg ha-1). In the field, the greatest yield (when

combined with fertilizer) and the greatest nitrogen use efficiency occurred with the highest biochar rate (10 Mg ha-1). There were few effects on microbial and soil nutrient properties. While analysis of the laboratory data indicated that the poultry litter biochar had greater water retention capacity across a wide range of water potentials than the pine wood biochar, water retention capacity was unaffected by application rate. Furthermore, results indicated biochar may not generally improve water retention at all water contents with one-time application rates. Taken together, results illustrate that mechanisms allowing biochar to provide agronomic benefit still need further investigation. However, these initial results suggest that biochar has, at the proper rate and in combination with fertilizer, the potential to improve agronomic performance in the midsouthern U.S.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
133	Pollution Prevention and Mitigation
203	Plant Biological Efficiency and Abiotic Stresses Affecting Plants

Outcome #22

1. Outcome Measures

Number of research studies on methane gas emissions from rice

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Methane (CH4) is one of the major greenhouse gases and has a global warming potential many times greater than carbon dioxide. Methane production occurs under anaerobic soil conditions, such as those associated with rice production. Due to the anaerobic conditions that develop in soils used for flooded rice production, along with the global extent of rice production, some sources believe that rice cultivation contributes to global anthropogenic CH4 emissions. The

current U.S. estimates of CH4 emissions from rice are based on data from all of the major rice-growing regions, however, there is a general lack of data representing Arkansas cultural practices and a lack of data from studies conducted in Arkansas specifically.

What has been done
Field studies were conducted in 2012 and 2013 at the Northeast Research and Extension Center in Keiser on a Sharkey clay to quantify season-long methane emissions from conventional and hybrid rice varieties grown following rice or following soybean. A chamber-based gas sampling procedure was used to directly quantify methane fluxes on a weekly basis over the growing season from flooding to after harvest.

Results
Season-long methane emissions are generally substantially lower clay soils than from silt-loam soils, lower from hybrid than from conventional, pure-line cultivars, and lower from rice following soybean than rice following rice. The low emissions measured, coupled with the magnitude of Arkansas rice production and extent of production on clay to clay loam soils in Arkansas, indicates that CH4 emissions from mid-southern U.S. rice cultivation may be substantially overestimated and the reported emissions factor used by the Environmental Protection Agency likely needs to be revised to account for more known factors that affect methane emissions from rice production (i.e., soil texture, cultivar, and previous crop).

4. Associated Knowledge Areas

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

Outcome #23

1. Outcome Measures

Number of clientele increasing knowledge of new wildlife foodplot concept

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Arkansas and the southeastern U.S., hunters spend significant time and money planting food plots for harvesting deer. An alternative is native food plots amended with boiler ash, a byproduct of timber mills.

What has been done
Demonstrations of native food plots and boiler ash applications were viewed at a county agriculture agent in-service training and landowner field days at the Southwest Research and Extension Center. The concept has also been presented (a) statewide in landowner meetings and other in-service trainings, (b) regionally at the Missouri Natural Resources Conference, and (c) nationally in the Journal of the National Association of County Agriculture Agents.

Results
Although native food plots are gaining traction nationally, changing the cultural norm will be difficult to overcome. For example, a landowner from Scott County spoke positively of native vegetation and prescribed burning, yet even he plants a traditional food plot near his deer stand.

4. Associated Knowledge Areas

KA Code	Knowledge Area
102	Soil, Plant, Water, Nutrient Relationships
123	Management and Sustainability of Forest Resources
204	Plant Product Quality and Utility (Preharvest)
511	New and Improved Non-Food Products and Processes
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

The outlook for forestry and forest products, at least in the short term, does not provide incentive for Arkansas forest landowners to make substantial investments in improvements of forest land. In Arkansas, where very little infrastructure related to biofuels has evolved, there is little incentive for producers of biofuels feedstocks to invest in alternative biofuels crops and related equipment. Interest in growing alternative biofuel crops in the state today is low, where traditional row crops enjoy reasonable profitability and the short term outlook for oil prices does not favor investment in biofuel alternatives.

The Big Creek research effort led by the Division's team of water resource protection scientists is authorized to continue monitoring water quality, including nutrients and bacterial concentrations, in a sensitive watershed, but the state funding for this long-term effort is uncertain.
The emergence of a viable and dynamic Carbon Market could have a big impact among Arkansas forestland and cropland managers.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

The Center for Agricultural and Rural Sustainability (CARS) completed a $3 million National Sustainable Strawberry Initiative, funded by the Wal Mart Foundation, in 2013. CARS faculty monitored the progress of 20 research and extension projects aimed at reducing the environmental impact on US strawberry production while increasing opportunities for production outside the traditional production areas. The projects were conducted July 2013 to June 2014. Project leaders submitted quarterly reports, created project videos, contributed to a program blog and shared information about their research with growers at workshops and field days. Project outputs and outcomes were shared through various media outlets including the program website, blog, Facebook, Twitter, SmugMug, Slideshare and YouTube sites. resulting in over 300,000 consumers, growers, advisors, educators, scientists and students informed by the NSSI project. The Wal Mart Foundation was sufficiently asked CARS to administer a $1 million Phase II of the NSSI in 2014.
The Discovery Farm Program is addressing the Best Practices for sustainable agricultural productionon nine farms in Arkansas. Discovery Farm uses edge-of-field monitoring of both the quantity and quality of inflow and runoff from fields on real, working farms. Data collected quantifies nutrient and sediment losses to determine off-farm environmental impacts and addresses long-term sustainability and profitability. The nine Discovery Farms strategically placed across the State to represent the predominant livestock and row crop enterprises. Discovery Farms showcase stewardship through website, field days, tours and through oral presentations throughout the State at various events. Discovery Farms generate opportunities for education and outreach efforts including: 1) Presentations made to more than 3,000 people at various events in Arkansas, 2) Conducted 15 field tours during the last three years for the Joint House/Senate Agriculture Committee, Arkansas Congressional staffers, Wal-Mart Sustainability Coordinators from eleven nations, Arkansas Farm Bureau, Natural Resources Conservation Service (NRCS), United Soybean Board Sustainability Workgroup, and a Multi-State (Seven States) Discovery Farm Tour.
The N-STaR samples submitted to the University of Arkansas N-STaR Soil Testing Lab during 2013 were categorized by county and soil texture. Samples were received from 27 Arkansas counties. The samples received were from 171 silt loam fields and 137 clay fields. In total the lab analyzed roughly 4,000 soil samples during the 2013 growing season. The N-STaR N rate recommendations for these samples were then compared to the producer's estimated N rate or the standard Arkansas N rate recommendation of 150 lb N/acre for silt loam soils and 180 lb N/acre for clay soils and divided into three categories--those with a decrease in recommendation, no change in recommended N rate, or an increase in the N rate recommendation. Samples classified as silt loams indicated a reduced N rate for 60% of the fields analyzed and the average N rate reduction was 25 lb N/acre, whereas clay soils resulted in reduced N rates for 70% of the fields tested with an average reduction in the N rate of 39 lb N/acre. These results from the 2013 season indicate the potential to reduce N rates for rice produced on both clay and silt loam soils while still maintaining yield and producer profitability. One of the greatest testaments to the N-STaR program came in

2013, when the N-STaR N rate recommendations were used in all of the Rice Research and Verification Program Fields. In the southern portion of Arkansas 8 of the 11 RRVP fields had significantly lower N rates using the N-STaR program than the producer would have traditionally applied based on soil texture, variety and previous crop. For those fields that indicated a reduced N rate the average reduction was 35 lb N/acre, but yields were drastically higher than the state average coming in at 196 bushels/acre. The inclusion of N-STaR in the RRVP is the first field-scale "real world" test for the program and based on 2013's yield results, it passed with flying colors.
5

Key Items of Evaluation

The number of N-StaR samples processed has increased every year since inception, indicating growing demand for the program and broader application of the research. It is unlikely that farmers will go to the inconvenience of taking and submitting N-S-STaR samples without implementing the recommendations.
The number of acres where best water conservation practices used and number of acres where best water quality and nutrient management practices used are both indicators of successful research and Extension impacts. These numbers may only reflect a fraction of the applications, but growing numbers indicates broader application.
The number of on-farm/on-site demonstrations and applied research trials indicates demand for information and willingness to adopt new practices.
Number of on-site, farm visits or one-on-one consultations is and indicator of interest as well as trust-in- source or competence.

V(A). Planned Program (Summary)

Program # 3

1. Name of the Planned Program

Access to Safe & Nutritious Food

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
501	New and Improved Food Processing Technologies	0%		10%	
502	New and Improved Food Products	5%		12%	
503	Quality Maintenance in Storing and Marketing Food Products	5%		1%	
504	Home and Commercial Food Service	5%		6%	
512	Quality Maintenance in Storing and Marketing Non-Food Products	0%		1%	
701	Nutrient Composition of Food	0%		3%	
702	Requirements and Function of Nutrients and Other Food Components	5%		6%	
703	Nutrition Education and Behavior	40%		8%	
704	Nutrition and Hunger in the Population	20%		3%	
711	Ensure Food Products Free of Harmful Chemicals, Including Residues from Agricultural and Other Sources	0%		11%	
712	Protect Food from Contamination by Pathogenic Microorganisms, Parasites, and Naturally Occurring Toxins	5%		31%	
721	Insects and Other Pests Affecting Humans	0%		5%	
724	Healthy Lifestyle	10%		3%	
806	Youth Development	5%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	51.1	0.0	82.0	0.0
Actual Paid	71.1	0.0	63.9	0.0

Actual Volunteer	7.1	0.0	3.5	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**
919502	0	337845	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
935439	0	5726592	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
6776366	0	1076412	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

According to Centers for Disease Control and Prevention (BRFSS), in 2013, 69.9% of adults (age 18 and over) in the state of Arkansas were classified as either overweight or obese. In 2013, Arkansas was the only state in the US to show an increase in obesity rates, which now makes Arkansas the third most obese state in the United States.
Five of the ten leading causes of death in the U.S. have been linked to diet and lifestyle as contributing factors. Poor diet and obesity remain common problems especially among under-served populations. The Extension Food and Nutrition programs focus on: adoption and maintenance of healthy lifestyles for chronic disease prevention including regular physical activity and healthy eating. The food and nutrition program identifies and promotes evidence-based policies and practices that will reduce the incidence of chronic disease.
The nutrition education program responds to the nutritional issues and needs of Arkansans across the lifespan and socioeconomic spectrum. Participants gain knowledge and skills that will help them adopt appropriate behaviors to prevent or delay lifestyle-related chronic diseases.
Adult Arkansans with diabetes participate in the Extension's diabetes education program; those wanting to improve weight and other health outcomes participate in Extension healthy weight programs; those wanting to learn healthy food preparation techniques to prevent or manage chronic diseases participate in cooking schools that will help them choose and prepare foods rich in health-promoting phytonutrients and low in fat, saturated fat added sugars and sodium. In addition, professors at the University of Arkansas are conducting research in the areas of obesity and diabetes prevention in order to help reduce the incidence of these disease within the state and nationally.
Division of Agriculture faculty develop, evaluate, and disseminate education programs and curricula, incorporating new research and emphasizing healthy lifestyles to prevent and/or reduce childhood obesity. Programs Include but are not limited to:

- Supplemental Nutrition Assistance Program Education (SNAP- Ed) Adults and Youth
- Expanded Food and Nutrition Education Program (EFNEP) Adults and Youth
- Reshape Yourself Healthy Weight Program
- Walk Across Arkansas Youth
- BodyWalk
- Adventures in Grandparenting

Division of Agriculture faculty conduct novel research to determine the impact of diet and food composition and functional food components on body weight.

The Division of Agriculture faculty and staff develop, evaluate and disseminate education and curricula incorporating research and teaching. Programs include:

- Quarterly HACCP Roundtable meeting
- HACCP workshops
- Food safety and preservation workshops
- Better Process Control School
- ServSafe workshops
- Culinary arts training for food industry personnel
- Online distance education in food safety and manufacturing
- Assistance to small food companies and entrepreneurs in the form of services, workshops, and consulting.

Research activities in food safety include work to better understand the ecology of food pathogens, improve food processing systems to minimize food pathogens and to improve detection systems for Listeria, Salmonella, EColi and other major food pathogens.
Research activities in food chemistry and food processing include work to (1) improve the quality of rice and improve rice processes, (2) expand the utilization of soybeans and its co-products, (3) assess the health benefits associated with processed specialty crops and (4) improve the sensory quality of processed foods.

2. Brief description of the target audience

Youth

School personnel

Parents

Adults

Grandparents

Child Care Providers

Researchers
Food Manufacturers

Farmers (Farmer's Markets)
Entrepreneurs and Restaurants

Food Service Employees and/or Food Handlers

Employers & Employees

Health Professionals

Consumers

3. How was eXtension used?

eXtension was not used in this program

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	117460	526682	197293	6388

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

Patent Applications Submitted

Year: 2014

Actual: 2

Patents listed

Use of Lactic Acid Bacteria to Reduce Pathogens and as a Bio-Sanitizer. Inventors: Crandall, Philip / Ricke, Steven / Ware, DouglasUS Patent #14/236,542.

Use of Beta Resorcylic Acid and OtherGRAS Compounds for Control of Foodborne Pathogens in Poultry Products. US 62/024,234. Inventors: Ann Donoghue, Dan Donoghue & Kumar Venkitanarayanan

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	2	53	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- # of 4-H/Youth Food, Nutrition and Physical activity programs delivered related to eating healthy and being active

Year	Actual
2014	31363

Output #2

Output Measure

- # of youth contacts in 4-H/ Youth Food, Nutrition, and Physical Activity programs related to eating healthy and being active

Year	Actual
2014	184907

Output #3

Output Measure

- # of adult clientele contacts from educational events (educational classes, workshops, group discussions, one-on-one interventions, demonstrations and other educational activities) related to eating healthy and being active

Year	Actual
2014	58488

Output #4

Output Measure

- Number of Online Master of Agriculture (Food Safety Emphasis) students enrolled in courses

Year	Actual
2014	30

Output #5

Output Measure

- Number of projects focused on increased understanding of the ecology of fecal indicators and pathogens

Year	Actual
2014	2

Output #6

Output Measure

- Number of projects focused on increased understanding of preharvest and postharvest processes impacts on microbial and chemical threats

Year	Actual
2014	5

Output #7

Output Measure

- Number of projects focused on novel food processing technologies

Year	Actual
2014	4

Output #8

Output Measure

- Number of projects focused on improving the quality of food

Year	Actual
2014	10

Output #9

Output Measure

- Number of projects focused on the impact of food on nutrition and health

Year	Actual
2014	7

Output #10

Output Measure

- Total competitive federal Grant $ for program area

Year	Actual
2014	2774597

Output #11

Output Measure

- Total other competitive grant $ for program area

Year	Actual
2014	30750

Output #12

Output Measure

- Number of participants in educational programs leading to graduation from the Better Process Control School

Year	Actual
2014	97

Output #13

Output Measure

- Number of participants in educational programs leading to ServSafe certification for food handlers

Year	Actual
2014	471

Output #14

Output Measure

- Number of participants in quarterly HACCP roundtables
  Not reporting on this Output for this Annual Report

Output #15

Output Measure

- Number of culinary workshops for food technologists

Year	Actual
2014	4

Output #16

Output Measure

- Number of participants in culinary workshops for food technologists leading to certification as Certified Culinary Scientist

Year	Actual
2014	34

Output #17

Output Measure

- Number of culinary workshop participants completing 120 hours of required contact time for the Certified Culinary Scientist recognition

Year	Actual
2014	11

Output #18

Output Measure

- Number of food processing laboratory services provided

Year	Actual
2014	39

Output #19

Output Measure

- Number of nutritional labels developed

Year	Actual

2014	105

Output #20

Output Measure

- Number of food processing approvals developed (2541a)

Year	Actual
2014	12

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants receiving certification in Better Process Control
2	Number of participants receiving certification in ServSafe
3	Number of participants in other workshops related to Food Safety including HACCP, food safety, food defense, food labeling, and food microbiology workshops receiving attendance certification
4	Number of growers and producers receiving GAP certification or equivalent
5	Number of youth demonstrating improved knowledge of food safety or hand washing
6	Number of Online Master of Agriculture (Food Safety Emphasis) graduates employed in the food industry
7	Number of viable technologies developed or modified for the detection and characterization of foodborne pathogens
8	Number of viable prevention, control and intervention strategies for food borne threats in the food system
9	Culinary workshop participants passing the examination to become a Certified Culinary Scientist
10	Number of viable technologies developed or modified for improving food processing systems
11	Number of viable technologies developed or modified to improve the nutritive quality of foods
12	Number of small businesses started as a result of the food entrepreneur assistance program
13	Number of children who practice healthy eating
14	Number of children who engage in healthy levels of physical activity
15	Number of families, children, and youth who have access to healthy foods
16	Number of adult participants who reported they less often run out of food before the end of the month following completion of a nutrition education program.
17	Number of participants who adopted one or more food/nutrition practice

18	Number of studies conducted related to factors affecting childhood obesity

Outcome #1

1. Outcome Measures

Number of participants receiving certification in Better Process Control

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	97

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

Number of participants receiving certification in ServSafe

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	342

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The Centers for Disease Control and Prevention estimates that each year approximately 48 million people gets sick, 128,000 are hospitalized and 3,000 die of foodborne diseases. Additional estimates provide the most accurate picture yet of which foodborne microbes cause the most illnesses in the United States. They include Salmonella, norovirus, Clostridium perfingens, and Campylobacter. Specific to Arkansas, the state has over double the desired CDC target rate for salmonellosis per 100,000 individuals.

What has been done
The University of Arkansas Division Of Agriculture Cooperative Extension Service offers a comprehensive approach to address food safety from industry to the individual. Taught in many Arkansas counties the ServSafe® Food Safety Program for Managers course provide the necessary tools for industry managers to effectively teach food service employees best practices in food safety.

Results
Over 470 individuals were trained using the ServSafe® Managers curriculum by the University of Arkansas Division of Agriculture Cooperative Extension Service. Of those participants 73% or 342 of 471 received certification which means they received a 75% or higher on a comprehensive exam covering principles of the FDA Food Code developed by the National Restaurant Association.

4. Associated Knowledge Areas

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

Outcome #3

1. Outcome Measures

Number of participants in other workshops related to Food Safety including HACCP, food safety, food defense, food labeling, and food microbiology workshops receiving attendance certification

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	36

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

Number of growers and producers receiving GAP certification or equivalent

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	0

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Over the past few decades, there has been an increase in the concern of foodborne illness resulting from the consumption of fresh produce. On average 37% of foodborne illnesses result from the consumption of produce such as melons, tomatoes, greens, and berries that do not receive a heat treatment prior to consumption. In January 2013, the FDA published proposed regulations on Good Agriculture Practices as part of the Food Safety Modernization Act that require certain field operations that would prevent the fecal contamination of fresh produce. The comment period was originally scheduled to end May 15 but has been delayed several times (Sept 15 and Nov 15). This past year, the FDA opened a Supplemental Rule for amending the regulations with final regulations expected to be published in August 2015.

What has been done
The Institute of Food Science & Engineering at the University of Arkansas has previously developed a voluntary GAP program for small scale growers such as those who sell at farmers markets and to schools in the ?Farm to School? program. This program is currently being used throughout Arkansas mainly for the ?Farm to School Program. We plan to continue to conduct training sessions in 2015 mainly for small scale growers that sell to farmers markets. Also in 2015, we plan to conduct a train-the-trainer workshop for county agents with the Produce Safety Alliance (PSA) in Fort Smith to facilitate the FDA requirements for large scale produce growers.

Results
Many small scale produce growers have been requesting assistance in developing a voluntary GAP program in order to be able to sell at farmers markets and to schools. This should improve the food safety of produce being sold at farmers markets and to school systems. Many large scale growers are anxious to be FDA GAP compliant however we cannot conduct training until the PSA has completed the initial tests on the curriculum and assisted the eight top produce growing states.

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

Number of youth demonstrating improved knowledge of food safety or hand washing

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5818

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Consumer food safety is a concern for everyone especially among at risk populations. At risk populations include the immunocompromised, preschool aged children and older adults. One of the best ways to prevent foodborne illness is by the simple act of hand-washing yet a large body of literature suggests that a minority of the population washes their hands after using the restroom as an example.

What has been done
The University of Arkansas Division Of Agriculture Cooperative Extension Service offers food safety education coupled to nutrition and health education. Youth nutrition and health education programming includes SNAP-Ed, EFNEP and 4-H Positive Development priority programs focused on healthy living and food security.

Results
Of the 8,585 youth reached by the University of Arkansas Division Of Agriculture Cooperative Extension Service's youth nutrition and health programs a majority gained knowledge or adopted safe food practices. Specifically, 75% or 3093 of 4271 of surveyed SNAP-Ed youth reported or demonstrated they more often practice personal hygiene such as hand washing as a result of participating in a SNAP-Ed program; 73% or 1778 of 2405 of surveyed 4-H participants reported or demonstrated they more often practice personal hygiene such as hand washing; and, 50% or 950 of 1909 EFNEP children and youth used safe food handling practices more often or gain knowledge.

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**

   Number of Online Master of Agriculture (Food Safety Emphasis) graduates employed in the food industry

2. **Associated Institution Types**

   - 1862 Extension
   - 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4

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 viable technologies developed or modified for the detection and characterization of foodborne pathogens

2. **Associated Institution Types**

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Salmonellosis is one of the most common foodborne diseases in the United States. Given that Salmonella can originate from a wide variety of food production environments, reduction of this organism at all stages of food production is critical. This project has three components designed to address this problem. Our specific research program goal reflects an integrated approach for controlling Salmonella spp. and other foodborne pathogens at all stages of food production. The relative incidence of Salmonella spp. foodborne disease continues, despite the growing body of information regarding the most common contamination routes. During its life cycle Salmonella can encounter various environmental stress conditions which may have dramatic effect(s) on its survival and virulence. Although there is considerable information regarding environmental signals that control growth and pathogenesis in animals and humans, little is known about the biology of Salmonella during food processing. Research is needed to determine the environmental factors that are critical for survival of this pathogen and therefore must be modified to prevent the early establishment of Salmonella in food processing environments and virulence expression under these conditions.

What has been done
Our current food production Salmonella spp. research projects have emphasized studies on the growth, survival and pathogenesis of the organism under conditions encountered during poultry processing. However, the success of Salmonella spp. in becoming re-established in the gastrointestinal tract of food animals during certain phases of processing indicates that Salmonella spp. can competitively interact with the dynamics of the food matrix. Based on these observations, our plan is to continue to focus on salmonellae metabolism and genetic regulation of stress responses when grown under processing conditions and determine how these overlap with expression of virulence when foodborne Salmonella spp. become pathogenic. The outcome of this research has implications not only for persistence of foodborne salmonellae in processing, but raises practical issues regarding the choices of antimicrobials as intervention steps in processing. Issues we are now pursuing include whether thermal treatment predisposes salmonellae to be more resistant to particular antimicrobials and how these conditions might influence virulence and pathogenic characteristics of salmonellae. Molecular techniques will delineate some of the phenotypic responses we have observed thus far and examine virulence expression of Salmonella under typical food production and processing conditions.

Results
Illness from Salmonella contaminated poultry is a huge problem. Despite the best efforts of the conventional poultry industry, the levels of Salmonella contamination are increasing. It is

estimated that in the U.S., Salmonella causes more than 1.3 million persons to become ill, 553 deaths and economic losses of $2.4 billion annually. A total of 5,000 foodborne illness outbreaks with a known etiology and vehicle occurred from 1990-2004. Raw chicken and chicken products were linked to 214 outbreaks of foodborne illness and of these, 195 were caused by Salmonella. One of the objectives of the Healthy People 2010 Initiative (2000) established a goal of no more than 6.8 cases of salmonellosis/100,000 persons, which is half of the baseline rate of 13.6/100,000. Unfortunately, outbreaks still occur and Salmonella-mediated foodborne illness continues to be a serious problem. There are many potential foodborne vehicles, but contaminated poultry meat has been implicated as a major contributor to salmonellosis both in the U.S. and globally.

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 #8

1. Outcome Measures

Number of viable prevention, control and intervention strategies for food borne threats in the food system

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Outbreaks from the consumption of fresh produce are a concern in the United States. The consumption of fresh produce has increased since the last 20 years because of the health trend of eating more fresh produce. Fresh produce is minimally heated or processed before consumption, which makes them a possible source of foodborne illness. The demand for preventing foodborne illness is on the increase not only from public health organizations point of view but also from an economical perspective since food recalls cause a substantial loss of money. Washing the produce is the most common protocol for disinfection in the food industry. But, pathogens like E.coli 157:H7 and Salmonella are able to survive washes by internalizing and forming a biofilm on the plant tissues. Research to disintegrate biofilms on fresh produce is scarce

while some methods such as washing with chorine and irradiation have been proven ineffective. Effective multiple-hurdle technologies are needed to disintegrate biofilms and pathogen intervention.

What has been done
Disks from Spinach leaves and cantaloupe rinds were inoculated with E. coli O157:H7/ Salmonella Typhimurium by soaking for 24 h at 25 °C in a 24-plate that contained the culture. Disks were then washed to remove non-adherent bacteria and sprayed electrostatically with organic acids. Lactic acid and Malic acids at varying concentrations of 1.0%/2.0%/3.0/4.0 were used alone and in combination. Log reductions were determined to evaluate the best treatment that reduced the attached bacteria. Crystal violet assay and confocal microscopy were used to quantify bacterial attachment on spinach and cantaloupe. Organic acids were electrostatic sprayed to demonstrate biofilm disruption, studied using the crystal violet assay.

Results
The significance of this research is the utilization of electrostatic spray system for delivery of inexpensive organic acids as antimicrobials. The malic and lactic acids used in this research have GRAS (generally recognized as safe) status. Electrostatic spray of natural antimicrobials diminished the bacterial number as well as disrupted the biofilms formed by major human food-borne pathogens on spinach and cantaloupe surfaces. The bacterial populations were reduced by 4.1 logs, while disruption of biofilm has significant impact in minimizing cross contaminations during packaging of spinach and cantaloupe. Furthermore, this multiple hurdle technology has demonstrated effective decontamination methods with high potential for adoption in the produce packaging industry. This will significantly promote acceptance of natural antimicrobials among consumers, while providing enhanced economic benefits to the food industry.

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 #9

1. Outcome Measures

Culinary workshop participants passing the examination to become a Certified Culinary Scientist

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual

2014	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
504	Home and Commercial Food Service

Outcome #10

1. Outcome Measures

Number of viable technologies developed or modified for improving food processing systems

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The attractive red color of strawberries is due to elevated levels of anthocyanin pigments, primarily pelargonidin derivatives. Unfortunately, color deterioration coincides with anthocyanin losses when strawberries are processed into preserves and jams, juices, and purees, and these detrimental changes persist during storage of strawberry products at ambient temperature. Color instability in strawberry products has also been attributed to enzymatic browning, Maillard browning, ascorbic acid catalyzed degradation, and polymerization reactions of anthocyanins with other phenolics, and most of these reactions are promoted by oxygen. Exclusion of oxygen throughout processing and storage of strawberry puree may be a viable technology to improve anthocyanin and color retention.

What has been done

Fresh strawberries were vacuum-deaerated and processed into puree in a glove box under nitrogen or carbon dioxide atmosphere. Control samples were processed in the same manner in the glove box under air. All samples were pasteurized in boiling water at 100oC for 10 min and then stored in the dark at 25oC. Three jars of puree from each treatment, control (air), carbon dioxide and nitrogen were analyzed one day after processing and after 2, 4, 6, and 8 weeks of storage for color, anthocyanin composition by HPLC and percent polymeric color. Purees prepared under carbon dioxide or nitrogen retained more anthocyanins (75% and 82%, respectively) following pasteurization than samples prepared under air (60% and 72%), respectively. The protective effect of oxygen exclusion on anthocyanin stability persisted throughout eight weeks of storage at 25oC with purees prepared under carbon dioxide or nitrogen each showing 23% retention, while purees prepared under air showed only 7% and 10% retention. Purees prepared under carbon dioxide or nitrogen also had greater color stability evident by lower L*, hue and percent polymeric color and greater chroma values than puree processed under air over storage.

Results

Processing strawberry puree under carbon dioxide or nitrogen atmosphere resulted in greater retention of anthocyanins compared to puree processed under air. Purees processed under carbon dioxide or nitrogen also retained more anthocyanins and had better color stability evident by lower L*, hue and percent polymeric color and greater chroma values than puree processed under air over eight weeks of storage at 25oC. Strict oxygen exclusion during berry processing appears to be a viable technology to improve anthocyanin and color stability, but additional technologies are needed to prevent anthocyanin losses that occur under anaerobic conditions during storage.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies

Outcome #11

1. Outcome Measures

Number of viable technologies developed or modified to improve the nutritive quality of foods

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Around 34.5% of adult Arkansans were recently reported as obese, which ranks Arkansas as the third most obese state in the US, behind Louisiana (34.7%) and Mississippi (34.6%). The US obesity epidemic has resulted in significant levels of obesity related diseases, such as cancer, heart disease and type-2 diabetes. Studies have shown that about three grams daily of dietary conjugated linoleic acid (CLA) confers great human health benefits in reducing the clinical indicators of these diseases, improving immune function and promoting weight loss in obese persons; yet it is difficult to obtain sufficient CLA in a typical healthy diet to realize these clinical benefits.

What has been done
In an attempt to translate our technology from the laboratory to industry, early in 2014 we adapted a steam distillation method, used in conventional oil processing, for CLA-rich oil production. In spring 2014 We met with Riceland Foods scientists and technologists when it was suggested that in order to be commercially feasible we needed to reduce production costs by: 1) using lower doses of cheaper reagents; 2) using different processing equipment that would be more commercially viable.

Results
The CLA-rich soy oil developed in our laboratory would allow consumers to obtain the clinically effective daily intake to combat obesity related diseases. A half ounce serving of 20% CLA oil would provide 3.1g CLA/day and typical 7 g serving of CLA-rich margarine will provide 0.6g CLA. Thus, 5 margarine servings will provide the required 3.2 g/CLA day with only 185 calories/day, which is well within the maximum recommended 700-980 fat calories/day. In contrast, an 8 ounce serving of beef or milk will only provide 0.27g and 0.06g of CLA, respectively.

4. Associated Knowledge Areas

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

Outcome #12

1. Outcome Measures

Number of small businesses started as a result of the food entrepreneur assistance program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
The vast majority of jobs in the United States and in Arkansas are created by small, privately held companies. It is therefore vital to create an environment and conditions to assist small businesses to develop and hire people. Assisting small food companies and entrepreneurs in technical and business issues of the food processing industry can improve the Arkansas job situation and provide additional tax revenue for Arkansas.

What has been done
The Institute of Food Science & Engineering (IFSE) and the Cooperative Extension Service in the Department of Food Science at the University of Arkansas in Fayetteville assists small food processing companies and entrepreneurs by providing technical assistance in several areas. The use of the Arkansas Food Innovation Center (AFIC) has provided the platform which to help entrepreneurs. This past year we have trained entrepreneurs in Good Manufacturing Practices (GMPs) as required by the Arkansas Department of Health teaching them about food processing regulations and labeling requirements. We also have conducted 2 round-table discussion forums between the Arkansas Department of Health and entrepreneurs.

Results
The AFIC currently has approximately twenty active entrepreneurs using the facility. With this growth of the AFIC by entrepreneurs, some entrepreneurs are beginning to outgrow the AFIC which are success stories in the making. We are also seeing additional opportunities to training entrepreneurs in areas that need attention such as writing business plans and marketing. We are currently developing programs to address these areas.

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
504	Home and Commercial Food Service

Outcome #13

1. Outcome Measures

Number of children who practice healthy eating

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	15139

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Obesity is a major health problem that frequently begins in childhood and adolescence. Overweight or obese children are more likely to become overweight or obese adults. Thirty-three percent of youth in Ashley County are at overweight or obese, which may lead to diabetes, high blood pressure, heart disease and many other problems.

What has been done
The Ashley County Cooperative Extension Service partnered with the Hamburg and Crossett School Districts to teach youth in grades K-5 how to make healthy food choices and the importance of being physically active. Fifty-seven monthly assemblies were conducted with three schools reaching a total of four hundred forty-one youth. Each parent received a monthly newsletter as well as quarterly CHOP CHOP magazines. The key messages taught were eat more fruits and vegetables, whole grains, low-fat dairy, lean protein and to be physically active at least 60 minutes each day.

Results
Four hundred sixty-four parent surveys showed:
81% of parents said their child talked about healthy food/snacks
74% of parents said their child asked for more or different fruits, vegetables, milk or yogurt
77% of parents said their child talked about being more active
59% of parents said they are more active as a result of what their child learned
61% of parents said they made changes in family's eating practices
35% of parents said they serve vegetables their family hasn't tried before
31% of parents said they serve fruits their family hasn't tried before
60% of parents said they serve their family more vegetables
61% of parents said serve their family more fruit.

What SNAP-Ed parents are saying:
"It has helped my child to be more open to trying new food. She loves how healthy they are for you and she gets excited to try something new. Thank You."
"It helped me by lowering my blood pressure and to stay healthy."
"I cannot get my son to try new things. Somehow Mrs. Phifer has!!! So THANK YOU."
"My child has been more willing to eat healthier foods and exercise more."

Quotes from SNAP-Ed youth:
"I plan to eat more fruits & vegetables, eat different colors."
"I plan to pick a better snack because I want to have a better life."
"I plan to eat healthier and be more active."

4. Associated Knowledge Areas

KA Code	Knowledge Area
501	New and Improved Food Processing Technologies
701	Nutrient Composition of Food
702	Requirements and Function of Nutrients and Other Food Components
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle
806	Youth Development

Outcome #14

1. Outcome Measures

Number of children who engage in healthy levels of physical activity

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5439

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
724	Healthy Lifestyle
806	Youth Development

Outcome #15

1. Outcome Measures

Number of families, children, and youth who have access to healthy foods

Not Reporting on this Outcome Measure

Outcome #16

1. Outcome Measures

Number of adult participants who reported they less often run out of food before the end of the month following completion of a nutrition education program.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1037

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In 2014 with an estimated population of 2,966,369 Arkansas is ranked 2nd in the nation for household food insecurity at 21.2% or 627,528 at risk individuals. Arkansas is ranked 1st in the nation for households with very low food security at 8.1%. Not surprisingly Arkansas has high childhood food insecurity rates at 28.4%. That means that one-fifth of households and over one-

quarter of Arkansas's children are not sure where their next meal is coming from. Associated with adverse health outcomes, including behavioral problems in children and obesity and type 2 diabetes in specific subpopulations of adults, food insecurity has the potential to negatively impact a wide range of individuals and activities.

What has been done
The University of Arkansas Division of Agriculture Cooperative Extension Service's Supplemental Nutrition Assistance Program - Education (SNAP-Ed) and Expanded Food and Nutrition Education Program (EFNEP) were delivered in every Arkansan county in FY2014. They provided Arkansas's most vulnerable families and youth with hands-on opportunities to address food security challenges. With goals to teach food resource management and address food security issues SNAP-Ed and EFNEP aimed to increase knowledge and influence behaviors such that food security is improved among participants.

Results
Over 2000 adults were surveyed by the University of Arkansas Division of Agriculture Cooperative Extension Service regarding their personal food security. Adults who received nutrition education from the federal grant programs, SNAP-Ed and EFNEP, that target low-income individuals, reported improved food security. For example 50% or 864 of 1716 EFNEP adult graduates reported they less often ran out of food before the end of the month after receiving education and 59% of SNAP-Ed participants that were surveyed or 173 individuals reported less often running out of food before the end of the month as a result of participating in a SNAP-Ed program.

4. Associated Knowledge Areas

KA Code	Knowledge Area
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #17

1. Outcome Measures

Number of participants who adopted one or more food/nutrition practice

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	8108

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Arkansas, 68% of adults are overweight or obese, 9.6% have diabetes, 40% have high blood cholesterol and 36% have high blood pressure. Research shows that even small changes in diet and small decreases in weight can lower the risks for diabetes, heart disease and hypertension.

What has been done
Multiple educational approaches were used to respond to issues related to chronic illness and obesity. Healthy weight classes were offered in 9 counties. Participants learned to plan healthy meals, balance calorie intake with calorie expenditure, read food labels, reduce portion sizes and decrease fat and sodium intake. Cooking classes offered in 20 counties helped people learn skills that enable them to plan and prepare healthier meals at home. Participants learned to cook using healthier techniques, eat more locally grown foods and save money by eating at home more often. Eight counties offered programs to help people with diabetes better manage their disease. General nutrition programs were offered in 36 counties. Programs focusing on healthy weight, diabetes self-management and choosing and preparing healthy foods resulted in 17,470 contacts through 1,642 direct education methods. Programs provided to adults through the Expanded Food and Nutrition Education Program and the SNAP-Ed program resulted in 56,430 direct education contacts through 14,327 educational sessions.

Results
Of adult participants in general nutrition programs, SNAP-Ed programs and EFNEP programs who were asked:
87% reported improvements in one or more nutrition practice
63% reported increased fruit and/or vegetable intake
42% reported increased lowfat or fat-free dairy intake
37% reported increased whole grain intake
60% reported reduced sodium intake
53% reported reduced fat intake
Of participants in healthy weight programs who were asked:
87% reported decreasing weight
75% reported decreased blood glucose and blood pressure
33% reported lower blood cholesterol

Changes like these can reduce the risk for diet-related chronic diseases and save participants money. Programs that help Arkansas reduce weight and improve health can reduce health care costs. Health experts estimate that every $1 invested in proven community-based disease prevention programs could save Arkansas ~$5 in future health care costs.

What participants are saying:
"This program was a lifestyle change. It is something I can keep doing. I was able to get in a dress I wore at my daughter's wedding over 8 years ago. I lost a total of 20 lbs & 17.5 inches. I could not have done this without this program." ~ ReNew You Participant

"This Extension program saved my life! My A1c was way too high and even though I have cooked all my life, I had no idea how to cook for myself as a diabetic. These classes taught me how to cook for a diabetic and eventually lower my A1c. My doctor is very happy with me." ~Living Well with Diabetes Participant

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
704	Nutrition and Hunger in the Population
724	Healthy Lifestyle

Outcome #18

1. Outcome Measures

Number of studies conducted related to factors affecting childhood obesity

2. Associated Institution Types

- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Childhood obesity is a major public health issue and is presently receiving great deal of attention due to its broader economic consequences and long term effects on children?s overall health, academic accomplishments, quality of life and productivity as they become adults. Arkansas schoolchildren are especially at risk for obesity. Arkansas is among the poorest and least healthy states. The childhood obesity rate has doubled over the last couple of decades and is now one of the highest in the country (Arkansas Center for Health Improvement, 2009).

What has been done
Professors Nayga and Thomsen's work in this area received an important infusion of resources in 2011 when it was awarded a large USDA-NIFA-AFRI grant. They are leading this project but it involves a diverse team of scholars representing expertise in early childhood education, child nutrition, child development, and the behavioral sciences. The project is unique in that all participants are from Arkansas-based institutions. Participants include the UA Division of Agriculture, UA Fayetteville, University of Arkansas for Medical Sciences (UAMS), and Arkansas Children's Hospital Research Institute. The project also involves important stakeholder groups including childcare providers, educators, policy makers, and farmers. Professors Nayga and Thomsen are examining the link between childhood obesity outcomes and features of the food and social environment. This work is being done to ensure that interventions are targeted to those children most at-risk for obesity. They are working closely with the UAMS Arkansas Center

for Health Improvement (ACHI) to access a unique individual-level dataset on obesity outcomes. Access to these data allows research to be conducted at a level of detail and accuracy that is not possible with national-level datasets.

Results

Nayga and Thomsen's research is able to assess causal linkages using quasi-experimental analytical methods and data-intensive identification strategies. Findings, published in the American Journal of Agricultural Economics, Economics and Human Biology, and Applied Economic Perspective and Policy, are providing a better understanding of the effect of supermarket access, the proximity of fast foods around schools and residences, the impact of school food programs such as the Fresh Fruit and Vegetable Program (FFVP) and the role of peers on childhood obesity outcomes.

4. Associated Knowledge Areas

KA Code	Knowledge Area
703	Nutrition Education and Behavior
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)

Brief Explanation

Recent food safety "outbreaks" have heightened concern among the public about the safety of, not only processed and restaurant food, but also fresh foods in the store or from local growers. This has led to increased government regulations such as the Food Modernization and Safety Act, which has created a confusing litany of potential on-farm rules, certification standards, and so fort. We have responded with improved certification and on the farm safety information for producers, but lack of capacity has hampered our efforts. This is further complicated by changes in farm worker populations, where many immigrant workers in the state have to be engaged in their first language. Increasing public priorities in local foods, community food systems, and farmer markets - and the resulting programmatic and economic factors associated with these movements will continue to create additional demand on our limited resources. We plan to continue our food service safety programs, and hope that public policy changes will help in this arena over time.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Food Safety:
28% (464 of 1685) of EFNEP adult graduates more often followed the recommended practices of not allowing meat and dairy foods to sit out for more than two hours. Furthermore 54% (913 of 1685) ALWAYS follow the recommended practice.
62% (1056 of 1711) of EFNEP adult graduates more often followed the recommended practices of not thawing foods at room temperature. Furthermore 14% (233 of 1711) ALWAYS follow the recommended practice.
77% (173 of 289) of surveyed SNAP-Ed adults reported adopting one or more food safety practice as a result of participating in a SNAP-Ed program.
75% (3093 of 4271) of surveyed SNAP-Ed youth reported or demonstrated they more often practice personal hygiene such as hand washing as a result of participating in a SNAP-Ed program.
73% (1778 of 2405) of surveyed 4-H participants reported or demonstrated they more often practice personal hygiene such as hand washing.
73% (342 of 471) ServSafe® Managers course participants received certification.
87% (343 of 394) food preservation workshop attendees indicated they intended to adopt at least one food preservation practice following an education, class seminar or workshop.
Food Security:
67% (1164 of 1731) of EFNEP adult graduates more often planned meals in advance.
57% (980 of 1729) of EFNEP adult graduates more often compared prices when shopping.
50% (864 of 1716) of EFNEP adult graduates less often ran out of food before the end of the month.
64% (1088 of 1708) of EFNEP adult graduates more often used a list for grocery shopping.
Of 1439 reports average EFNEP adult graduate cost savings per month was $20.40 per participant.
51% (128 of 252) of surveyed EFNEP 6th-8th grade youth improved in their responses to: Using measuring cups and spoons?
35% (87 of 252) of surveyed EFNEP 6th-8th grade improved in their responses to: Following directions in a recipe?
46% (23 of 50) of surveyed EFNEP 9th-12th grade improved in their responses to: In the last month, if your family did not have enough food, how often did you help by going to a food pantry or finding other free or low-cost food resources?
59% (173 of 289) of surveyed SNAP-Ed adults reported less often running out of food before the end of the month as a result of participating in a SNAP-Ed program.
47% (160 of 337) of surveyed SNAP-Ed adults reported saving money on groceries as a result of participating in a SNAP-Ed program.
Nutrition:
87% (2076 of 2386) of participants indicated they made one or more positive dietary change as a result of completing a program
63% (3397 of 5409) of participants increased average daily consumption of fruit and/or vegetable as a result of completing a program
37% (712 of 1919) of participants increased averaged daily consumption of whole grains as a result of completing a program
42% (727 of 1712) of participants increased average daily consumption of fat free or low fat dairy foods as a result of completing a program
44% (153 of 345) of participants decreased consumption of salt/sodium as a result of completing a program
53% (961 of 1805) of participants decreased consumption of saturated and/or trans fats as a result of completing a program
Childhood Obesity:
For youth EFNEP uses age appropriate evaluation tools with K-2nd using the same tool,

3rd-5th using a different tool, 6-8th using a different tool, and finally 9th-12th is using a different tool. Every state uses the same evaluation tool as required by our Federal partners. Food resource management and food security are only assessed in the 6-8th grades and 9-12th grades, respectively.
For EFNEP youth outcomes:
86% (1666 of 1927) Children and youth improve their abilities to choose foods according to the Federal Dietary Recommendations or gain knowledge
50% (950 of 1909) Children and youth improve their physical activity practices or gain knowledge
For SNAP-Ed Process evaluation is critical because it allows ongoing monitoring of the program and enables timely refinements which help achieve success. Process evaluation activities include tracking the number of SNAP eligibles and potential eligibles reached, the number of materials distributed at educational displays and the number of events and methods used to reach the target audience. SNAP-Ed reports planned events in the UACES Arkansas Information Management System (AIMS) online electronic reporting system.
Formative evaluation assures the best possible program by identifying appropriate target audiences and ensuring program messages and activities are relevant and meaningful to them. Methods used to evaluate the program include observing participant behavior, informal talks with the participant about the educational activity, giving short surveys, holding group discussions with participants to gain feedback to assess a project as it progresses or to determine improvements and adjustments needed to attain the program objectives.
Outcome/impact evaluation is conducted with direct contact programs. Pre-and post-tests or post-then pre-tests are used to assess knowledge, attitude, and behavior change among youth and adults. A series of evaluation questions are in place for county agents to use to develop appropriate questionnaires that fit their programs and are aligned with UACES outcome/impact indicators.
For SNAP-Ed. Youth evaluations collect information on knowledge gain and diet and physical activity practices.
Youth outcome evaluation measures as a result of participating in a SNAP-Ed program. The number of youth surveyed is not necessarily the same for every outcome indicator. Of youth surveyed:
•73% reported they gained knowledge of MyPlate.
•52% reported they intend to follow MyPlate guidelines.
•46% reported eating closer to the recommended number of cup equivalents from the fruit group most days.
•45% reported eating closer to the recommended number of cup equivalents from the vegetable group most days.
•33% reported eating closer to the recommended number of ounce equivalents of whole grains most days.
•30% reported eating closer to the recommended number of cup equivalents of low fat or fat free foods from the dairy group most days.
•49% reported increasing physical activity or reduced sedentary time.
•72% reported/demonstrated they more often practice desirable personal hygiene such as hand washing.
•48% reported gaining knowledge about foods of which to increase consumption as recommended by the Dietary Guidelines for Americans.
•28% reported gaining knowledge about foods of which to decrease consumption as recommended by the Dietary Guidelines for Americans.
•53% reported understanding the importance of balancing food intake and physical activity.
•35% reported decreasing consumption of sugar sweetened beverages.

•78% reported increased knowledge about Arkansas foods.

Key Items of Evaluation

ServSafe® training is evaluated using pass rates for the ServSafe® Food Safety Program for Managers Exam. Test takers must pass the exam with a minimum a score of 75% to show competency to earn a 5 year ServSafe® Managers Certification.
In 2014 for Arkansas EFNEP 100% of adult graduates and 50% of enrolled youth complete pre- and post- evaluations. For adults' data is collected using a national tool called the Behavior Checklist. The Behavior Checklist asks a set of 10 plus three additional questions specific to Arkansas EFNEP. Included in the Behavior Checklist and specific to food safety is the Food Safety Domain which includes two questions. For youth EFNEP uses age appropriate evaluation tools with K-2nd using the same tool, 3rd-5th using a different tool, 6-8th using a different tool, and finally 9th-12th is using a different tool. Every state uses the same evaluation tool as required by our Federal partners. Food safety is evaluated for all ages of youth.
For SNAP-Ed evaluation adults are surveyed, frequently using a pre- and post- methodology. SNAP-Ed and 4-H youth evaluations for food safety use a one item survey tool and similar to adults pre- and post- methodology is encouraged.
Nutrition:
# of participants who indicated they made one or more positive dietary change as a result of completing a program
# of participants who increased average daily consumption of fruit and/or vegetable as a result of completing a program
participants who increased averaged daily consumption of whole grains as a result of completing a program
participants who increased average daily consumption of fat free or lowfat dairy foods as a result of completing a program
of participants who decreased consumption of salt/sodium as a result of completing a program
participants who decreased consumption of saturated and/or trans fats as a result of completing a program
Childhood Obesity:
Increase knowledge concerning one or more healthy food/nutrition choice
Adopt one or more healthy food/nutrition practice
Eat nearer to the recommended number of cup equivalents from the Fruit and/or Vegetable Group
Eat nearer to the recommended number of cup equivalents from the Dairy Group
Eat nearer to the recommended number of cup equivalents from the Grains Group
Engage more often in regular physical activity
Adopt one or more desirable food safety habit
Increase ability to balance calories from food and beverages with calories expended

V(A). Planned Program (Summary)

Program # 4

1. Name of the Planned Program

Increasing Opportunities for Families & Youth

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
607	Consumer Economics	0%		30%	
724	Healthy Lifestyle	25%		0%	
801	Individual and Family Resource Management	20%		0%	
802	Human Development and Family Well-Being	20%		29%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	5%		3%	
806	Youth Development	30%		3%	
902	Administration of Projects and Programs	0%		2%	
903	Communication, Education, and Information Delivery	0%		33%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	132.2	0.0	0.0	0.0
Actual Paid	136.6	0.0	11.0	0.0
Actual Volunteer	282.5	0.0	0.0	0.0

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

Extension		Research	
Smith-Lever 3b & 3c	**1890 Extension**	**Hatch**	**Evans-Allen**
1972436	0	9599	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
2006625	0	1011342	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
14536088	0	549631	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

Living Healthy

Extension Health programs aimed to improve health at every stage of life by educating and engaging Arkansans to address locally relevant health issues. Programs like Extension Get Fit, which included StrongWomen & Men, Walk Across Arkansas, and Fit in 10, helped young and old Arkansans increase physical activity, improve health, and improve quality of life. Low levels of health literacy contribute to poor health outcomes. Be Medwise, a medication literacy program, assisted Arkansans to better manage their own health and health care while Healthy Homes, an environmental health program, teaches about home safety like poison storage and smoke alarms. The Extension Wellness Ambassador Program trained and engaged community volunteers to address local health issues by implementing projects and conducting health improvement activities. 4-H Healthy Living programs addressed these issues by engaging youth and their families in hands-on opportunities to enhance physical, social, and emotional well-being.

Aging Well

Programs like Aging in Place, Acknowledging Aging and Keys to Embracing Aging help older Arkansans extend productivity and independence into later life. Extension Aging programs helped Arkansans of all ages achieve optimal physical, mental, and social health, which can result in significant savings in healthcare and treatment dollars each year.

Strengthening Families

The Division's Marriage, Parenting and Family Life Programs helped Arkansas families face the challenges of economic stress and relationship issues. Parenting education and child care in an increasing complex society is extremely important. To provide the best care possible, Arkansas Extension provides child care professional with a minimum of 10 hours per year of training to maintain their licensure.

Family Economics

Arkansas had the 7th highest poverty rate (18.7 percent) in the country. Pockets of extreme poverty remain throughout the state, and 16 counties in the state had a poverty rate 25 percent or greater. Extension conducted its programming through a network of local offices in each of Arkansas' 75 counties. CES educators are adept at reaching these audiences and disseminating information via methods and locations that meet the needs of our target audiences.

Empowering Youth

As one of the largest and oldest youth serving organizations in Arkansas, the 4-H Youth Development program uses the experiential learning model to reach 143,879 within 75 counties. In 2014, 4-H Clubs across Arkansas involved young people in hands-on education and service learning opportunities that

enhanced their life skills, such as decision making, communications, problem solving, critical thinking, service learning, and healthy lifestyle choices.

2. Brief description of the target audience

Employers and Employees
County Extension Agents & Program Asssistants
Consumers
Farmers - regardless of agriculture enterprise or means capability or ethnicity
Health Professionals
School teachers
Child Care & Senior Care Providers (center or home-based)
Adults
Youth
Prospective & Current 4-H Members, 4-H Parents and 4-H Volunteers
Master Gardeners, Extension Homemakers (Councils)
Military Families
Homeowners
State and Federal Agency Personnel
General Public
Project and program funding organizations
Public Health Officials
Policy Decision-makers
Elected Officials
Civic leaders and organizations
Married couples or those considering marriage
Business leaders - Industry, small, large, rural, urban, consultants and other
Parents, Grandparents, Step-Parents & Foster Parents
The economically disadvantaged or those at risk

3. How was eXtension used?

eXtension is used as a reference source during the creation of child care professional training modules. Extension educators are also encouraged to utilize eXtension resources within their programs to expand their outreach efforts.
The Arkansas Cooperative Extension Service is approved by the US Department of Justice to provide in-person debtor education for bankruptcy filers. Arkansas who request an online course are referred to eXtension. A USDOJ approved online course is available through eXtension. Several eXtension resources are referenced and linked from www.uaex.edu.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	531213	177951	499076	107721

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	28	7	35

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of organized clubs and groups supported by Division of Agriculture Research and Extension resources

Year	Actual
2014	787

Output #2

Output Measure

- Number of educational products and materials developed or updated for print, electronic media, radio, podcasts or display

Year	Actual
2014	486

Output #3

Output Measure

- Number of clientele in individual & family resource management programs
  Not reporting on this Output for this Annual Report

Output #4

Output Measure

- Number of clientele contacts resulting from education classes, workshops, group discussions, one-on-one interventions, demonstrations, and other educational methods

Year	Actual

2014	454673

Output #5

Output Measure

- Number of educational materials, curricula, newsletters, web-based modules and fact sheets developed, produced and delivered

Year	Actual
2014	236835

Output #6

Output Measure

- Web content utilization data tracking including hits, clicks and content utilized

Year	Actual
2014	99950

Output #7

Output Measure

- Number of Health and Aging programs delivered

Year	Actual
2014	4150

Output #8

Output Measure

- Number of participants in Health & Aging programs

Year	Actual
2014	72573

Output #9

Output Measure

- Number of grants and dollars generated by grant and contract development efforts

Year	Actual
2014	2436225

Output #10

Output Measure

- Number of youth and their families participating in 4-H Healthy Living learning opportunities

Year	Actual
2014	163299

Output #11

Output Measure

- Number of youth participating in science, engineering and technology program and activities

Year	Actual
2014	99738

Output #12

Output Measure

- Number of youth participating in community service and volunteering

Year	Actual
2014	7076

Output #13

Output Measure

- Number of Small Steps to Health and Wealth program participants

Year	Actual
2014	51

Output #14

Output Measure

- Number of child care professionals trained.

Year	Actual
2014	6101

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants (youth and adult) who report conducting programs, community service projects, adopting new skills or accepting new leadership roles as a result of leadership development education programs
2	Estimated dollar value of program support volunteers (includes: EH; 4-H, Master Gardeners; Leadership students, etc.)
3	Number of program participants who indicate a change in behavior, based on lessons learned from Division of Agriculture sponsored Research and Extension programs
4	Number of participants who adopted at least one positive health practice
5	Number of participants reporting a reduction of at least one risk factor for chronic disease after completing a health education program
6	Number of participants reporting an increase in physical activity after completing an Extension Excercise and/or health education program
7	Number of youth that demonstrated leadership efficacy
8	Number of youth increasing awareness of community and community issues
9	Number of adopting behaviors to prevent injury prevention behaviors such as: seatbelt use, helmet use, distraction-free driving, ATV use, bicycle, shooting sports safety, etc.
10	Number of 4-H youth that ate more healthy foods
11	Number of youth adopting behaviors to reduce sedentary activity
12	Number of youth that practiced positive communication skills
13	Number of youth that increased their understanding of the consequences of risk behaviors
14	Number of youth adopting Positive Attitudes and Aspirations toward Science
15	Number of Small Steps to Health & Wealth participants who report increased personal financial well-being
16	Number of Small Steps to Health & Wealth participants who report increased health well-being
17	Number of Small Steps to Health and Wealth participants who report behavior change

18	Number of adult participants who report conducting programs, community service projects, adopting new skills or accepting new leadership roles as a result of Extension Wellness Programs
19	Number of Marriage, Parenting, and Family Life participants who changed at least one behavior/practice
20	Number of child care provider training program participants who changed at least one behavior/practice.
21	Number of Marriage, Parenting and Family Life program participants who indicate their knowledge has increased.
22	Number of marriage, parenting and family life participants who completed the program evaluation survey.
23	Number of adult participants who reported improved physical health.
24	Number of adult participants improving functional fitness after participating in Extension Exercise Program

Outcome #1

1. **Outcome Measures**

   Number of participants (youth and adult) who report conducting programs, community service projects, adopting new skills or accepting new leadership roles as a result of leadership development education programs

2. **Associated Institution Types**

   - 1862 Extension
   - 1862 Research

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5342

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #2

1. Outcome Measures

Estimated dollar value of program support volunteers (includes: EH; 4-H, Master Gardeners; Leadership students, etc.)

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	22983578

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
724	Healthy Lifestyle
802	Human Development and Family Well-Being
806	Youth Development

Outcome #3

1. Outcome Measures

Number of program participants who indicate a change in behavior, based on lessons learned from Division of Agriculture sponsored Research and Extension programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	36451

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Much of Arkansas's population is economically vulnerable, with many counties having poverty rates in excess of 25% (Rural Profile of Arkansas). Arkansas consumers may not have the knowledge and skills they need to build financial security. Research indicates that income does not exceed expenses for almost half of Arkansas households and more than half lack adequate emergency savings (FINRA Financial Capability Survey). Arkansans have the 48th worst financial behavior and the 49th worst financial literacy among all states (FINRA Financial Capability Survey). Financial capability matters not only for individuals but for society.

What has been done
County FCS Agents conducted educational outreach programs across the state including programs such as Navigating Your Financial Journey (basic financial management); Your Farm, Your Legacy (estate planning seminar); and Get Real, Here's the Deal (youth personal finance simulation).

Results
Extensions personal finance educational programs gave Arkansans the knowledge and skills they needed to build financial security. Extension's personal finance educational programs give Arkansans the knowledge and skills they need to build financial security. Participants learned the basics of financial management for spending, saving, credit management, and retirement and estate planning. They developed skills such as creating a spending plan, checking a credit report, shopping smartly, setting financial goals, etc. County FCS Agents conducted educational outreach across the state including programs such as Navigating Your Financial Journey (basic financial management); Your Farm, Your Legacy (estate planning seminar); Get Real Here's the Deal (youth personal finance simulation); just to name a few of the many topics and educational opportunities offered. More than 7,000 Arkansans participated in Cooperative Extension Service family and consumer economics programs. Evaluation results show that 6,237 reported increased

knowledge and 3,313 indicate that they intend to make a positive financial management behavior change based on what they learned. Positive behavior changes in financial management practices were made by 1,015 program participants.

4. Associated Knowledge Areas

KA Code	Knowledge Area
801	Individual and Family Resource Management
806	Youth Development

Outcome #4

1. Outcome Measures

Number of participants who adopted at least one positive health practice

Not Reporting on this Outcome Measure

Outcome #5

1. Outcome Measures

Number of participants reporting a reduction of at least one risk factor for chronic disease after completing a health education program

Not Reporting on this Outcome Measure

Outcome #6

1. Outcome Measures

Number of participants reporting an increase in physical activity after completing an Extension Excercise and/or health education program

Not Reporting on this Outcome Measure

Outcome #7

1. Outcome Measures

Number of youth that demonstrated leadership efficacy

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4134

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

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

Outcome #8

1. Outcome Measures

Number of youth increasing awareness of community and community issues

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4367

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

The 4-H program develops youth by engaging them to give back to their communities. Youth and adult partnerships to tackle locally-identified needs are a cornerstone of 4-H. Programs develop youth leadership skills and provide opportunities for youth to apply skills learned to improve their communities.

What has been done
In 2014, Arkansas 4-H was honored by the Arkansas legislature with a substantial monetary award for program enhancement. A committee comprised of internal and external stakeholders was formed to prioritize the needs and identify the best use of funding. Three strategies selected included funding for: 1. County-based citizenship events, 2. Community service activities, and 3. A statewide Citizenship/Leadership camp held at the Arkansas 4-H Center.

Results
More than 4,000 youth from 42 counties were engaged in citizenship educational activities at the county level. Nearly 130 youth were selected to attend the state Citizenship/Leadership Camp, which provided a week-long overnight camping experience. The camp included cultural experiences, personality assessments, leadership activities, and a State Capital tour. Community service activities conducted in October, which is National 4-H Month, were held in 49 counties. These efforts engaged 1,618 youth and adult volunteers and reached 121,522 Arkansans. Engagement at the local level generated more than $14,000 to fund care packages and provide support for other local causes.

4. Associated Knowledge Areas

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

Outcome #9

1. Outcome Measures

Number of adopting behaviors to prevent injury prevention behaviors such as: seatbelt use, helmet use, distraction-free driving, ATV use, bicycle, shooting sports safety, etc.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	4038

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Serious ATV injuries affect more than 120,000 people each year in the United States. Arkansas ranks third in the nation in injury rates for those age 16 and under and averages more than 15 ATV-related deaths per year. Nearly 90% of ATV crashes in Arkansas occur with drivers under age 16 driving an adult-sized ATV. Recent research demonstrates that children under age 16 suffer a disproportionate share of injuries, do not wear helmets, and fail to receive formal ATV training.

What has been done
The Division of Agriculture has the capability to reach youth and adults in every county in the state with ATV Safety messages. The Division's 4-H Youth Development program offers the ATV Safety Institute's (ASI) RiderCourse program to help youth and adults learn to safely and properly ride ATV's. Twenty-three Division faculty and staff are trained to teach the four-hour ASI ATV RiderCourse. This program is made possible through partnerships with many businesses, state agencies, and other organizations. In addition, school and community-based ATV safety educational programs are provided to clientele.

Results
In 2014, 233 youth and adults participated in the 43 ASI ATV RiderCourse classes and 3,669 Arkansans were reached with the 4-H ATV Safety message through educational programs.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
806	Youth Development

Outcome #10

1. Outcome Measures

Number of 4-H youth that ate more healthy foods

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1291

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Arkansas youth suffer from a complex, two-pronged problem: hunger and obesity. Arkansas children are among the hungriest in the nation, ranking second in the US for food insecurity. At the same time, Arkansas children are among the most overweight or obese; 38% weigh in with health-threatening Body Mass Index numbers (CDC). USDA data indicate 19% of Arkansas households are food insecure. Children suffer a poverty rate of 30%, above the national average of 22% (US Census Bureau, 2012). Arkansas is the most sedentary state in the US (United Health Foundation, 2013). The majority of Arkansas youth are not physically active; only 25% meet physical activity recommendations.

What has been done

4-H Healthy Living programs aim to address these issues by engaging youth and their families in hands-on opportunities to enhance physical, social, and emotional well-being. The 4-H approach is holistic and includes promoting healthy eating habits, physical fitness, the capacity to recognize and direct emotions, and ability to develop and maintain positive social interactions and relationships. Efforts in Arkansas center around two main programs: 4-H Yoga for Kids and Healthy Lifestyle Choices. These programs help youth to develop an awareness and positive attitude about healthy living while increasing their knowledge, skills, and competencies in physical, social and emotional well-being.

Results

More than 59,000 Arkansas youth were reached with 4-H healthy living programs in 2014. Extension faculty and staff devoted nearly 30,000 hours to these programs, which were supported by 2,484 trained volunteers who contributed service hours valued at $214,789. A survey of nearly 3,000 Arkansas students involved in multi-session 4-H healthy living programs showed that 93% increased knowledge of healthy food choices. Ninety-one percent reported little to no difficulty in making healthy food choices; 91% improved eating habits; and 81% had positive attitudes toward physical activity. 4-H participants were more active than Arkansas Youth Risk Behavior Survey (YRBS) respondents; 85% of 4-H participants reported healthy physical activity habits, compared to just 40% for YRBS respondents. Fifty-six percent of students said they had changed their practices as a result of 4-H healthy living programs, and 36% shared what they learned with their families.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle
806	Youth Development

Outcome #11

1. Outcome Measures

Number of youth adopting behaviors to reduce sedentary activity

Not Reporting on this Outcome Measure

Outcome #12

1. Outcome Measures

Number of youth that practiced positive communication skills

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	2677

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

Number of youth that increased their understanding of the consequences of risk behaviors

Not Reporting on this Outcome Measure

Outcome #14

1. Outcome Measures

Number of youth adopting Positive Attitudes and Aspirations toward Science

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	893

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

Number of Small Steps to Health & Wealth participants who report increased personal financial well-being

Not Reporting on this Outcome Measure

Outcome #16

1. Outcome Measures

Number of Small Steps to Health & Wealth participants who report increased health well-being

Not Reporting on this Outcome Measure

Outcome #17

1. Outcome Measures

Number of Small Steps to Health and Wealth participants who report behavior change

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	25

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
724	Healthy Lifestyle
801	Individual and Family Resource Management

Outcome #18

1. Outcome Measures

Number of adult participants who report conducting programs, community service projects, adopting new skills or accepting new leadership roles as a result of Extension Wellness Programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	60

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Lifestyle factors, such as diet and exercise, lay at the core of Arkansas' heavy chronic disease burden. Arkansans have fewer opportunities to engage in health-promoting services and programs. Limited access to fitness facilities and programs means rural citizens, who tend to be less healthy than their urban counterparts, are geographically isolated from resources that could help them live healthier lives.

What has been done
Extension's approach to improving Arkansas health engages residents to use their knowledge in service to others in their local communities. The Extension Wellness Ambassador Program trains Arkansans to help their friends, neighbors and communities live healthier lives. This lay health leadership development program provides training and an organizational structure to guide collective efforts to improve health in Arkansas.

The program?s 68 graduates from pilot efforts in 18 counties demonstrated increased knowledge of personal and community health, nutrition, and exercise by passing a final exam following the 40-hour basic training program. The Wellness Ambassador Program includes planning and implementation of projects by program graduates. More than 400 educational classes and sessions in 2014 reached a reported 4,273 Arkansans. Approximately 5,641 volunteer hours valued at $127,205 were contributed by Wellness Ambassadors. Dozens of state and local partnerships have been formed to support healthy communities, with a common goal of increasing the number of Arkansans who are healthy at every stage of life.

Results
Extension Wellness Ambassador Program graduates are filling programming gaps and expanding Extension?s capacity to improve health in communities. Ambassadors planned and are

implementing projects to help others live healthier lives. Extension Wellness Ambassadors improved their own health while serving their communities. Program evaluation data, which were collected at the start of the program, and 3- and 6-months later, showed that:
94% maintained or increased self-efficacy to take control of personal health
52% increased physical activity levels
31.5% improved blood glucose
31.5% improved total cholesterol
47% improved systolic blood pressure
50% with baseline BMI-less than 25 improved weight

Ambassador graduates significantly improved functional fitness as demonstrated by tests of upper and lower body strength, aerobic endurance, and lower body flexibility.

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

Outcome #19

1. Outcome Measures

Number of Marriage, Parenting, and Family Life participants who changed at least one behavior/practice

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1620

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
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #20

1. Outcome Measures

Number of child care provider training program participants who changed at least one behavior/practice.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	5978

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Research indicates that for every dollar spent on early childhood intervention and training programs, there is a $2.50-4.00 return on investment (ROI). That means the ROI within the state of Arkansas for our early childhood professional training programs is between $1.19 and $1.90 million dollars annually. This return on investment is realized as early childhood professionals learn the latest research-based practices and implement them in their child care programs. They are also realized in the lives of the children who benefit from these practices by receiving better care and being more prepared to enter school.

What has been done
Extension's early childhood professional training programs (Best Care, Best Care Connected, and Guiding Children Successfully) provide Arkansas's early childhood professionals with the verified training they need. Cooperative Extension is uniquely qualified to create and deliver early childhood professional training. All of our training programs are research-based and developed by subject matter specialists in the areas of child development, nutrition, health and safety, and resource management. All of our training programs are delivered through Extension's statewide network so they are readily available to Arkansans in all 75 counties. In addition, our programs are available in multiple formats (i.e., face-to-face, online, & self-guided) to accommodate different learning styles and work schedules.

Results
In 2014, with a budget of $475,000 in external funding, we trained 6,101 Arkansas early childhood professionals who successfully completed 45,565 hours of training through our three training programs. Our Best Care (face-to-face) program trained 2,797 professionals who completed

25,600 hours of training. Our Best Care Connected (online) program trained 1,370 professionals who completed 6,850 hours of training. Our Guiding Children Successfully (self-guided) program trained 1,934 professionals who completed 13,115 hours of training.

As a result of the training, 98% of program participants increased their knowledge of effective child care practices and 96% of participants adopted a recommended practice.
Research indicates that for every dollar spent on early childhood intervention programs, there is a $2.50-4.00 return on investment (ROI). That means the ROI within the state of AR for our child care training programs is between $1.19-$1.90 million dollars.

4. Associated Knowledge Areas

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

Outcome #21

1. Outcome Measures

Number of Marriage, Parenting and Family Life program participants who indicate their knowledge has increased.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1692

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Most Arkansans want to be emotionally healthy individuals, good partners, and effective parents. These are keys to happiness in family life. But it can be difficult to find the time to attend classes in these areas or to find trusted sources of information on these topics. Our vision is to provide Arkansans with the best family life information available in an easily accessible way that that fits their busy schedules.

What has been done
With that in mind, the University of Arkansas Cooperative Extension Service created the

Navigating Life?s Journey (NLJ) program, where you can sign up to receive free weekly emails in the areas of personal well-being, couple relationships, and parenting. The emails are short so you can read them quickly during your busy day. The research-based ideas in the emails come from dozens of the world?s best family life experts so you can trust that they are credible and will work for you. Each message also contains practical suggestions of how you can apply the ideas to your life.

Results
In 2014, Navigating Life's Journey (NLJ) e-mails, with their great quotes and invitations to apply them, were sent to 2,241 subscribers weekly. In addition, there are 195 subscribers to the NLJ blog, 658 Facebook followers, and 413 Twitter followers. A survey of 233 NLJ subscribers revealed that 100% of them said the weekly NLJ emails are valuable to them and 90% of them said their lives and relationships are better as a result of the NLJ messages. Comments from some subscribers about the impact of the NLJ emails:
1)I like the short and to-the-point suggestions. These are timely and manageable to put into immediate action. I feel validated in my efforts when I read and apply them.
2)Great quotes, inspiring and practical ideas to use in conversation and life with kids. I look forward to reading every time I get it in my inbox!
3)Navigating Life's Journey emails give me a small, but very valuable, bit of information that is easy to digest and ponder. I feel lifted up by its messages.
4)These emails give me "big ideas" and topics that I can take home and talk about with my spouse and children. Thank you for helping to take big ideas from research and help us apply to everyday life.
5)I teach family and consumer sciences and I use the emails in class with my students. Thank you for continuing to put out such good information!

Navigating Life's Journey subscribers currently come from all 50 states and over a dozen foreign counties. Extension's goal is to continue to grow our subscriber base for the weekly emails as well as increase our presence on social media. It seems that the small dosage interventions provided by NLJ can have a lasting impact over time because subscribers are continually reminded of the research-based principles they can use to improve their lives and relationships.

4. Associated Knowledge Areas

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

Outcome #22

1. Outcome Measures

Number of marriage, parenting and family life participants who completed the program evaluation survey.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1720

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 #23

1. Outcome Measures

Number of adult participants who reported improved physical health.

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	589

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

Arkansas tops the list of least healthy states. More than 66% of residents are overweight or obese. High chronic disease rates, including diabetes, heart disease, and hypertension, burden the state and strain health care resources. Rural residents lack opportunities to be physically active and have limited access to programs addressing lifestyle behaviors.

What has been done

Extension faculty dedicated more than 17,000 hours to improving Arkansans health in 2014. Extension exercise programs reached 44,595 Arkansans with sessions to increase fitness. This program is supported by a strong base of over 800 volunteers. More than 2,100 people learned the health impact of environmental risks, such as mold and carbon monoxide, increased knowledge of health and medication literacy, or learned principles for successful aging through special programs.

Results

Participation in Extension health programs helped thousands of Arkansas residents reduce chronic disease risk factors and improve well-being. Of participants surveyed, 72% increased knowledge of healthier practices; 84% reported improved physical health. Functional fitness was improved by 71% of strength training participants evaluated, with resulting annual estimated healthcare cost savings topping $8 million. Volunteers contributed nearly 11,813 hours in support of health programs, with time valued at $266,282.

4. Associated Knowledge Areas

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

Outcome #24

1. Outcome Measures

Number of adult participants improving functional fitness after participating in Extension Exercise Program

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	425

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Arkansas is the most sedentary state in the nation. According to state data, more than 31% of adults report no physical activity or exercise. Regular physical activity is one of the most important elements of a healthy lifestyle. Sedentary lifestyles increase risk of developing cardiovascular disease, diabetes, hypertension, and obesity.

What has been done
More than 1,500 adults participated in Extension exercise sessions offered through multi-session programs in counties across the state. Programs included the StrongWomen & Men strength training program and Arkansas' Fit in 10 program.

Results
Results from the Senior Fitness Test and participant evaluations showed that Extension Exercise programs increased strength and flexibility, improved balance, and improved mental and physical healthy. Specifically, 89% of participants increased strength, 81% increased flexibility, 77% improved agility and balance, 90% reported improved physical health, and 46% reported improved mental health. Based on Senior Fitness Test results, it is estimated the program resulted in the following medical and treatment cost savings (estimates for one year):

$3.2 million in hospitalization cost savings from reduced fall risk
$1.2 million in hospitalization cost savings from hip fracture prevention
$2.7 million in treatment cost savings from hip fracture prevention
$1.6 million in nursing home cost savings
Total cost savings: $8.7 million

4. Associated Knowledge Areas

KA Code	Knowledge Area
724	Healthy Lifestyle

V(H). Planned Program (External Factors)

External factors which affected outcomes

- Economy
- Appropriations changes
- Public Policy changes
- Government Regulations
- Competing Public priorities
- Competing Programmatic Challenges
- Populations changes (immigration, new cultural groupings, etc.)
- Other (NASS data availability)

Brief Explanation

Clientele availability is a constant factor affecting programs attendance and participation in the Increasing Opportunities for Families and Youth. The Division CES programs are competing with other priorities for our target audience's time and attention. Club

participation and project group attendance is a challenge due to the multiple extracurricular activities youth are engaged in or opportunities for engagement.
Grant procurement and funding has shifted; thus causing programmatic shifts.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

Family Economics

- 3722 adult and youth consumers increased knowledge related to financial management practices. Of those, 1033 adults and 2226 youth reported intending to change behavior based on what they learned
- 517 adults made a positive behavior change as a result of the program in which they participated.

Health & Aging

Results from the Senior Fitness Test and participant evaluations showed that Extension Exercise programs increased strength and flexibility, improved balance, and improved mental and physical healthy. Specifically, 89% of participants increased strength, 81% increased flexibility, 77% improved agility and balance, 90% reported improved physical health, and 46% reported improved mental health.

Strengthening Families

- Trained 1,419 people in our personal well-being programs. 1,271 of them indicated their knowledge of personal well-being increased.
- Trained 555 people in our parenting programs. 342 of them indicated their knowledge of effective parenting increased and 279 of them committed to change at least one behavior or practice to become more effective parents.

Child Care

Provide training and resources to help Arkansas Child Care Providers better care for children.

2585 Number of Best Care participants surveyed who indicate their knowledge of child care issues has increased.
2411 Number of Best Care participants surveyed who will change at least one child care behavior or practice
1538 Number of participants in Best Care Connected program/classes
1532 Number of Best Care Connected participants surveyed who indicate their knowledge of child care issues has increased
1497 Number of Best Care Connected participants surveyed who will change at least one child care behavior or practice
10950 Number of Guiding Children Successfully participants who indicate their knowledge of child care issues has increased
10409 Number of Guiding Children Successfully participants who will change at least one child care behavior or practice.

Empowering Youth

- A survey of nearly 3,000 Arkansas students involved in multi-session 4-H healthy living programs showed that 93% increased knowledge of healthy food choices. Ninety-one percent reported little to no difficulty in making healthy food choices; 91% improved eating habits; and 81% had positive attitudes toward physical activity.
- 237 youth participated in a robotics program through a partnership with National 4-H Council and Lockheed Martin. 77% of participants indicated interest, engagement, and

positive attitudes toward science. 72% of the youth were able to apply science skills. 90% answered "yes", they could do an experiment to answer a question.

Key Items of Evaluation

Family Economics

- 365 participants reported increasing savings and/or decreasing debt.

Child Care Provider Education

In a review of benefits and savings of early childhood intervention programs, calculated that for every dollar invested in such programs, there is an estimated return of $2.50 to $4.00. That means that the return investment within the state of Arkansas for our child care professional training programs is between $1.19 and $1.90 million dollars.

Healthy Living

Based on Senior Fitness Test results, it is estimated the program resulted in the following medical and treatment cost savings (estimates for one year):

- $3.2 million in hospitalization cost savings from reduced fall risk
- $1.2 million in hospitalization cost savings from hip fracture prevention
- $2.7 million in treatment cost savings from hip fracture prevention
- $1.6 million in nursing home cost savings
- **Total cost savings: $8.7 million**

Empowering Youth

- 233 youth and adults participated in the 43 ASI ATV RiderCourse classes and 3,669 Arkansans were reached with the 4-H ATV Safety message through educational programs.
- ASI RiderCourse Training - 43 classes - 233 participants;Educational programs - 22 for 3,669 participants;ASI ATV Safety E-Course (online)- 151 youth;ATV Community Safety Events - (2 or more hours of education) - 2 for 381 participants.
- More than 4,000 youth from 42 counties were engaged in citizenship educational activities at the county level. Nearly 130 youth were selected to attend the state Citizenship/Leadership Camp, which provided a week-long overnight camping experience. Community service activities conducted in October, which is National 4-H Month, were held in 49 counties. These efforts engaged 1,618 youth and adult volunteers and reached 121,522 Arkansans.
- 1,700 adults volunteered 14,616 hours of service in delivering science-based programs resulting in a value of $329,590.80.

Strengthening Families: Marriage Parenting & Family Life

Between February 1, 2014 and September 30, 2014, Extension's family life web pages received 14,601 page views and 11,063 unique visitors. In addition to the brisk activity on the webpage, the Navigating Life's Journey (NLJ) program provided weekly e-mails with great quotes and invitations to apply them to their lives to 2,241 subscribers over the past year.

- "I like the short and to-the-point suggestions. These are timely, and manageable to put into immediate action. I feel validated in my efforts when I read and apply them!"
- "These emails give me "big ideas" and topics that I can take home and talk about with my spouse and children. Thank you for helping to take big ideas from research and help us apply to everyday life."

V(A). Planned Program (Summary)

Program # 5

1. Name of the Planned Program

Economic & Community Development

☑ Reporting on this Program

V(B). Program Knowledge Area(s)

1. Program Knowledge Areas and Percentage

KA Code	Knowledge Area	%1862 Extension	%1890 Extension	%1862 Research	%1890 Research
112	Watershed Protection and Management	6%		0%	
601	Economics of Agricultural Production and Farm Management	0%		34%	
602	Business Management, Finance, and Taxation	25%		0%	
603	Market Economics	0%		5%	
604	Marketing and Distribution Practices	0%		5%	
606	International Trade and Development Economics	0%		16%	
607	Consumer Economics	0%		1%	
608	Community Resource Planning and Development	17%		19%	
609	Economic Theory and Methods	0%		1%	
610	Domestic Policy Analysis	2%		14%	
702	Requirements and Function of Nutrients and Other Food Components	0%		2%	
703	Nutrition Education and Behavior	0%		1%	
704	Nutrition and Hunger in the Population	0%		1%	
724	Healthy Lifestyle	0%		1%	
803	Sociological and Technological Change Affecting Individuals, Families, and Communities	46%		0%	
806	Youth Development	4%		0%	
	Total	100%		100%	

V(C). Planned Program (Inputs)

1. Actual amount of FTE/SYs expended this Program

Year: 2014	Extension		Research	
	1862	1890	1862	1890
Plan	20.2	0.0	2.0	0.0

Actual Paid	19.6	0.0	14.9	0.0
Actual Volunteer	13.1	0.0	0.5	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**
405403	0	62669	0
1862 Matching	**1890 Matching**	**1862 Matching**	**1890 Matching**
412431	0	1507152	0
1862 All Other	**1890 All Other**	**1862 All Other**	**1890 All Other**
2987664	0	274993	0

V(D). Planned Program (Activity)

1. Brief description of the Activity

In the area of **Economic Viability and Sustainability**, the University of Arkansas Division of Agriculture has worked to:

- Identify trends affecting Arkansas communities and regions.
- Help Arkansas communities and regions identify and implement innovative economic development strategies.
- Provide education and technical assistance to Arkansas businesses and entrepreneurs.
- Help local governments explore innovative solutions and optimize resources.

In the area of **Rural Infrastructure**, the University of Arkansas Division of Agriculture has worked to:

- Provide tools for communities to assess infrastructure needs.
- Assist in identifying local, state and federal resources to address infrastructure challenges.
- Support communities' efforts to obtain and use infor-mation technologies, including broadband connectivity.

In the area of **Leadership and Community Involvement**, the University of Arkansas Division of Agriculture has worked to:

- Provide leadership education for youth and adults.
- Assist local coalitions to develop and implement strategic plans.
- Work with communities and leaders to create environments that encourage innovation.
- Teach citizen involvement to enhance the vitality of Arkansas communities and regions.
- Engage diverse and under-served populations in civic involvement.
- Provide science--based information and education about public issues.

In the area of **Quality of Life**, THE U OF A DIVISION OF AGRICULTURE WILL:

- Provide tools to help communities evaluate and enhance their quality of life assets and opportunities.
- Assist communities in quality of life marketing to targeted audiences.

In the area of **Population Composition and Change**, the University of Arkansas Division of Agriculture has worked to:

- Inform policymakers and community leaders of pertinent population trends.
- Deliver programs that help leaders anticipate impacts of population changes.
- Develop and deliver programs for specific population groups based on demographic changes.
- Help Arkansans understand and address opportunities and challenges of the rural/urban interface.

2. Brief description of the target audience

- Producers - Small, large, limited resource, retirement, and other
- Non-Farm Private Landowners
- Businesses - Industry, small, large, rural, urban, consultants, and other
- Elected Officials - City, county, state, and federal
- Unelected and emerging leaders
- Organizations - Civic, community, producer, consumer, nonprofit and other
- Government Personnel - Public agencies and administrators, and other
- Voters
- Research, Extension and teaching professionals
- Educators
- General Public
- Youth

3. How was eXtension used?

Use of eXtension varied depending on program and research needs of faculty and staff members. Several faculty members are members of one or more communities of practives (CoP). The portal was accessed periodically to see if information had been shared by others that could be used for a particular project. Faculty and staff also participated in webinars directly linked to or affiliated with eXtension, such as those offered on regional and local food systems. They have also promoted webinars that might be of interest to internal or external clientele through social media and email. The National Agricultural Law Center (NALC) serves as the lead institution for the Agricultural & Food Law Community of Practice; therefore, in that capacity, University of Arkansas faculty (where NALC is housed) developed and posted content and conducted several webinars on topics such as animal confinement laws, application of the Clean Water Act to agriculture, federal crop insurance and the farm bill. These webinars have been well-attended and have reached a diverse audience of policymakers, Cooperative Extension Service professionals, attorneys, and others. In addition, several grant applications submitted by faculty have included an eXtension component. Examples include Native American agricultural and food law resources, agritourism and landowner liability issues, equine boarding stable contracts, and estate planning. The NALC has brought the Agricultural & Food Law Consortium members into the CoP leadership, to help review new content, ensure quality, and encourage the publication of new articles and content.

V(E). Planned Program (Outputs)

1. Standard output measures

2014	Direct Contacts Adults	Indirect Contacts Adults	Direct Contacts Youth	Indirect Contacts Youth
Actual	79198	25647	3737	1809

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

Patent Applications Submitted

Year:	2014
Actual:	0

Patents listed

3. Publications (Standard General Output Measure)

Number of Peer Reviewed Publications

2014	Extension	Research	Total
Actual	11	0	0

V(F). State Defined Outputs

Output Target

Output #1

Output Measure

- Number of clientele contacts resulting from education classes, workshops, group discussions, one-on-one interventions, demonstrations, and other educational methods

Year	Actual
2014	40395

Output #2

Output Measure

- Number of educational materials, curricula, newsletters, web-based modules and fact sheets developed, produced and delivered

Year	Actual
2014	4328

Output #3

Output Measure

- Number of grants and dollars generated by grant and contract development efforts

Year	Actual
2014	1347223

Output #4

Output Measure

- Number of issue groups formed
  Not reporting on this Output for this Annual Report

Output #5

Output Measure

- Number of organized watershed groups
  Not reporting on this Output for this Annual Report

Output #6

Output Measure

- Number of public meetings held for issue and watershed groups

Year	Actual
2014	19

V(G). State Defined Outcomes

V. State Defined Outcomes Table of Content

O. No.	OUTCOME NAME
1	Number of participants (youth and adult) who report conducting programs, community service projects, adopting new skills or accepting new leadership roles as a result of leadership development education programs
2	Estimated dollar value of program support volunteers (includes: EH; 4-H, Master Gardeners; Leadership students, etc.)
3	Total annual revenue generated by active APAC business clients
4	Number who indicate a change in behavior, based on lessons learned from Community & Economic Development programs
5	Number who indicate new knowledge gained based on lessons learned from Community & Economic Development programs
6	Number of Tax Preparers certified through Tax Schools
7	Number of floodplain managers certified
8	Number of citizens participating in ballot issues education who indicate an intent vote
9	Number of community actions taken as a result of participating in a Breakthrough Solutions program
10	Number of policy actions taken as a result of civic engagement

Outcome #1

1. Outcome Measures

Number of participants (youth and adult) who report conducting programs, community service projects, adopting new skills or accepting new leadership roles as a result of leadership development education programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	395

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
When the Land Grant Colleges were formed, they were called "people's colleges" because they provided practical education for a broad spectrum of people. This included a commitment to teaching people information about particular technical subjects, as well as the leadership and organizational skills to get things done in their communities and improve their quality of life.

What has been done
Lead Arkansas (LeadAR) is a two year life-changing event for emerging Arkansas leaders from rural and urban communities. Our goal is to increase participants' knowledge and understanding of the economic and social changes affecting our state through the practical application of leadership skills and development of expertise to address critical problems facing their communities.

Results
Several members of LeadAR Class 16 completed service projects in 2014. Projects included: creation of a high school leadership program; development of an online community resource directory; solicitation of funding to purchase city street signs; securing an agreement with a state agency to improve policies and procedures regarding foster youth; creation of an elementary school science center; funding and installation of a city welcome sign; expansion of a U. S. National Committee of United Nations Women chapter; free income tax assistance program; creation of a temporary homeless shelter; establishment of an historical school restoration committee; and implementation of a "No Place for Hate" program in two schools.

4. Associated Knowledge Areas

KA Code	Knowledge Area

608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #2

1. Outcome Measures

Estimated dollar value of program support volunteers (includes: EH; 4-H, Master Gardeners; Leadership students, etc.)

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	15008739

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
In Arkansas, 21.8% of residents volunteer. With 21.5% of volunteers being over the age of 55. In Howard County, volunteers are vital to Extension programs. They assist in conducting programs and fundraising.

What has been done
County Extension Agents provide leader training, serve as advisors and support volunteers in conducting community projects. In Howard County, agents organized an area leadership conference for Extension Homemakers; worked with Master Gardeners to plan a pre-conference educational tour for the State Master Gardeners meeting; and shared volunteer opportunities to assist with 4-H activities, school programs, fundraising and other community needs.

Results
Volunteers in Howard County have responded positively with over 5600 volunteer hours reported, valued at $125,978. They completed 29 community service projects and collected over $30,000 in grants and donations to conduct educational programs. They conducted 20 Farmers Market Days with educational programs, assisted with 17 educational programs, and provided 17 Leadership training opportunities for others in the county.

4. Associated Knowledge Areas

KA Code	Knowledge Area
607	Consumer Economics

608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

Outcome #3

1. Outcome Measures

Total annual revenue generated by active APAC business clients

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Condition Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	28894239

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Changes in the economy, technology, and population continue to transform communities, the economic climate and the lives of Arkansans. While urban areas in Arkansas have mostly recovered from the Great Recession, rural areas have been slower to rebound. In a constantly changing economic environment, it is important for businesses to be able to identify and access new market opportunities.

What has been done
The Arkansas Procurement Assistance Center (APAC) is operated by the University of Arkansas System, Division of Agriculture, Cooperative Extension Service under a Cooperative Agreement from the Department of Defense (DOD) through a program administered by the Defense Logistics Agency (DLA). The purpose of the program is to generate employment and to improve the general economy of a locality by assisting business firms in obtaining and performing under federal, state and local government contracts.

Results
In Program Year 2014, APAC personnel had 989 individual counseling sessions with clientele. They held 43 events, such as presentations, meetings workshops and exhibits, where they had direct interaction with 968 people. During this period APAC clients reported receiving 510 awards valued at nearly $28.9 million in government contracts, making a significant economic contribution to Arkansas communities and the state.

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development

Outcome #4

1. Outcome Measures

Number who indicate a change in behavior, based on lessons learned from Community & Economic Development programs

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	1798

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
608	Community Resource Planning and Development
803	Sociological and Technological Change Affecting Individuals, Families, and Communities
806	Youth Development

Outcome #5

1. Outcome Measures

Number who indicate new knowledge gained based on lessons learned from Community & Economic Development programs

2. Associated Institution Types

- 1862 Extension
- 1862 Research

3a. Outcome Type:

Change in Knowledge Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	12959

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation
607	Consumer Economics
608	Community Resource Planning and Development
610	Domestic Policy Analysis
806	Youth Development

Outcome #6

1. Outcome Measures

Number of Tax Preparers certified through Tax Schools

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	365

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
602	Business Management, Finance, and Taxation

Outcome #7

1. Outcome Measures

Number of floodplain managers certified

Not Reporting on this Outcome Measure

Outcome #8

1. Outcome Measures

Number of citizens participating in ballot issues education who indicate an intent vote

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual
2014	350

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)

What has been done

Results

4. Associated Knowledge Areas

KA Code	Knowledge Area
610	Domestic Policy Analysis

Outcome #9

1. Outcome Measures

Number of community actions taken as a result of participating in a Breakthrough Solutions program

Not Reporting on this Outcome Measure

Outcome #10

1. Outcome Measures

Number of policy actions taken as a result of civic engagement

2. Associated Institution Types

- 1862 Extension

3a. Outcome Type:

Change in Action Outcome Measure

3b. Quantitative Outcome

Year	Actual

2014 1

3c. Qualitative Outcome or Impact Statement

Issue (Who cares and Why)
Lake Maumelle is a valuable resource for Pulaski County. The lake is a source of drinking water for nearly 400,000 Central Arkansans. County residents are concerned about the lake's future water quality, encroachment of city development, maintenance of stream corridors and buffers, and land owner property rights. The watershed area was subject to the county's first zoning codes, which were controversial.

What has been done
The Lake Maumelle Watershed Task Force was an independent group of Pulaski County residents formed to review a county zoning ordinance. Quorum Court members asked UA Division of Agriculture staff to facilitate task force meetings over a one-year period. The group recommended changes to the zoning code involving stream buffers, conditional use permits, rezoning requests, and definitions of land use practices. The group also agreed to ask the highway department to change hazardous liquid transmission policies in the watershed.

Results
The Pulaski County Quorum Court in August 2014 unanimously adopted changes to the Lake Maumelle Watershed zoning code after a year of work by the task force, whose 31 members spent a combined 3,481 hours researching and deliberating suggested changes. These volunteer hours are valued at $77,080 based on per hour estimates utilized by the Arkansas Division of Community Service and Nonprofit Support.

4. Associated Knowledge Areas

KA Code	Knowledge Area
112	Watershed Protection and Management
608	Community Resource Planning and Development
610	Domestic Policy Analysis
803	Sociological and Technological Change Affecting Individuals, Families, and Communities

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
- Populations changes (immigration, new cultural groupings, etc.)
- Other (Conflicting inter-state policies)

Brief Explanation

Funding concerns limited our inability to replace staff members who left the organization for retirement or other reasons. This is the only external factor with any significant impact on outcomes.

V(I). Planned Program (Evaluation Studies)

Evaluation Results

A variety of methods were used to evaluate programs including the use of advisory groups, participant questionnaires, pre-and post-tests, interviews with program participants, required reporting mechanisms and informal feedback. Examples of evaluation results in 2014 include:

- Ten out of 21 LeadAR Class 16 reported completing service projects to give back to their communities in 2014.
- Nearly 1,800 program participants reported a change in behavior as a result of programs including implementing new strategies, tools, or technology; initiating programs and activities that reflect participation by a broad base of stakeholders; initiating collaborative activities; developing, adopting or implementing plans; or taking other actions.
- Nearly 13,000 program participants reported gaining knowledge, understanding, awareness, or skills as a result of our programs.

Key Items of Evaluation

Arkansas Procurement Assistance Center clients are required to submit monthly online activity reports indicating whether they receive any government contracts. This information is used to track contract dollars received and jobs created or retained. An annual customer satisfaction survey is also conducted. in 2014 clients reported 510 awards valued at just under $28.9 million with an estimated 578 jobs created and/or retained.

VI. National Outcomes and Indicators

1. NIFA Selected Outcomes and Indicators

Childhood Obesity (Outcome 1, Indicator 1.c)	
15139	Number of children and youth who reported eating more of healthy foods.
Climate Change (Outcome 1, Indicator 4)	
0	Number of new crop varieties, animal breeds, and genotypes whit climate adaptive traits.
Global Food Security and Hunger (Outcome 1, Indicator 4.a)	
7479	Number of participants adopting best practices and technologies resulting in increased yield, reduced inputs, increased efficiency, increased economic return, and/or conservation of resources.
Global Food Security and Hunger (Outcome 2, Indicator 1)	
2	Number of new or improved innovations developed for food enterprises.
Food Safety (Outcome 1, Indicator 1)	
1	Number of viable technologies developed or modified for the detection and
Sustainable Energy (Outcome 3, Indicator 2)	
0	Number of farmers who adopted a dedicated bioenergy crop
Sustainable Energy (Outcome 3, Indicator 4)	
0	Tons of feedstocks delivered.